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IUFRO World Series Vol. 32 – Forests under pressure – Local responses to global issues

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Editors:
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Glenn Galloway
Wil de Jong
Pablo Pacheco
Gerardo Mery

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Preface

Forests under Pressure – Local Responses to Global Issues is the third major publication produced by the Special Project World Forests, Society and Environment (WFSE) of the International Union of Forest Research Organizations (IUFRO). The two previous volumes are *Forests in Global Balance: Changing Paradigms* (Mery et al. 2005) and *Forests and Society – Responding to Global Drivers of Change* (Mery et al. 2010).*

IUFRO-WFSE is an open, independent network of scientists and practitioners steered by 10 international research organisations, involving more than 100 researchers from throughout the world. It supports sustainable natural resources management, sustainable development and livelihoods, and related policy processes, focusing principally in two main efforts: 1) collating, critically analysing, and synthesising existing scientific knowledge on topics of international relevance in the forest, society, and environment interface in order to draw out important lessons learned and recommendations and 2) undertaking new research to fill in crucial gaps in existing knowledge. WFSE addresses these topics in a cross-sectoral, holistic, and interdisciplinary fashion, encouraging innovative approaches and anticipating what will influence future forest-related development at different scales, from local to global.

The idea to produce this book originated from discussions in the IUFRO-WFSE Steering Committee (SC) meetings in Vienna (2011) and Helsinki (2012). The SC concluded that, despite the considerable attention devoted to advancing sustainable forest management (SFM), increased understanding of the aspects that foster or hinder progress towards SFM is needed. The sustainable management of natural resources, especially forests, is of vital importance to global, regional, and national efforts to achieve sustainable development and should play a key role in efforts to mitigate and adapt to climate change and further low-carbon development.

The goal of this book, therefore, is to increase the understanding of the conditions and combinations of conditions that foster or hinder progress towards SFM and forest-related sustainable development. The book focuses on these conditions at the local level and also includes processes and influences originating at broader national and global scales. The book is divided into four parts: Part I introduces the rationale, overall structure, and analytical framework of the book; Part II consists of 27 local- and regional-level case studies from different parts of the world; Part III presents a synthesis of the case studies and the main findings derived from an analysis across the cases; Part IV is forward-looking and discusses several of the issues and findings from Parts II and III in the context of future outlooks and scenarios. We hope that this publication provides invaluable insights that may help advance SFM and forest-related livelihoods in different parts of the world.

Acknowledgements

This book is the product of collaborative work of 144 scientists and experts from IUFRO-WFSE partner organisations and other universities and research organisations who acted as authors in different capacities. Many of them contributed to this book on their own time, in addition to their primary duties and responsibilities. We sincerely thank all of them for the quality of their contributions, commitment, and outstanding efforts that made this publication possible.

The case study chapters of Part II and the chapters of Part IV were reviewed by renowned scientists and experts. Part III, which presents a synthesis of the case studies and the results of an analysis across the cases, was reviewed by the convening lead authors of the case study chapters. We especially acknowledge the crucial role of external reviewers of the different chapters of this book and offer our profound thanks for their generous contributions, which undoubtedly improved the quality of this publication.

* Mery, G., Alfaro, R., Kanninen, M. & Lobovikov, M. (eds.). 2005. Forests in the global balance – Changing paradigms. IUFRO World Series volume 17. Vienna. 318 p.
Mery, M., Katila, P., Galloway, G., Alfaro, R., Kanninen, M., Lobovikov, M. & Varjo, J. (eds.). 2010. Forests and society – Responding to global drivers of change. IUFRO World Series volume 25. Vienna. 509 p.

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A workshop held in Helsinki (2012) brought together the majority of the convening lead authors of the different chapters of the book and formally initiated the development of the book. It was followed by a series of smaller meetings and workshops that focused on specific parts or chapters. We are particularly grateful to CATIE, CIFOR, CIRAD, FAO, Metla, University of Florida, and Tropenbos International for hosting these events.

Furthermore we would like to thank the members of the IUFRO-WFSE Steering Committee for support and guidance to our efforts, as well as the IUFRO Secretariat for supporting our work.

We are grateful to Ree Sheck for language editing and guidance in the technical editing and to Seppo Oja for designing and preparing the layout of this publication. In addition, we thank Pablo Quiñónes Montiel, Tuuli Somerma, and Leena Kettunen for assistance with editorial tasks. Finally, we want to express our appreciation to all other people and organisations that have contributed to this publication in one way or another, including the countless community members, foresters, private sector representatives, and policy-makers who have played an active role in the initiatives represented in the case studies and who were willing to share their perspectives and experiences with the case study authors.

The editors

Pia Katila, *Glenn Galloway*, *Wil de Jong*,
Pablo Pacheco, *Gerardo Mery*

Contents

IN MEMORIAM

Matti Palo, founder of the research project World Forests, Society and Environment, died in a car accident in February 2014. He was the professor of forest economics and an active researcher in the Finnish Forest Research Institute (METLA), where he worked for about four decades, until his retirement in 2003. He is renowned for his work in the field of forest economics and international forest policy. He founded the World Forests, Society and Environment (WFSE) project in 1996 as a joint initiative with METLA, the European Forest Institute (EFI), and the United Nations University (UNU). Palo was the director of WFSE until 2001, when WFSE became a special project of the International Union of Forest Research Organizations (IUFRO).

Under his leadership, WFSE produced five books and achieved wide international recognition. The current IUFRO-WFSE builds on the foundation he laid. Palo emphasised the need to develop innovative research, and to focus particular attention on the intricate relations between forests, society, and the environment. He also saw the need to address these issues from a broad, interdisciplinary perspective. Palo participated actively in international scientific and policy fora and discussions and was among the pioneers in modelling the issues related to deforestation in the tropics. Always full of energy and innovative ideas, he was passionate about his work. Palo had a strong international orientation throughout his career. He served as a professor of forest economics at the Royal Veterinary and Agricultural University KVL, Copenhagen, Denmark, and lectured about forest economics, international forest development, and environmental politics at the University of Helsinki and the University of Eastern Finland, where he was an adjunct professor. In Costa Rica, he taught at CATIE (Tropical Agricultural Research and Higher Education Center) and the United Nations University for Peace. During his long career, he also worked as a consultant for FAO in Asia and Africa and as a visiting professor at Seoul National University in South Korea. Palo continued to work actively in international forest policy research after retirement, until the last day.

As WFSE colleagues of Matti Palo, we express our profound sense of loss at his passing and our recognition of and lasting gratitude for his invaluable contributions to forest research, and to our project.

Gerardo Mery, *Pia Katila*, and *Sinikka Västilä*

PART I

INTRODUCTION

Glenn Galloway, Pia Katila, Wil de Jong, and Pablo Pacheco

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PART I – Chapter 1

Introduction

The present book *Forests under Pressure: Local Responses to Global Issues* is the third volume produced by the International Union of Forest Research Organizations' Special Project World Forests, Society, and Environment (IUFRO-WFSE). The two previous volumes are: *Forests and Society – Responding to Global Drivers of Change* (Mery et al. 2010) and *Forests in Global Balance: Changing Paradigms* (Mery et al. 2005).

This volume is divided into four parts. Within each part there are a number of chapters. Part I introduces the overall structure of this volume and provides an introduction to Part II, which consists of local- and regional-level case studies. Part III presents a synthesis of the case studies, drawing on their findings and important processes within individual cases. Part IV is forward-looking and discusses several of the issues and findings from Parts II and III in the context of future outlooks and scenarios.

In many parts of the world, forests and forestry are undergoing far-reaching changes. Indeed forests are under pressures that threaten the sustainable provision of forest-based goods and services. These pressures and the drivers of change affecting forests and forestry were the focus of the two previous WFSE volumes and are briefly summarised in Part I, chapter 2. Also, in the previous two WFSE volumes, valuable insights were compiled and presented as key messages to aid decision-makers and their advisors in order to foster sustainable forest management (SFM) and enhance forestry contributions to livelihoods, well-being, and sustainable development.

To date, general principles and recommendations provided in numerous publications and by various processes and organisations have not led to sufficient changes at the local level. In recognition of this crucial problem, this volume focuses on local- and regional-level initiatives from different parts of world to shed light on the prerequisite conditions (PC) and combinations of these conditions that seem to foster SFM and forest-related sustainable development at the local level, including processes and influences originating at broader national and global scales.

This volume maintains that sustainable management of natural resources, especially forests, is of vital importance to global, regional, and national efforts to achieve sustainable development and should play a key role in efforts to mitigate and adapt to climate change and further low carbon development. In addition, an underlying premise is that there is no universally agreed upon definition of SFM and that SFM incorporates diverse understandings, values, and interests that change over time in response to dynamic and evolving needs of society. In general SFM aims to maintain and enhance economic, social, and environmental values of all types of forests for the benefit of present and future generations (UN 2007). Endeavours to further SFM often imply trade-offs between the provision of different goods and services and a wide array of diverse, often conflicting, interests having important effects on the distribution of these goods and services (for discussion on the sustainable management of tropical forests, see Part IV, chapter 2).

SFM has become the general guiding principle among the international forestry community. Numerous development programs, projects, and initiatives implemented by governments, non-governmental organisations, and donor agencies have aimed at instituting this principle in an effort to increase the contribution of forestry to livelihoods, local development, and conservation. Moving towards SFM has involved undertaking important policy reforms and institutional changes not only in the forest sector but also in other sectors (e.g. land tenure, economic policy). The outcomes of these efforts have varied greatly. In many locations unsustainable practices prevail, while in others, different stakeholders have managed to develop and/or sustain management regimes and activities that support the sustainable use of forest resources with contributions to people's livelihoods, rural development, and provision of ecological services.

Major research efforts have been directed to further increase the understanding of the different issues and conditions that directly or indirectly affect how natural resources are used and managed and consequent outcomes. This understanding is crucial for developing policies and approaches to foster sustainable resource management in the face of the drivers of change that threaten forests and forest-related livelihoods in many regions of the world. The past decades of forestry research and practical experiences have yielded important insights into how forest management is influenced by multiple external factors linked to different dimensions and operating at several scales, from local to global. Analysts have proposed a variety of general frameworks, models,

and theories that link social, economic, cultural, political, environmental, and biophysical conditions with the approaches employed by different actors to access and manage forests and show how forests respond to external influences and the resulting trade-offs. A brief overview of the existing knowledge on these linkages is presented in Part I, chapter 3.

The analytical framework or "lens" for this book is presented in Part I, chapter 4. The development of this framework drew on lessons learned in previous WFSE volumes and other key sources. Its use encouraged case analysis from a holistic perspective, focusing attention on the prerequisite conditions and combinations of conditions that seem to foster progress towards SFM and sustainable local development. The analytical framework not only guided the preparation of the case studies but also served to structure the development of the synthesis of case studies.

Part II of this book consists of 27 case studies applying the aforementioned analytical framework. The case studies focus on areas where considerable efforts have been undertaken to further SFM and sustainable forest-related local development. While most focus on the local level and the interaction between policies and practices at that level, some cases embody processes occurring at broader scales, such as at regional or national levels. With regards to the prerequisite conditions included in the analytical framework, beyond their presence or absence, authors were also requested to focus attention on interaction among them to foster or constrain SFM. One of the book's main objectives is to learn from the array of local experiences and extract lessons to boost progress towards SFM, implying greater contributions to livelihoods and well-being, local rural development, and conservation of forests goods and services. These outcomes are crucial to efforts seeking to mitigate the impacts of global economic shocks and climate change.

Part III presents a synthesis and comparative analyses of the case studies. It begins with a concise summary of the findings from the case study analyses, including reflections on important implications of these findings for future efforts seeking to further progress towards SFM (Part III, chapter 1). It then presents a more comprehensive synthesis of the cases, first from the perspective of the primary outcomes of interest of SFM – the contribution of forests to livelihoods, and to forest extent and condition – and then analysing each prerequisite condition included in the analytical framework across the cases (Part III, chapters 2 and 3). Following the across-cases analyses, chapter 4 of Part III directs attention to interactions among prerequisite conditions within the case studies. This section makes it clear that measures taken for each prerequisite condition do not act in isolation, rather, outcomes depend on complex interactions among them. In this section, attention also focuses on the influences of regional/global processes on forest-related policies and behaviour in the cases studied, demonstrating that forces/inputs influencing conditions for SFM originate from different scales, from global to local. Part III ends with a short section on methodological and analytical considerations, especially in relation to the availability and quality of information (Part III, chapter 5).

Part IV focuses on the future of several of the issues and insights discussed in Parts II and III. Part IV, chapter 2 explores the evolution of the SFM concept over the past decades and how it might evolve in coming years. This is an important issue since it will also influence the strategies required to achieve SFM, which are at least partially conditional on our shared understanding of SFM. Part IV, chapter 3 then applies an analytical exercise deemed to be "forward looking," an evolving academic discipline finding applicability in forest sciences. One important option of forward looking is the development of future scenarios, relying primarily on expert knowledge rather than on statistical models. By using so-called multi-scale scenarios, forward -looking exercises can draw on expertise from multiple stakeholders, including rural communities, small and medium forest holders, corporations, administrators, and policy-makers, thereby adding to the value and bolstering the legitimacy of scenarios for multiple purposes, including forest policy formulation. Forward looking can also be done more specifically by anticipating trends in the prerequisite conditions that contribute to SFM. Part IV, chapter 3 summarises the various FAO Outlook Studies to anticipate future trends in the prerequisite conditions included in the analytical framework. The last chapter of Part IV (chapter 4), tries to show how the prerequisite conditions for SFM might evolve under different Shared Socio-economic Pathways that are one component of a new round of climate scenarios, focusing primarily on socio-economic conditions.

Forests under pressure

Forests account for about one-third of the total land area of the world (FAO 2010). Throughout human history, forests have been essential for human well-being and currently contribute to the livelihoods of an estimated 1.6 billion people worldwide (World Bank 2004). Forest resources are especially important for the poor, contributing directly to the livelihoods of 90% of those living with less than USD 1/day. Forests contribute to livelihoods by providing subsistence goods and income from the sale of forest products, inputs to agriculture, and income from employment. In addition to tangible wood and non-wood forests products, forest ecosystems provide a range of services at local, regional, and global levels, including flood control, air filtration, soil stabilisation, and climate regulation. Forests also provide habitat for about two-thirds of the world's known terrestrial species. The world's forests store a large amount of carbon and it has been estimated that they account for a large proportion of the world's land-based carbon uptake (Pan et al. 2011).

While sustainable management, planting, and rehabilitation of forests can sustain or increase forest-based ecosystem services, deforestation, degradation, and poor forest management reduce their provision. In many regions of the world, forests and forestry in general are undergoing far-reaching changes that threaten the sustainable provision of forest-based goods and services. During the past decade about 13 million ha of forest at the global level have been converted annually to other land uses or lost through natural causes (FAO 2010). Deforestation, mainly due to conversion of forests to agricultural land, shows signs of decreasing in several countries but continues at an alarmingly high rate in others. Agricultural expansion, mainly large-scale crop plantations, are the main direct cause leading to forest conversion in the tropics (Chomitz 2007, Rudel et al. 2009, Pacheco et al. 2011), along with forest conversion to cattle ranching in the Amazon (Margulis 2004 and Figure I 2.1). Additional pressures originating in other economic sectors include such activities as biofuel development and mining. Several underlying drivers prompting forest change originate from human activities and include climate change, population growth and urbanisation, associated changes in values and consumption patterns, and globalisation of trade, finance, and investments (Geits and Lambin 2002).

By 2050, the world population is projected to exceed nine billion and the proportion of urban dwellers is likely to be 70%. Nearly all population growth will take place in developing countries. At the same time, incomes will rise (UN 2009). With increasing population and incomes, the global demand for food, feed, fibre, and energy will also increase. Without improved agricultural productivity, rising food demand alone will perpetuate deforestation. Rising incomes in developing countries, especially in emerging economies, will also increase the consumption of some products, such as livestock products and coffee, which require large extensions of land, further increasing pressure on arable lands now under forests (Gerbens-Leerns and Nonhebel 2005).

In coming years, the world's energy consumption is expected to increase dramatically, particularly in Asia, which will place additional pressure on forests. While fossil fuels will account for most of the increased energy supply, renewable sources of energy will gain importance (FAO 2008). There is great variation in the role of wood as a source of energy in different regions of the world. Many developing countries rely heavily on fuelwood and charcoal for energy, and the consumption of fuelwood is expected to grow due to population growth, especially in Africa (FAO 2008). High fossil fuel prices, energy security concerns, and climate mitigation policies in developed countries aimed at replacing fossil fuels with renewable energy have led to rapidly increasing production of biofuels. Policy promoting the use of renewable energy, particularly biofuels, to meet the energy needs of the transport sector has accelerated the demand for some energy crops, with some likely direct and indirect effects on forest conversion in the tropics (Timilsina and Shrestha 2010). Production of biofuels has tripled since 2000 and is projected to double again within the next decade (FAO 2009). Increasing biofuel production can lead to deforestation directly when forests are cleared for biofuel crops or indirectly when other agricultural crops are replaced by biofuels, thus displacing crops or livestock into forest areas (Gao et al. 2011).

The pressures on forestlands in many countries of Africa, Asia, and South America are seen augmenting due to the rapid increase in demand by foreign and domestic investors for land suitable for producing food and energy crops (IFAD 2009). For example, between 2004 and 2009 the land area transferred to

Figure I 2.1 Forest cleared for agriculture in Mato Grosso, Brazil. ©Grid-Arendal/Riccardo Pravettoni (http://www.grida.no/photolib/detail/cleared-land-in-the-amazon-jungle-brazil_65e5)

investors amounted to 2.7 million ha in Mozambique, 4 million ha in Sudan, and 1.6 million ha in Liberia (Deininger and Byerlee 2011). It has been estimated that during the past five years, international investors have acquired about 50–80 million ha of land in middle- and low-income countries, through either purchases or lease agreements, mostly for the development of large-scale crop plantations (HLEP 2011). Zagema (2011) has estimated that 227 million ha of land have been sold or leased since 2011, mostly to international investors. While there is not enough information about where these land deals are located, it is assumed that a portion of them are forestlands that could fall prey to agricultural expansion.

Growing urban centres and infrastructure development (roads, mines, dams, etc.) increase pressure on forests in many regions of the world. For example, today the majority of the Amazonian population lives in urban areas. Expanding road networks facilitate access to previously remote forest areas and expand opportunities for commercial utilisation of land and forest resources and/or the conversion of forest to agriculture (de Jong et al. 2010a). In addition, growing urban populations also imply higher consumption demands for supply originated in forestlands converted to agriculture in order to meet such growing demand (DeFries et al. 2010). Furthermore, oil and gas exploration and exploitation and expanding mining concessions contribute to deforestation and are a source of forest-related conflicts both in developing and developed countries (Figure I 2.2). Increasingly, urban population will also value forests for amenity purposes and recreation, raising pressures to reserve forests for recreation, especially near urban areas (Hägerhäll et al. 2010).

Climate change is already affecting forest ecosystems and the services they provide and these effects will increase in the future. Under most Intergovernmental Panel on Climate Change (IPCC) climate-change scenarios, climate change is projected to alter the distribution of forest types and tree species in all biomes; however, the nature and magnitude as well as their socio-economic and environmental implications vary. In some regions, forest productivity is expected to rise for some decades, however, ultimately, in most areas productivity is expected to decline (Alfaro et al. 2014). Disturbances associated with climate change, such as floods, droughts, wildfires, and pest outbreaks, can lead to further changes in forest ecosystems (Seppälä et al. 2009, Alfaro et al. 2010). Climate change will also indirectly affect forestry by changing the production possibilities and yields of agricultural crops. Although there will be gains in some agricultural crops in some regions of

Figure I 2.2 The search for minerals and the subsequent road constructions are often the first steps for deforestation as is occurring here in the province of Riau in Sumatra, Indonesia.
©Grid-Arendal/Peter Prokosch (http://www.grida.no/photolib/detail/rainforest-in-sumatra-indonesia_aa2c)

the world, the overall impact of climate change on agriculture is expected to be negative (Nelson et al. 2009) and could thus increase land demand for agriculture and shift production to new areas.

Increasing global demand for and trade in forest and agricultural products can have important ramifications at regional and local levels, affecting forest industries, local livelihoods and forests. As already mentioned, global trade may expand the market opportunities for commodity crops that may be produced at the expense of forestlands, either targeting conventional food export markets or expanding biofuel markets. Large-scale agricultural investment often follows market opportunities, in many cases favouring the expansion of mono-crop plantations, mainly soybeans and oil palms (HLPE 2011). In addition, expansion of timber trade tends to prompt timber extraction, often using unsustainable logging practices. Both, global agricultural and timber trade have contributed to deforestation and forest degradation, especially when illegality and poor institutional capacity have resulted in unsustainable practices (Galloway et al. 2010).

It is noteworthy that the sources and intensity of the various pressures on forests differ between regions and countries, but are affecting the sustainability of forests and forest ecosystem services in all parts of the world, with differential effects on people's livelihoods and economic development across regions. Nonetheless, the impacts of the drivers of change on forests and forest-dependent people are, and will continue to be, most severe in less-developed regions where the pressures on forest are most urgent and where people lack adaptive capacity due to poverty and political and institutional marginalisation. The impacts resulting from those changes tend also to affect the rural poor most severely, including smallholders and communities whose livelihoods depend to a large degree on forest resources. In many cases, a handful of companies and corporations tend to benefit most from forest intervention and conversion due to unequal social distribution of economic benefits. The drivers of change affecting forests and forest-dependent people cut across different scales, from global to local and vice versa. Global processes can directly affect the resilience and sustainability of forests and socio-cultural systems at the local and regional levels. At the same time, land-use decisions at the local and regional levels contribute in a cumulative fashion across time and space to global environmental, social, and economic sustainability, or lack thereof.

Sustainable management and conservation of the world's remaining forests is essential for the continuous provision of forest-based products and ecosystem services. With climate change and the crucial role that forests have in global climate regulation, the need to sustain forests is greater than ever.

PART I – Chapter 3

Derivation of the analytical framework

3.1 Revisiting current analytical perspectives

Various concepts, models, and theoretical frameworks have guided the extensive literature that addresses natural resource management and the use and conservation of these resources as well as the diverse governance modes that are in use to steer resource use and management. These approaches have directed attention to different dimensions of governance and human-environment interactions. A brief summary of this literature is presented here, structured around the main themes that feature predominantly in the existing literature.

3.1.1 Tenure and property rights

Land and forest tenure and property rights to forests and trees have received increasing attention as crucial social institutions that define access, use, and management options for natural resources. Tenure regimes have been broadly classified into private, state, and common-property regimes, while under open access, there are no property rights and no defined group of users or owners. Situations resembling open access arise when the state does not impose constraints on access or when they are not enforced and unauthorised or illegal use becomes possible (Bromley 1991). Property rights consist of a bundle of rights that include access, withdrawal, management, exclusion, and transfer rights and may relate to different elements or benefit streams of the property. These rights are divided in different ways between the state and other actors. In most tropical countries forest lands are property of the state, and the state can under different mechanisms grant specific rights to single persons and legal entities, for instance families, companies, communities or community organisations. These rights are often conditional, meaning that owners have specific rights, but the state reserves the right to revoke such rights under given circumstances, or the rights have a definite duration. The resulting property regimes are characterised by the distribution of the right bundles between different actors as well as the duration and security of the rights (Schlager and Ostrom 1992). The nature and characteristics of the right bundles influence resource use and management as well as the outcomes for rights holders. They define the options and opportunities to benefit from the resource and thus shape the incentives for sustainable resource management, including investing in, sustaining, and improving the resource (e.g. Ostrom and Schlager 1996, Wiebe and Meinzen-Dick 1998, Deinigner 2003).

Despite the considerable attention devoted to property right regimes and changes in these regimes, conclusive information about the relationship between different regimes and natural resource and livelihood outcomes remains evasive. A recent extensive review of literature on the relationship between tenure and forest cover concludes that "globally, the relationship between tenure regime and forest cover change is mixed and there is no clear evidence to suggest that a specific tenure type will ensure forest conservation" (Aryal and Pokharel 2011, p. 7). However, the review also found that tenure security, including enforcement and monitoring aspects, and local rule-making were strongly related to improved forest cover.

A large body of research has focused on the recent changes in forest tenure, especially the devolution of forest rights to communities and smallholders. Overall, the devolution of forest rights has not always led to the improvements predicted by the property rights theory (Edmunds et al. 2003). Community-based resource management has been shown to result in improved management of natural resources and increased benefits to local actors in some locations (see e.g. Dev et al. 2003 for Nepal and Beaucham and Incram 2011 for Cameroon) but not in others. One explanation is that the devolution polices have not led to substantive changes in decision-making rights and benefit-sharing arrangements (Agrawal and Ostrom 2001, Larson and Dahal 2012). Also, in order to benefit from forests, those who hold rights must also have the capacities, know-how, and technologies necessary for obtaining benefits (Ribot and Peluso 2003), and these are often lacking.

In many countries the legal framework that defines rights to natural resources (constitution, laws, and lower-level regulations) has not been created or developed in a vacuum; instead, it has been overlaid on existing rule structures that are based on customary systems. Diverse customary resource management systems continue to prevail in rural areas

in many countries. For example, while almost all land is formally under government ownership and administration in Africa, de facto land ownership is still dominantly based on customary tenure systems (Alden Wily 2012, Larson and Dahal 2012). More recently, government policies in some countries have instituted forest management built on customary regimes or introduced new management arrangements based on communities or user-groups. However, overlapping statutory and customary land tenure and resource management systems leading to competing claims and conflicts often undermine the security of both systems (Christy et al. 2007).

3.1.2 Common pool resources and collective action

The discourse on forest tenure and devolution of forest rights to local actors is closely related to discourses on common pool resources and collective action. Collective action is needed for developing rule systems to regulate the use of resources, but at the same time the extent to which decision-making and rule-making are formally devolved to local actors is defined by the prevailing rights regime (Meinzen-Dick et al. 2001).

The commons literature has emphasised the role of transaction costs in the success or failure of community-based resource management (Ostrom 1990, Agrawal 2001). Transaction costs include the costs of collaboration (attending meetings, negotiation, and conflict resolution) and costs related to the enforcement of property rights to natural resources, monitoring of resource use, etc. These are further influenced by the characteristics of the resource and the community. It has been argued that perceived or actual transaction costs can often exceed the benefits of collaboration, thus constraining participation and inhibiting successful resource management (Hanna 1995).

Quite extensive research on common-pool resources management has identified a list of principles that facilitate successful collective action and sustainable resource use. These principles relate to the resource users, resource characteristics, and political-institutional environment. More specifically, conditions that have been related to successful management of common-pool resources, such as forests, include, for example, concurrence between the costs of management (investment of time and resources) and benefits received, participation in designing and modifying rules governing resource use and management, accountable system for monitoring resource use, enforceable sanctions for rule violations, and the existence of low-cost conflict resolution mechanisms (Ostrom 1990, 2004).

While these general principles have been understood for some time, the reality today is that in only few occasions have they been successfully applied or, when applied, have resulted in effective positive change. The principles for designing institutions for specific goals have been criticised for neglecting to recognise that they will not be created in an institutional vacuum. Instead these new institutions will be added or embedded into a historically and socially shaped reality where numerous existing institutions operate. This again directs attention to the locally specific situations and circumstances, including existing rules and norms as well as power inequalities, gender issues, and diverse interests of resource users (de Konig 2011).

3.1.3 Regulatory framework and administration

The formal legal and regulatory framework shapes the options to access, use, and benefit from forest resources. Property rights regime is a crucial part of this framework. However, even when property rights to forest resources have been devolved to local communities or households, the entitlement to exercise property rights can be enabled or constrained by administrative arrangements at various scales (Mahanty et al. 2009). In many countries, especially in the tropics, regulatory frameworks have mostly been designed to steer and control the actions of large-scale corporate actors. Lengthy and complicated processes for getting management plans approved, obtaining licences and permits, and formalising community-based organisations can effectively prohibit communities and smallholders from the benefits of sustainable use of forest resources (de Jong et al. 2010b, Pulhin et al. 2010). Regulatory frameworks have also led communities to turn to illegal practices when formal requirements for forest use and management are found too cumbersome or expensive to fulfil (Colchester et al. 2006). In addition, the lack of implementation and enforcement, illegalities, and corruption undermine forest administration and the effectiveness of the regulatory framework, having important effects on forests, local livelihoods, and local development (Tacconi 2007).

It has also been widely acknowledged that cross-scale and cross-sectorial linkages influence forestry development and forest sustainability. Often, the strongest drivers of forest change originate from outside the forest sector (Galloway et al. 2010). Government policies have an important role in defining whether the regulatory environment enables, encourages, and facilitates collective action and sustainable use of forest resources.

Figure I 3.1 Observing wildlife, Chitwan National Park, Nepal. Ecotourism has in some areas contributed to conservation and provided income to local communities. ©Grid-Arendal/Peter Prokosch (http://www.grida.no/photolib/detail/observing-wildlife-chitwan-national-park-nepal_66a7#)

3.1.4 Economic, social and cultural issues

Forests have long been recognised to contribute to rural livelihoods. People living in forest environments harvest forest products for daily consumption. Many also commonly trade forest products in markets to augment their cash income. The absolute contribution of forests to the overall income varies substantially. According to study that covered 24 developing countries the average share of forest income in total household income is about 22% (Angelsen 2014). Proponents of the possibility of deriving more income maintain that a the contribution to total income (monetary and non-monetary) suggests the scope to boost that proportion by increasing production, developing new value chains, and enhancing the benefits producers of primary forest products capture.

More recently, payments for environmental services (PES), especially for carbon sequestration and storage (REDD+), have been expected to hold great potential for providing monetary benefits to small-scale farmers and communities living in and around forests by compensating them for the environmental services that they produce through conservation or sustainable use of forest resources. To date, however, these expected benefits have not been realised to the degree envisioned, and instances where the local actors have benefitted from PES are mainly limited to specific projects and a few wider government programs (Milder et al. 2010, Tacconi et al. 2013). Institutional aspects, especially tenure and collective-choice institutions, and contractual issues of PES schemes have been found to be crucial in mediating both resource and livelihood outcomes of these schemes (Tacconi et al. 2013). Similarly, developing tourism – ecotourism in particular – has been seen as a way to integrate conservation with the provision of alternative income sources to local actors (Figure I 3.1). The success of these efforts has also been limited. The natural resource and livelihood impacts vary greatly and are location specific, depending not only on the attractiveness of the natural resource but also institutional, social, and economic issues, and the quality of services provided (Sakata and Prideaux 2013).

There are, however, arguments against the forest income-improvement model. Some key issues are 1) the poor competitiveness of forest products, for which often more attractive alternatives exists; 2) important local differences in forest dependency and total forest incomes, with subsequent limitations of those in the lower-income groups to benefit from new forest-related economic opportunities; and 3) limited opportunities to expand forest-based economic activities beyond the forestry sector, resulting in the syndrome of the forestry trap (Sunderlin et al. 2005). Commentators have observed that communi-

ty-forestry support initiatives will only contribute to significant changes if they focus on high value forest products with an established national or international value chain (Pokorny et al. 2009).

The existing scholarship emphasises the role of perceived benefits in guiding the use and management of natural resources. The benefits can be either tangible or intangible, for instance, production for subsistence use or for sale, soil stabilisation, or upholding cultural and spiritual values. For different actors, individuals, communities, or companies, etc., to invest time, labour, and funds in sustainable resource management and conservation, they must perceive that they will be able to enjoy the fruits of these investments. This directs our attention to the benefit-sharing arrangements in national forests between the state and local actors. In many cases, policies that have aimed at increasing community participation in forest management and conservation have mostly compensated community members for the labour they have invested in protection and management activities (Edmunds et al. 2003).

In order to benefit from forests, those who hold rights must also have the capacities, know-how, and technologies necessary for obtaining benefits (Ribot and Peluso 2003). The focus, then, is on the ability of local actors to access capital and markets and to technological, managerial, and leadership skills that shape the opportunities for realising the potential of forests to contribute to local livelihoods. Development of small- and medium-sized forest enterprises, improving market access, and developing forest-based value chains as well as capacity-building in different aspects of forest management have been central to efforts to harness the potential of forest resources to contribute to local livelihoods and improve sustainable resource management.

In addition, in recent years community forestry observers have pointed out imbalances in values between forest dwellers and actors promoting forest-based rural development initiatives. The latter hold, although not always in very explicit terms, values commonly shared among members of mainstream society. These include values related to work ethics, capital accumulation, and sharing and social responsibility that may be fundamentally different than those held by the supposed beneficiaries of forestry support initiatives (Gasché and Vela Mendoza 2012). For some, these underlying contradictions characterising forestry development promoters and the supposed beneficiaries of their efforts largely explain the limited success of many such initiatives (de Jong et al. 2010b, Gasché and Vela Mendoza 2012).

The values and practices found in various locations are an integral part of the traditional (or local) knowledge that has guided the use and management of forest resources by local smallholders and communities for generations. The important role of traditional knowledge is increasingly recognised by the scientific and policy communities, and conservation and development organisations. This has been supported by the general increasing acknowledgment of different environmental, social, and cultural forest values. Yet, as concluded by Trosper and Parrotta (2012), a lack of understanding of traditional knowledge still prevails. The authors maintain that traditional and scientific knowledge should be considered as complementary in efforts to develop sustainable, locally adapted forest-management approaches.

Forest values and practices are also often gender specific. Women and men typically have different knowledge, roles, uses, and practices in relation to forest. Policies and development interventions can thus have disparate effects on men and women. Gender issues and the situation of disadvantaged or marginalised groups feature prominently in the efforts to involve and empower all actors in natural resource-related decision-making and benefit-sharing. Increasing participatory governance, where different stakeholders have a voice in decision-making and empowerment of marginalised groups, has been linked to sustainable resource management (e.g. Persha et al. 2011), but the inadequate resolution of conflicting interests appears to inhibit progress, even where participation has significantly improved.

Power relations between different stakeholders participating in forest-related decision-making processes are also important in explaining outcomes of policies or other kinds of interventions meant to promote sustainable resource management. Frameworks to analyse and explain power emphasise the role of institutions in distributing power across social groups and mediating access to decision-making (for historical institutionalism, see Hall and Taylor 1996) or highlight the mechanisms through which actors try to influence the debates and subsequent decision-making (for discourse theory, see Winkel 2012). Analysis of opposing discourses is nowadays a common tool to capture power (im)balance, and local communities themselves have learned to develop their own discourse (Medina et al. 2009).

3.1.5 Natural resource base

The natural resource base, i.e. the extent and condition of forest and tree resources, define to a significant degree the ecological restrictions for forest management and use and thus the options to manage forests for subsistence or commercial purposes. These options are further shaped by the interaction between the human and the ecological systems, particularly the diverse needs for forest goods and services and the role of forests in local livelihood strategies.

Forest-related polices or their enforcement and the way they are implemented are also often influenced by the condition and extent of forest resources, especially the commercial value of these resources. For example, in many countries, devolution policies have focused mainly on devolving to local actors the rights to degraded forests or bare lands, while commercially valuable forest areas have remained in state control (e.g. Dahal 2003 for Nepal).

3.1.6 International processes

The widely accepted global importance of forests for providing diverse goods and environmental services together with concerns for the sustained production of these goods and services have led to international efforts to increase sustainable use and conservation of forests. International processes can influence national level policies and behaviour at national or local levels through different pathways: international rules, international norms and discourses, markets, and direct access to domestic policy-making processes (Bernstein and Cashore 2000).

The international-rules pathway focuses on the influences of international policy-making processes and the resulting legally binding rules and regulations. The international norms and discourse pathway centres attention on "norms embodied in institutions or informed by broader practices of global governance" (Bernstein et al. 2010, p. 112). This pathway encompasses, for example, the dominant discourse of SFM and the discourses on "good forest governance," participation, decentralisation, tenure reform, and corruption. The market pathway embodies processes that attempt to influence policy change through market mechanisms. It includes such avenues as boycott campaigns, environmentally sensitive markets, and certification systems. Finally, the direct access to domestic policy processes encompasses for example efforts of donor agencies, non-governmental organisations, educational institutions, and foreign governments to shape national policies through financial resources, expertise, technical knowledge, and training (Bernstein et al. 2010). Knowledge on the extent of influences and the pathways through which international influences have affected or permeated national policies and/or directly affected behaviour at the local level is for the most part lacking. However, the influences of international forest-related governance processes on national and local levels can be expected to vary according to socio-economic and natural conditions and power relations within the different entities and among stakeholders exercising authority over forests.

3.1.7 Need for a holistic approach

The previous discussion clearly emphasises the importance of local social, cultural, economic, political, and environmental conditions in resource management and use and in mediating the influences and outcomes of different interventions that aim at instituting sustainable resource management. The influences shaping natural resource management originate at different scales, from local to global, and often originate from other economic or political sectors, indicating the need for interdisciplinary approaches focusing on the diversity of conditions affecting resource management across scales. It has also become clear that the different conditions for SFM interact in complex ways. The complexity of issues affecting the use and management of forest resources and related outcomes and trade-offs has been acknowledged, and even though most scholarship has focused on some particular aspects of sustainable resource management, some efforts have been made to develop more integrated approaches. For example, Sayer and Campbell (2001) recognise the complexity of natural resource systems and call for a new integrated research approach including integration across scales, components, stakeholders, and disciplines.

The analytical framework presented in section 3.2 was developed in an effort to move towards a more integrated and holistic approach in analysing the different conditions that seem to influence forest resources management, and in particular, associated forest and livelihood outcomes.

3.2 An analytical framework for SFM

On the basis of the results and conclusions from the previous WFSE publications and the current scholarship summarised briefly in the previous section (3.1), we identified what might be termed "prerequisite conditions (PC)" for progress in SFM. By concentrating attention on these PCs, we seek to shed light on how the presence, absence, and interaction among these PCs have influenced SFM in the case studies. The conditions of interest are distributed among four broad groups: *policies, institutions and governance; livelihoods, capacities, cultural and socio-economic aspects*; *natural resource base*, and *research and monitoring*. These categories consider the realities of forest users who attribute diverse values to forests, including economic interests and cultural values. For analytical purposes, they are presented here as different categories though in practice the different conditions interact in complex ways (Figure I 3.2). These conditions and the interaction among

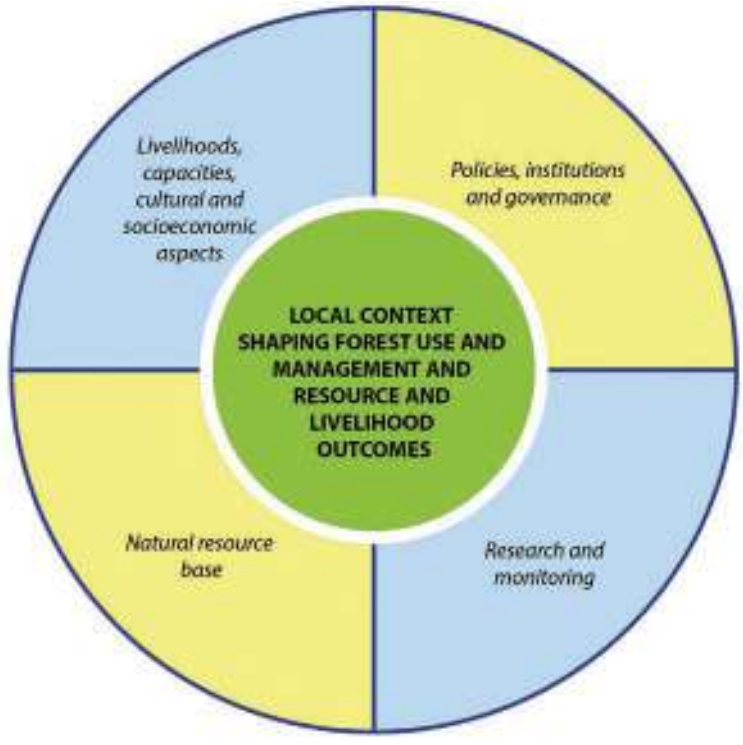

Figure I 3.2 Analytical framework for the case studies.

them are considered to be important in defining the circumstances that influence the use and management of forest resources and related outcomes. The outcomes of interest are those related to livelihoods and forest extent and condition.

The way forest users interact with forests is, in addition to the economic and cultural conditions, influenced by social conditions, like for instance the number of forest users in relation to the availability of resources, economic stratification and power relations, and by capacities, whether resulting from education or experience. These aspects are grouped under *livelihoods, capacities, cultural, and socioeconomic aspects*.

The multiple and oftentimes contradictory societal demands exceed the capacity of the world's forests to provide forest goods and services, so societies have devised regulatory mechanisms to restrain appropriation of tangible and intangible goods and services. The conditions related to the regulatory mechanisms are captured under the category *policies, institutions, and governance*. Institutions include formal rules, laws, other regulations, and policies as well as non-written agreements, norms, and codes of conduct. Where formal institutions are in place, public administration is needed to put them in practice. Policy-making is an important dimension of public administration. While the previous representation mostly suggests public administration of forests at the national or sub-national level, there is an equivalent at the municipal level and, oftentimes, at the community level, where rules to regulate forest use and their enforcement and sanctioning are devised independently of formal regulations or the state administration. The workings of the institutional-policy sphere are conditioned by the prevalent governance mode, which may vary from a top down public administration where bodies that have constitutional or legal authority dominate rule setting or policy formulation and implementation, to self-governance where interested constituencies largely negotiate and come to agreements independently, in which case the constitutional authorities largely supervise that the parties remain within legal boundaries.

The category *natural resource base* brings together a number of factors that ultimately determine the level of productivity (forest products and environmental services) that can be expected from forests. The natural resource base is modified by natural and anthropogenic disturbances. The responses of forests or related biological environments to external impacts are highly influenced by multiple environmental and biophysical conditions, elements such as soil type, climate, type of vegetation and its natural productivity, and ecosystem conditions, compared to its undisturbed natural state. In the case of altered forests, be they forest gardens, forest plantations, or other types of anthropogenic forests, similar environmental and climatic factors, as well as biological factors (such as tree species and species composition) influence how those respond to external impacts.

A final important category of conditions are those that generate the necessary knowledge to support forest management decisions: *research and monitoring*. Knowledge is one key ingredient in achieving sustainable development and in contributing to SFM, and research and monitoring are important in generating relevant knowledge. In addition, a large body of valuable traditional and local knowledge related to natural resources has been accumulated through practice and custom. This knowledge should be better utilised by bringing together different knowledge systems, the scientific and the traditional systems (Colfer et al. 2005).

We seek to identify what appear to be the most important conditions within the above realms that foster meaningful progress towards forest-related sustainable development and SFM. Biodiversity conservation, maintenance of forest cover and condition, and enhanced livelihoods through forest-based activities are seen as essential outcomes of this progress. We are also interested in how the different conditions and their combinations have changed during the past 20 years and how they (and this change) have affected sustainable forest-related local development and SFM. We are curious both about their individual effects and in how they interact to contribute to processes of interest. We develop these insights inductively in Part III by analysing a number of local initiatives from different regions of the world presented in Part II.

An additional aspect of this analysis is to increase understanding about how the conditions have come to exist in some places but not in others, and what has been the role of international regimes, and other types of normative, ideological, and coercive pressures from beyond the local community.

Part II of this book focuses on local and regional experiences and the conditions that have either enhanced or hindered SFM or sustainable forest-related development at the local level within a significant number of illustrative case studies from around the world. The studies focus on cases where various stakeholders have come together to find solutions to forest-related issues and where considerable efforts have been undertaken to further SFM and economically, socially, and environmentally sustainable forest-related local development. The analytical framework described above guided the case study analyses and helped to classify and review relevant conditions for understanding local on-the-ground forest management and related outcomes. It was further specified by focusing specific attention on the issues addressed in the framework questions in Table I 3.1. However, in each case study special attention was directed to those issues most relevant to that specific context. The analytical framework is also used to structure the development of the synthesis of the case studies in Part III. Important implications for future efforts seeking to advance SFM are drawn based on this synthesis and the analyses of the different prerequisite conditions across cases.

Table I 3.1 Framework questions that guided the case study analyses.

Condition	Question(s)
I Policies, institutions, and governance	
Land tenure and rights to forests and trees	Have there been changes in land tenure regimes and/or in the rights to forests and trees (e.g. with respect to different forest products and services, including carbon sequestration) in the past 20 years? Why were these changes made (justification for the changes) and what if any impacts have resulted from these changes?
Public administration	Have any reforms in public administration been made that affect community and producer efforts to carry out SFM? What regulations and policy instruments have been put into place to encourage/discourage involvement in SFM?
Participation and stakeholder cooperation	What strategies related to participation and stakeholder cooperation are in evidence in forest-related planning and decision-making in your area of study? If present, please describe how these are working.
Issues of power and representation	Can you cite efforts to empower local stakeholders to play a greater role in forest management and conservation and related decision-making? What policies and strategies are being pursued for the purpose of empowering these stakeholders? Are equity and gender issues considered?
Enforcement of laws and regulations	Have efforts been made to reduce illegal logging and other illicit activities related to forests and landscapes and/or promote legality? Can you cite effective efforts related to FLEGT/national mechanisms that have contributed to strengthening legality of the forest sector in the area of your case study? Are efforts being made to address issues of corruption?
Reconciliation of different land uses	Have there been efforts to reconcile different land uses and to address competing land uses, such as agriculture and forestry, energy and forestry, among others? Please describe the most important strategies and initiatives to address intersectorial issues or to encourage appropriate land use (e.g. land use planning or other policies/programs to contribute to the reconciliation of competing land uses).
Long-term societal commitment to SFM	How would you typify the continuity of processes related to SFM in your area of study? What factors have led to marked disruptions of ongoing processes? To what degree are the issues related to forests and forestry evident in the national agenda?
Influences of regional/global processes on forest-related policies and behaviour in the region of your study?	Which regional/global forest-related processes have had an influence in your area of study, particularly in policies and stakeholder behaviour? We would like you to use the framework described in the text to analyse the influences of regional and global forest-related processes and the mechanisms through which these influences have occurred. The framework differentiates four pathways through which international processes may influence policies and behaviour at the national or local level: 1) international rules, 2) international norms and discourses, 3) markets, and 4) direct access to domestic policy-making processes. We would like you to direct special attention to the influences of the following processes: REDD, FLEGT, certification, C&I, CDM, CBD, Millennium Development Goals and economic globalization, but if any other international process has been influential in your region of study, it should be included in the analysis.

II Livelihoods, capacities, cultural and socio-economic aspects	
Contribution of forests and forest resources and services to livelihoods	In a broad sense, how important are forests to local livelihoods in your area of study, considering environmental, economic, and cultural benefits? Are traditional knowledge and cultural links to the forest considered in the development of forestry programs in your area of study?
Commercial opportunities, linkages to markets – value chains	To what extent do local actors benefit economically from their efforts to manage forests and market forest goods and services? Have efforts been made to integrate local producers into improved market opportunities, for example, through the value chain approach or improving the functioning of markets? What results can you cite from these efforts?
Technical, managerial, leadership	Do diverse stakeholders involved in SFM have access to capacity-building and technical assistance? What types of topics are covered in capacity-building programs (for example, technical aspects, business and managerial, leadership, policy, and regulatory aspects, among others)?
Access to capital	How do local actors access capital, either by formal or informal channels? Have efforts been made to create formal mechanisms that provide investment capital to local actors involved in forest-related activities and what have been the result of these efforts? How have investments into forest-related activities impacted traditional uses of forests? Are cultural impacts of "forestry development," in general, in evidence in your area of study?
Security and conflict	Do serious issues of security and conflict characterise your region of study? How have these issues affected efforts to progress in SFM?
The role of industrial forestry	How would you characterise the prevalence of industrial concerns in your region of study? Are these driven by natural forests or plantations? Does the forest industry engage with local communities in ways to foster collaboration?
Landscape or ecosystem management	Do stakeholders involved in SFM in your region of study pursue a landscape level or ecosystem management approach? What have been the most important results of these efforts and what factors have most influenced outcomes to date?
III Natural resource base (biophysical conditions)	
Extent and condition of forest resources	How would you typify the forest resources in your area of study with regards to their potential to provide goods and services demanded by society? How would you typify the tendencies with regard to forest resources (forest area and conditions) in your area of study? What are the major drivers influencing forest extent and condition in your area of study?
Trees outside forests, including agroforestry	To what degree do trees outside forests contribute to the production of goods and services, including ecosystem services?
IV Research and monitoring	
Research programmes	In the area of your case study, is there an ongoing research programme to provide information to SFM initiatives? Are research efforts devoted to social, cultural, economic, technical, and policy dimensions of SFM?
Monitoring programmes	Is a continuous monitoring program in place in your region of study to track outcomes? Is the information generated utilised to redirect ongoing efforts (adaptive management approach)? Are participatory monitoring efforts in evidence involving local stakeholders in the process?
Intersection among diverse policies and institutions	
"Prerequisite" conditions, policies, and institutions interact in complex ways. These interactions may be synergistic, somewhat neutral, or even antagonistic. We would like you to examine how the aforementioned conditions (present or absent), policies and institutions, including the international processes, are interacting in your region of study and the perceived effect(s) of these interactions in fostering or constraining SFM. Please concentrate attention on norms and instruments employed and vertical and horizontal interactions among policies and institutions.	
Projected future trends in the conditions considered	
We would like you to consider the likely future trends in relation to the conditions addressed above. What are the projected trends and changes in the aforementioned conditions and what are the projected effects of these trends on forests, progress towards SFM, and local livelihoods?	

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PART II

Case studies

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Forest Citizenship in Acre, Brazil

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Abstract: Since 1998, the western Amazonian state of Acre has been the site of ambitious policies to support sustainable forest-based development initiatives. The result is a long-term successful experiment in transformation of the state from an outsider-driven development based on conversion of forest to pasture and agriculture to an endogenous, participatory process of development focused on sustainable use and valorisation of environmental, economic, social, and cultural assets of the local populations. Both successes and challenges of this unique experience provide valuable lessons in the search for forest-based development approaches. The sections in this chapter trace the innovations in laws, institutions, public administration, and policy to promote forest-based development, alongside the opening of policy-making to citizen input. Data presented from government reports outlining policies, supplemented by available empirical research, show impressive gains in stabilising deforestation, expanding forest production, and favourable but uneven socio-economic impacts of the state's forest development programs. The chapter documents the successes in transformative institutional and policy development at the state level, remaining challenges, and lessons learned in Acre for potential application of sustainable development policies over the long term.

Keywords: Acre, Brazil, Amazon, florestania, forests

1.1 Introduction: Key contributions of Acre case

Since 1998, the western Amazonian state of Acre has been the site of ambitious policies to support sustainable forest-based development initiatives. The result is a long-term successful experiment in transformation of the state from an outsider-driven development model based on conversion of forest to pasture and agriculture to an endogenous, participatory process of development focused on sustainable use and valorisation of environmental, economic, social, and cultural assets of the local populations. Both successes and challenges of this unique experience provide valuable lessons in the search for forest-based development approaches. This chapter documents the success in transformative institutional and policy development at the state level, impacts on deforestation and forest-based livelihoods and industries, and the challenges to ensuring the long-term continuity of these initiatives in an equitable and sustainable way.

A remote state, small in both area (164 128 km^2, 63 370 square miles) and population (733 559 in 2010), and lacking in minerals and potential for great hydroelectric power, Acre never was a focus of Brazil's ambitious Amazon development policies of the 1970s and 1980s, nor did the state suffer the massive in-migration typical of other Amazonian states. Acre was home to a relatively endogenous population with strong social capital and historic cultural ties to traditional forest-based livelihoods centred on rubber tapping, dating from the turn of the 20th century. In the absence of strong economic elites, and with a largely discredited political class, it was from Acre's forest-dwelling communities that innovative land-tenure proposals emerged from successful grass-roots movements in the 1970s and 1980s to defend forested areas from outside cattle ranchers (Keck 1995, Allegretti 2007, Cronkleton et al. 2008). Three successive governors (1998–present) built on these successes and invested in infrastructure, training, institutions, market supports, technological innovations, and proposals for transformational policy

initiatives aimed at sustainable, forest-based development. The innovative, comprehensive statewide forest-based development model that emerged was called *florestania*, a neologism meaning "forest citizenship;" it combined market-oriented forest-based development strategies with a strong commitment to citizenship and participation (Kainer et al. 2003, Schmink and Cordeiro 2009, Schmink 2011).

The sections in this chapter emphasise the remarkable connection between Acre's unique local cultural history and the transformative policies stimulated by the activism and vision of its forest communities – the rubber tappers. Data presented from government reports outlining policies, supplemented by available empirical research, show impressive but uneven socio-economic impacts of the state's forest development programs. The chapter documents the successes in transformative institutional and policy development at the state level, remaining challenges, and lessons learned in Acre for potential application of sustainable development policies over the long term.

Figure II 1.1 Rubber extraction. ©Judson Valentim

1.2 Policies, institutions and governance

1.2.1 Land tenure and rights to forests and trees

The comprehensive forest-development initiatives under florestania were inspired by the rubber tapper social movement in the 1980s, led by union organiser and visionary Chico Mendes (Keck 1995, Allegretti 2007). The rubber tappers' key achievement was the national adoption of their proposal to create sustainable-use reserves known as the Federal Extractive Reserve System (RESEX), which recognised tapper communities' rights to forests where traditionally they had lived and worked. RESEX represented a solution to the land conflict with cattle ranchers and a recognition of land and resource rights previously expressed in the unique institution of the *seringal* (rubber concession), which was controlled by the rubber barons during the rubber boom. Rubber tapping (Figure II 1.1) became part of a new common property regime to be co-managed first by local residents in partnership with the state (Allegretti 1990, Esteves 1999, Cardoso 2002, Allegretti and Schmink 2009) and later by a management committee representing diverse stakeholders.

The new form of land and forest tenure soon expanded to diverse areas across Amazonia and throughout Brazil (forest, grassland, and marine) and became a model for sustainable-use areas in other parts of the world (Gomes 2009). The addition of extractive reserves and sustainable-development reserves to indigenous territories, and new state forests created since 2003, have left 48% of the territory of Acre under some form of protection. The innovative land reform policy was later incorporated into Brazilian federal law under the National System of Conservation Units (SNUC), and inspired other nations to recognise collective land rights for traditional peoples in sustainable-use areas.

Despite secure land rights and protected forests, traditional rubber-based livelihoods in RESEX were undermined by the removal of federal rubber subsidies and declining market prices for rubber starting in the 1990s. The Acre state government invested in new subsidies and support programs seeking to harness new markets for non-timber forest products (NTFPs) and to provide improved infrastructure and services to remote communities; some forests extractivists succeeded in shifting their livelihoods to off-farm labour, access to social transfer programs, agriculture and cattle, and Brazil nuts. With the exception of Brazil nuts, which have established markets and strong prices, progress in development of other non-timber markets has lagged, and some forest communities face the choice between risky timber-management initiatives and expansion of agriculture and cattle raising. Although Acre's forests are still largely intact, increasing deforestation driven by land-use change, along with changing identities and aspirations of new generations that are more urban-oriented, are changing the cultural and livelihood bases of florestania policies.

Box II 1.1 Achievements reported by Acre government, 1998–2009

- More than 200% increase in native rubber production
- Acre emerging as Brazil's second-largest Brazil nut producer, producing 14 035 tons in 2011 (one-third of national production) and supporting about 5000 families
- Development of management protocols for 21 NTFPs (non-timber forest products)
- Increased value-added capacity of two new Brazil nut processing factories (in Xapuri and Brasiléia) from 5% to 50%
- Production in 2008, by more than 400 rubber tappers of about 103 000 litres of latex for the Natex Condom Factory (the only one in the world to use latex from native rubber stands)
- Lowest deforestation rate in the state for past nine years (0.19%) achieved in 2008, well below the 1998–2008 average of 0.43%
- 373% increase in Tax on Circulation of Goods and Services (ICMS)
- Average annual GDP increase of 6% and accumulated growth of 26.5% from 2002–2006, the sixth highest in Brazil
- 400% increase in net value of forest production

Sources: GoA 2009, Embrapa 2012.

An important legacy of the rubber tapper social movement of the 1970s and 1980s was the vision of an alternative development paradigm for the region, which was carried forward through alliances with local professionals and activists who supported the rubber tapper movement, Several key Acrean leaders subsequently were able to translate their vision into political mandates at local, state, and national levels. Acrean rubber tapper Marina Silva, a close ally of Chico Mendes, was elected Rio Branco town council member in 1988, state deputy in 1990, and federal senator in 1994, serving in the senate until 2003. That year she was named Brazil's environmental minister, the first cabinet appointment by President Luís Inácio (Lula) da Silva, a former labour organiser who once was arrested by the military government alongside Chico Mendes in Acre. The Forest Government of Acre was favoured by this broader political momentum at national and state levels.

1.2.2 Public administration

The successive "Forest Governments" of Acre invested heavily in revamping the public administration of the state to address the complex challenges of forest-based development: community forest management; state public forests; expansion of the forest-product market chains; forestry education; and technical assistance (Kainer et al. 2003, Stone 2003, Schmink and Cordeiro 2009). The pre-existing semi-autonomous Acre State Technological Foundation (FUNTAC), created in 1987, already administered the Antimary State Forest, created in 1988 with massive financial support from the International Tropical Timber Organization (ITTO); Antimary would become a laboratory for the state's experiments with sustainable forest management (SFM) (Shaeff 1998). Beginning in 2002, the state government built on these existing programs to develop a complex forest-oriented infrastructure, supported by large amounts of funding from the Inter-American Development Bank, the World Bank, and national sources of funding in Brazil. These investments provided the basis for an impressive growth of forest-based enterprises in Acre, based on existing evidence. Key achievements reported by the government for 1998–2009 are listed in Box II 1.1.

Available data clearly show that state and federal policies are being successful in promoting a decoupling of the agriculture and cattle production systems as deforestation drivers. Annual deforestation has decreased in Acre from 107 900 ha in 2003 to 28 000 ha in 2011 (INPE 2012). Meanwhile, the cattle herd grew from 1.87 million to 2.55 million head in the same period and showed a trend towards stabilisation and even a small decrease in the herd between 2010 and 2011 (IBGE 2012). This was accomplished mainly by farmers' intensification of cattle production systems using improved grass and legume cultivars, improved breeds, reclamation of degraded pastures, and improved pasture management. This was supported by the state government's Ecologic and Economic Zoning Plan, the newly created State Institute of Plant and Animal Health, and campaigns that led the state to be recognised in 2005 by the World Organisation for Animal Health as free of foot and mouth disease practicing vaccination (Valentim and Andrade 2009). Also, logging activities that were previously unsustainable were mostly converted to sustainable precision-forest-management systems (Modeflora, see Box II 1.6 and Figure II 1.2), and many cattle ranchers now practice SFM activities in the areas of forest in legal reserves that the Brazilian Forest Code requires them to maintain. Nearly 30 000

Figure II 1.2 Low-impact community forest management. ©Judson Valentim

ha of forests were managed in Acre using Modeflora in 2011, generating an economic benefit of USD 1.94 million. The data on agriculture also show large decreases in deforestation and a declining proportion of deforestation in relation to the area cultivated in agriculture (IBGE 2012).

The Forest Governments implemented a complex of new laws and institutions that provided support and incentives for private sector investment in SFM. These included establishing a state environmental policy, biodiversity and forestry laws, ecological-economic zoning, and other supportive policies, including a new forest secretariat and a 2006 Science, Technology, and Innovation Plan (GoA 2006a, 2009). The state supported the development of a network of cooperatives for smallholders (Cooperacre, see Box II 1.5), designed to organise producers into regional groups for marketing of different forest products, and an association of entrepreneurial forest managers (Assimanejo). The existing agricultural extension service was restructured as an agroforestry extension service, and the existing agricultural college was converted to a forestry college to train technicians recruited from throughout the state, most coming from families of small farmers and extractive communities. The Federal University of Acre (UFAC) added a new forestry degree program, complete with innovative forest residencies (the first in Brazil) that placed students in industrial or community management programs to gain experience. With support from the Worldwide Fund for Nature (WWF) and other organisations, the state government created a state forest certification program, pioneering with certification of the first state public forest and the first community forest management project in Brazil (Stone 2003).

The Acre state government also undertook ambitious institutional development to support payments for environmental services (PES) programs of diverse types (see Boxes II 1.2 and II 1.3).

Building on the experience of a federal pilot program called Proambiente (DiGiano 2006, Bartels 2009), in 2008 the state created a comprehensive program called Valorization of Environmental Assets, which sought to support both the development of sustainable product chains and protection of the standing forest, including a statewide deforestation target for 2020 that conformed with international standards defined by the European Union and Kyoto Protocol (EDF n.d.).

The Certification for Sustainable Rural Properties Project, written into state law in 2008, provided agricultural equipment and training for small producers who were voluntarily certified in more sustainable agricultural practices, along with an annual monetary bonus of about USD 250 per family based on conditional compliance with sustainable agricultural practices and fire reduction. Extensionists contracted through a network of eight local NGOs were responsible for visiting approximately 17 000 Acrean farm families four to five times each year (Santos et al. 2012). Certified producers were required to

Box II 1.2 Proambiente: Integrated smallholder social and environmental development

Proambiente was an integrated social and environmental development program for smallholder households in rural Amazonia. It was originally envisioned by colonist farmers along the Tranzamazon Highway, also supported by rural unions in Acre, and adopted as federal government policy in 2003. In many ways Proambiente was an innovative policy because it was originally defined, in part, by local stakeholders (Fearnside 2008). In Acre, a total of 400 rural households were involved in the program, which proposed to pay half a minimal salary per month (USD 95) as a payment for environmental services, as well as to offer training and support for household farm and extractive activities (Hall 2008).

During the 2003–2008 period, technical and community field agents made monthly visits to Acre rural communities involved in Proambiente. Households created individualised management plans that focused on environmental issues (i.e. deforestation prevention, sustainable pasture management, protection of water bodies, reforestation projects); health (i.e. household water and waste treatment); production (i.e. training in green manure use, agroforestry, and green certification); education; and organisational support.

Despite such innovations, however, Proambiente experienced difficulties such as frozen funds and organizational and monitoring issues (Bartels 2009). To make matters worse, Brazilian law had to be rewritten (while funding came to a halt) in order to recognise the economic value of avoided deforestation and other environmental services provided by standing forests in the tropics. In the end, households received drastically reduced payments totalling approximately USD 325 (Hall 2008). The federal program ended in 2010. During times of frozen federal funding, state and local agencies in Acre continued to support the program in some fashion. Without a monthly payment, most families still remained in the program (in fact, there was a waiting list to join the program as late as 2008, long after payments had stopped), citing technical assistance, training, and outreach as the main benefits of the program (Vadjunec 2011).

Box II 1.3 State System of Incentives for Environmental Services

Acre's State System of Incentives for Environmental Services (SISA) was passed into law on November 11, 2010. It focuses on the conservation and recuperation of seven environmental services: 1) carbon sequestration and enhancement of stocks through forest conservation and management; 2) natural scenic beauty; 3) socio-biodiversity; 4) water and hydrological services; 5) climate regulation; 6) appreciation of cultures and traditional ecological knowledge; and 7) conservation and recuperation of soils (GoA 2010b, Duchelle et al. 2013). SISA is based on the State Policy for the Valuation of Forest Environmental Assets, which involves recuperation of degraded lands (through reforestation and revitalised agricultural production) and valuation of standing forests (through forest management, the Certification for Sustainable Rural Properties Project, and payments for environmental services). A new state entity – the Institute for Climate Change and Regularization of Environmental Services – was created to approve, register, and monitor sub-projects within SISA.

During the construction of SISA, the draft law was published and made available through Acre's state government website, in addition to being sent to 120 people from more than 72 national and international organisations for evaluation and feedback. The state environment secretariat also held public consultation meetings with a total of 174 people to discuss the document and achieve a fair and efficient structure of benefit sharing; five meetings were held with technical staff from local NGOs, three workshops brought together potential beneficiaries (indigenous people, extractivists, and rural producers); and a technical seminar included 10 national and international organisations that represented civil society as well as representatives of seven state secretariats (GoA 2010b).

The objective of the Integrated Science Assessment (ISA) carbon component of SISA, which is recognised internationally as a sub-national REDD+ program, is to promote the reduction of greenhouse gas emissions from deforestation and degradation, following the State Plan for Control and Prevention of Deforestation. Acre is an important partner in the Governors' Climate and Forests Task Force, a sub-national collaboration between 16 states and provinces from the United States, Brazil, Indonesia, Nigeria, Mexico, and Peru. Acre's ISA-Carbon was chosen as the task force's Brazilian pilot REDD+ initiative.

Source: GoA 2010b.

stop burning agricultural plots and to use a legume (*Mucuna* spp.) as a cover crop to fix nitrogen and reclaim soil fertility, thus allowing the farmers to grow subsistence crops and to reduce the need for slash and burn of additional areas of forest. Along with *Mucuna* seeds, producers received an agricultural kit (grass cutter, machete, planter, scythe) to help them implement and maintain these alternative production activities over a period of one to eight years.

The valorisation program later was expanded to include an elaborate new infrastructure for the State System of Incentives for Environmental Services (SISA, see Box II 1.3) with regulatory, monitoring, capacity-building, and enforcement mechanisms (GoA 2010b, Santos et al. 2012). Four communities in the priority zone for initial implementation of SISA were starting to benefit from territorial planning, including official demarcation of customary landholdings as well as technical assistance and direct cash payments for sustainable agricultural practices (Duchelle et al. 2013). The comprehensive SISA program is the most ambitious and complete Brazilian initiative for environmental services regulation, providing important learning opportunities as the nation moves towards developing federal laws (Santos et al. 2012). Additionally, under the multi-use umbrella of SISA, in 2010 Acre signed a historic, sub-national memorandum of understanding (MOU) with the state of California as part of an agreement on future cap and trade emissions trading (TFG 2010). In 2012 the state signed an agreement with the German KFW Development Bank in the amount of EUR19 million as payment for reductions in carbon emissions already achieved due to avoided deforestation, the first state-level REDD initiative of its kind in the world. These resources will be used to promote practices that reduce deforestation, such as sustainable production, forest management, and environmental conservation (http://www.agencia.ac.gov.br/index.php/noticias/governo/21891-banco-alemao-aposta-na-biodiversidade-do-acre.html).

1.2.3 Participation and stakeholder cooperation

The state government's concept of florestania, linking the forest with citizenship, and its proposal for an open form of policy-making with a commitment to the strengthening of organised civil society in Acre represented a major departure from previous practices that lacked dialogue with communities (GoA 2000). This commitment to participatory governance was initially put into practice in the implementation of the Ecological and Economic Zoning (ZEE) Plan to regulate activities and plan different land uses throughout the state (GoA 2000, Schmink and Cordeiro 2009). The state was mapped first in 1999 at 1:1 000 000 scale (GoA 2000) and then at the 1:250 000 scale in 2006 (GoA 2006b), producing a set of thematic maps and land-use plans as the result of a pact among the different groups of rural stakeholders. As a federally ratified state law, the ZEE Plan provides the legal basis for management of protected areas and forests and for regulation of economic activities in the 12% of the state that is already deforested (EDF n.d.). A commission with broad representation from the government, private sector, and civil society guided a process of consultation with approximately 150 local and regional leaders and through public forums in every municipality of the state (GoA 2000, Santana 2004). A similar participatory discussion process was later conducted in 2010 in the development of the SISA program (GoA 2010b) related to the public consultation regarding socio-economic indicators for REDD+ (June–September 2011) and a training and exchange workshop for indigenous leaders in January–February 2012 (Santos et al. 2012).

The state formed strong partnerships with local non-governmental organisations (NGOs) such as the Group for Research and Extension in Agroforestry Systems of Acre (PESACRE) and the Center for Amazonia Workers (CTA) to support extension outreach with rural communities related to agroforestry and forest management. This included the participation of six local NGOs in the six-year, USD 150 million Program of Social Inclusion and Sustainable Economic Development (PROACRE), which began in 2007. Focused on education, health, and sustainable production, the program used a participatory approach to the development of community development plans in remote and vulnerable regions, linked to growth-pole strategies in rural and urban areas. State-level councils on environment, science, and technology; forestry; and sustainable rural development provided ongoing mechanisms for input and monitoring of state policies, although the councils often were perceived to lack the capacity and independence for effective participation, in part because of the growing dependence of NGOs and social movements on state funding. The absorption of grass-roots and NGO leaders and organisations into the state governance system contributed to weakening the potential for political pressure on the government by the social movement.

1.2.4 Issues of power and representation

Even with a favourable political conjuncture and considerable financial resources, the Forest Government still faced considerable challenges, including maintaining the support of social-movement and grassroots constituencies. Some movement leaders worried that the dynamism of state policies weakened the movement because its role was no longer clear and because some policies – such as forest management and green marketing – were controversial and challenging new ideas for communities to accept after years of struggle against outside loggers. The state and municipal governments absorbed many of the most talented leaders in universities and NGOs as well as social-movement leaders themselves, many of whom became more distanced from their base in the rural areas (Sant'Ana 2004, Ehringhaus 2005).

The apparently favourable inclusion of RESEX in Brazil's National System of Conservation Units (SNUC) also undermined the autonomy of reserve residents in the management of their common property, previously their responsibility in collaboration with the federal agency in charge of RESEX. By placing the co-management responsibility in the hands of a broader committee of stakeholders, the shift undermined the previously central decision-making role of the local RESEX association (Ehringhaus 2005, Pacheco 2010).

Acre's public defenders' office (Ministério Público) took an active watchdog role, forcing the government to enforce burning prohibitions starting in 2009 and demanding that the government provide small farmers with alternative production practices that did not require the use of fire. In 2012, the state government appealed to federal courts to allow up to 3 ha of burning for subsistence crops, arguing that achieving alternative sustainable practices would require investment in equipment and technical assistance over many years (Machado 2012). The Acre public defenders also pursued complaints about irregularities in forest management procedures and complaints about relations between loggers and communities (Ministério Público do Acre 2012; see also Torres and Quadros 2011).

As a result of the public defenders' burning prohibition, in subsequent years many small farmers were forced to practice illegal deforestation in order to grow subsistence crops to ensure their food security, and some were notified by the state and federal environmental agencies of fines amounting to dozens of thousands of dollars, many times higher than their total land value. This forced the state government to shift the focus of its policies towards providing the more than 20 000 families of small farmers with agricultural machinery (tractors and plows), farm inputs (such as lime), and technical assistance to help them produce food in the areas already deforested. In 2012 the state government invested more than USD 25 million from a Brazilian National Economic and Social Development Bank (BNDES) loan to buy more than 140 tractors for the Program of Degraded Land Reclamation for Food Production by Small Farmers.

1.2.5 Long-term societal commitment to SFM

State-level investments in permanent infrastructure and incentives programs seem likely to sustain most of these SFM programs for the long-term, but the forestry sector must continue to compete with other state government development sectors – each with its social constituencies and political interest groups – for public resources and attention. One of the indications of the potential loss of importance of the forest sector in state policies is the merger of the Secretary for Forests with others under the umbrella of the Secretary for Sustainable Forest Development, Industry, Trade, and Sustainable Services (SEDENS). With all the policies and programs related to these sectors now under the responsibility of one secretary, the forest sector may shift from the focus on forestry in favour of other more urban sectors that are more organized and have more political power.

An incipient State Forest Fund has been created to compensate small farmers, although not yet fully funded (Santos et al. 2012). The certification and SISA programs, aimed at small producers, have developed plans over several years to gradually support the transition to sustainable productive practices while providing incentives and technical assistance. The state government's Sustainable Extractive Reserve Project, launched in 2010, spells out a comprehensive set of objectives to address the long-term needs of the extractive reserves. The government's 2011–2015 development plan contains ambitious targets for the state's carbon economy: 1) approximately USD 45 million worth of project investments to directly and indirectly generate 11 000 jobs benefitting 5000 small producers; 2) 25 000 ha of planted forests (fruit, rubber, timber), and 3) community-managed forests expanded to 300 000 ha. The aim is to bring a projected increase of USD 7.5 million/year in net forest production to benefit 1500 families (GoA 2011). How realistic these goals are remains to be seen.

SFM, especially for communities, remains a controversial and experimental proposal among technicians, academics, policy-makers, civil society, and communities both inside and outside the government

Box II 1.4 Changing livelihoods in Acre's extractive reserves

Studies by Wallace (2004) and Wallace and Gomes (forthcoming) have demonstrated the continued importance of forests to rubber tapper livelihoods in the Chico Mendes Extractive Reserve. However, a longitudinal study of 24 households including household data from 1996, 2001, and 2006 (Wallace 2009) found extraction as a percentage of household market-based income to be falling. While the standing forest, through extraction of rubber, Brazil nuts, and other fruits and fibres continued to play an important role in the market-based income of households, the study documented a rise in the value and percentage of total household income from other income sources, such as large animal trade (cattle) and off-farm income. Off-farm income came through positions such as health agents and teachers as well as through labour opportunities, such as carpentry work (i.e. home construction), as households moved from traditional homes built of palm slats and fronds to sawn-wood homes. In addition, state government programs such as feeder road construction and the building of storage units to support the state government's latex program had created new income-earning opportunities for the region's inhabitants. Thus, while households had seen growth in average income over this 10-year period, including growth in average per household extractive income, extraction contributed less as a percentage of total household income among the 24 study households, while cattle trade and off-farm labour had grown in terms of the overall percentage of the total contribution. In addition, households reported increased income from government social programs, such as pensions, maternity payments, health disability payments, and the Bolsa Familia progam, which provided monthly payments to families with children in school.

While extraction remained an important income source for households more generally, for lower per capita-income households, extractive activities were critical. Of 13 households that received no rural pension payments over the study period, those with higher per capita income mainly earned income from cattle sales and off-farm labour opportunities, rather than from extractive activities. Other evidence suggesting the growth of cattle production as a productive activity include the recent growth in the average pasture area and number of cattle owned by households (Gomes et al. 2012). Furthermore, research from these and other studies shows that certain areas of the reserve have significantly different levels of both cattle ranching and pasture development, leading to variables rates of deforestation (Vadjunec et al. 2009). Vadjunec and Rocheleau (2009) suggest that rubber tappers have distinct, often regional, livelihood preferences based on either agriculture and/or traditional extractive land-use trajectories – these need to be acknowledged by policy-makers. Overall, research suggests that paths of development among households in the reserve are quite divergent, and future management needs to consider the diverse paths and preferences of development being followed and how each may require distinct types of management (Vadjunec et al. 2009, Wallace 2009).

(Sant'Ana 2004, Zimmerman and Kormos 2012). Government technicians recognise the urgency of establishing functioning forest market chains connected to rural communities, but many forest producers have resisted the government's perceived imposition of timber management programs (Stone 2003, Humphries 2005, Humphries and Kainer 2006, Fantini and Crisóstomo 2009, de Paula 2012).

1.2.6 Influences of regional/global processes on forest-related policies and behaviour

Acre's forest-based development program has been strongly and directly influenced by global and regional policies, institutions, and resources since the rubber tapper social movement received crucial support from international environmentalists concerned with the impact of World Bank policies in the 1980s (Rich 1985). The 1992 UN Conference on Environment and Development in Rio legitimated the focus on local communities and social benefits of forests through such documents as Agenda 21. From that conference emerged the massive Pilot Program for Protection of the Brazilian Rain Forest (PPG-7), which supported widespread experimentation in forest-based development in Acre and across the basin, including the 2003 Promanejo program to support community forest management.

In this same period, partly responding to these international influences and pressures, the Brazilian environmental agency (IBAMA) began serious enforcement of deforestation regulations as well as to develop policies to support community-based certified forest management (Stone 2003). The 2004 Action Plan for Protection and Control of Deforestation in the Amazon (PPCDAM) called for territorial planning in forest areas and the promotion of sustainable and productive forestry management. New Brazilian legislation passed in 2006 included a Management of Public Forests Law, a new national forest service, and a National Forest Development Fund (Stone 2003).

Figure II 1.3 The Natex condom factory, a public-private-community partnership, purchases latex from approximately 650 households. ©Judson Valentim

International NGOs and researchers also have been influential in the development of forest-based policies and behaviours in Acre. The University of Florida helped to form the NGO PESACRE in 1990, which took a lead role in supporting community-oriented policies and technical extension work with rural communities; Acre's long-established Center for Amazonian Workers also redirected much of its work to community forest management. The WWF chose Acre as the site for a regional office and provided strong support to Acre's efforts to certify forests. Most recently, Acre has positioned itself well for REDD initiatives (reduced emissions from deforestation and forest degradation), including the sub-national Governors Climate and Forests Taskforce (GCF), which selected Acre as a pilot site.

1.3 Livelihoods, capacities, and cultural and socio-economic aspects

1.3.1 Contribution of forests and forest resources and services to livelihoods

Acre's experience in forest citizenship is anchored in the state's history of forest dependence and cultural identification with the forest: until the 1990s, the vast majority of the state's economy and population depended on forests. This is now changing rapidly, due to shifting federal policies such as removal of the longstanding national rubber subsidy for producers, which was replaced by a new state subsidy; new lines of credit that favoured expansion of agriculture and cattle; declining prices for rubber; and the paucity of other non-timber income-earning alternatives aside from Brazil nuts and, to a lesser extent, forest oils such as *copaiba* and *andiroba*. Forests continue to be important sources of livelihoods in Acre, especially for the poorest rural households, but rising incomes were associated less with forest extractivism and more derived from cattle, off-farm employment, and government social programs transfers (see Box II 1.5).

The state's Chico Mendes Law, a 1999 subsidy to rubber producers combined with technical assistance and other measures, proved effective in reaching more than one-third of Acre's rubber tapper families, especially the poorest (Wallace 2009, Sills and Saha 2011). Along with the new condom factory and other support programs, these programs have helped to sustain extractive livelihoods and curb rural-to-urban migration by some families. However, by 2011, rubber tapping was so limited that programs were being developed to promote expansion of cultivated rubber trees in pure stands and in agroforestry systems as part of the state Program of Reclamation of Degraded Lands, in order to assure future production of condoms (Figure II 1.3).

Although highly variable in productivity due to ecological differences and management practices, Brazil nuts, with their established global markets, have provided communities in eastern Acre with an important source of income over centuries (Wadt et al. 2005, Kainer et al. 2006, 2007). Acre is second only to the state of Amazonas in Brazil nut produc-

Box II 1.5 Institutions to support forest-product marketing

The FLORA Fair, a forest products fair held annually in Rio Branco from 1994 to 2005, was established to provide communities and artisans an opportunity to sell forest products directly to consumers, promote community forest ventures, and raise public awareness about the strong regional extractive culture (Wallace et al. 2000). FLORA grew from the 1994 participation of 17 communities and artisans with retail sales of approximately USD 6000 to the 2005 participation of 78 sellers (some from outside the state) and sales of USD 67 000 (Wallace et al. 2008). In 2001 FLORA expanded its activities to promote greater market opportunities for communities and artisans seeking markets beyond market fairs stands, to include a *rodada de negócios*, or business round table. This event provided a space for communities and entrepreneurs in Acre to meet and negotiate contracts with commercial organisations from Acre as well as other states (Wallace et al. 2008). More recently, FLORA has been absorbed into the Panamazonia Fair, which took place in Rio Branco in 2007 and 2010 (Agencia de Notícias do Acre n.d.). While FLORA focused on Acre and more broadly the Brazilian Amazon, the Panamazonia Fair has a strongly international character with participants from eight other countries including Mexico and countries from Central and South America. Forest-based initiatives also are featured at the annual Expoacre, Acre's week-long annual exposition, but they represent a minor component of the event's main focus on cattle, complete with rodeos and national country and western stars (Hoelle 2011).

Cooperacre, a cooperative composed of numerous rural cooperatives in Acre and now the largest cooperative in the Amazon region, has also played an important role in strengthening regional market systems. Established in 2001 with state support, Cooperacre is heavily involved in the state's Brazil nut trade through the purchase and processing of nuts, selling more than 4000 tons in 2011 (Almeida et al. 2012), as well as managing a recently constructed Brazil nut-processing plant in Xapuri. In addition, Cooperacre manages the logistics of supply and transport of liquid rubber, or latex, sold to Natex, the condom factory located in the municipality of Xapuri, as well as development of new products made from chemically processed rubber. Opened in 2008, Natex is a public-private-community partnership that now purchases latex from approximately 650 households. The state further supports latex trade by providing a subsidy payment of USD 2.10 per litre to households. Natex sells approximately 100 million condoms per year through a contract with the National Health Agency. In addition, Cooperacre also has begun processing diverse regional fruits into pulps, including *açaí* (*Euterpe precatoria*) and *cajá* (*Spondias mombin*) at a small plant located in Rio Branco.

A cooperative of community forest managers, COOPERFLORESTA, was formed in 2005 with support from the state government, the local NGO CTA, and WWF and has grown to represent 10 communities and six local associations, representing 140 approved community timber management plans (Joaquim Meier-Doernberg, personal communication).

COOPERFLORESTA's leadership has developed an entrepreneurial vision, adapting to changes in markets and economic viability by experimenting with different forms of partnership with private logging companies, with continued support from the state and NGOs

tion, most of which is concentrated in the municipalities of Rio Branco, Xapuri, Brasiléia, and Sena Madureira, where the natural groves are most plentiful (and markets most accessible). Twenty cooperatives and associations represent 1500 producers of Brazil nuts, rubber, or *copaiba* in their sales to European importers, some of them interested in nuts certified to follow social and environmental standards. Despite continuing challenges in quality control and management, by 2006 the government, in partnership with WWF, had certified 260 Brazil nut-producing families in nine municipalities of Acre (Martins et al. 2008). Production rose from only 3629 tons in 1997–98 to 14 035 tons in 2011, a record volume (Martins et al. 2008, Embrapa 2012). A differentiated state tax on sales of processed Brazil nuts (removed from inner shells) to other states or for export provided a competitive advantage to local Brazil nut-processing plants, while adequate credit provided by the Amazon Bank, and training for cooperative and extractive families in good practices for collection, storage, and processing, stimulated expansion of industrial capacity in Acre. As a result, sales of shelled Brazil nuts from Acre decreased from 2410 tons in 2008 to 375 tons in 2011, while sales of shelled Brazil nuts increased from 638 to 858 tons in the same period (Embrapa 2012). Another important change was the growth of demand for processed Brazil nuts in the Brazilian domestic market, which absorbed 100% of the processed product from Acre in 2011 and led to importation of an additional 150 tons from Bolivia (Embrapa 2011).

A number of initiatives have been implemented to facilitate access to markets by forest households and communities, at both the local and national levels (see Box II 1.5). A project to develop management plans for *copaiba* oil begun in 1998 by researchers at UFAC, in collaboration with the state, produced the first NTFP management plan approved by IBAMA, reaching approximately 500 families in nine munici-

palities of the state (Leite 2004). Despite the potential pharmaceutical and cosmetics markets for NTFPs, connecting these markets to forest producers and products has been challenging (Schmink 2004). For example, *copaiba* oil shows substantial promise as a well-known "natural pharmacy" with many medicinal uses, but production is low and highly variable, and the oils themselves vary widely in colour and quality, making commercialisation more difficult (Leite 2004). Global prices for NTFPs may vary widely; Brazil nut prices ranged from as little USD 1.75 or USD 2.25 to USD 5 per can in 2000 but sold for as much as USD 8.50 per can in late 2005 (Cymerys et al. 2005, Martins et al. 2008). Moreover, smallholder cooperatives in Acre have often struggled to survive and to balance political, social, and economic agendas.

Alongside efforts to support NTFP production, state and international organisations have invested heavily in promoting community timber management, including inside the extractive reserves, beginning in 2012. A departure from traditional forest extractive traditions, timber management by communities is often costly and has uncertain returns, especially after the first harvests, and requires additional supporting state investments (Stone 2003, Rockwell 2005, Humphries and Kainer 2006, Rockwell et al. 2007,Fantini and Crisóstomo 2009). Models of future resource use among agricultural colonists in Acre suggest significant limits to timber markets as a source of income at the individual level (Vosti et al. 2002).

In the past decade, many rubber tappers have shifted their forest extractivist production strategies to include cattle raising, even inside the extractive reserves (Salisbury and Schmink 2007, Toni et al. 2007, Gomes 2009, GoA 2010a). In the upper Acre region, political and economic changes and positive cultural perceptions of cattle-based livelihoods have contributed to this expansion among rubber tappers and other rural groups (Hoelle 2011). A recent study in the Chico Mendes Extractive Reserve shows that deforestation rates have increased in some more accessible areas, approaching the 10% upper limit allowed, although the reserve area still is only 8% deforested and continues to provide a clear buffer against the deforestation pressures around its borders (GoA 2010a). More details on changing livelihoods in Acre's extractive reserves are reported in Box II 1.5. The increasing diversity of livelihoods within RESEX threatens to undermine the rationale for these sustainable-use units, and weaken the link between forest livelihoods and forest-based development policies.

1.3.2 Technical, managerial leadership

A new public institutional infrastructure has been created for forestry and smallholder production, technical assistance, small business development, and technology (SEF, SEAPROF, FUNTAC, SEBRAE) and new training programs developed at technical and professional levels. A study carried out in 2006 found that the state's extension programs were undergoing a transition (Cosson Mota 2006). Based on producers' social concerns about resource availability for future generations, an incipient dialogue with extensionists was emerging about environmental issues in production and support for practices such as maintenance of forests and recuperation of degraded areas. This dialogue was reinforced through the Proambiente program (Bartels 2009, Vadjunec 2011, see Box II 1.2). New technologies for SFM began to emerge from partnerships between the state government and forestry research institutions in Acre, including Embrapa (see Box II 1.6).

The comprehensive and intersectoral nature of the reforms undertaken in Acre far surpassed the limited talent pool of the state's small population to provide the necessary technical and social expertise in so many sectors and activities, a continuing obstacle to sustainability. Given the experimental and pioneering nature of many of the policies undertaken to support sustainable timber and non-timber management, and to implement participatory programs with communities throughout the state, few models are available; Acreans are heroically innovating in their approaches by drawing on whatever resources they can. Trained staffing of successive state and local governments, and of numerous new large statewide programs as well as the NGOs and civil society groups that support them remains a continuing challenge for the florestania proposal.

1.3.3 The role of industrial forestry

Acre state forest policies have focused with increasing emphasis and clearer successes on industrial forestry compared to community forestry. Until 1999, an estimated 90% of logging activities in Acre were carried out illegally (Brilhante 2000). Major resources have been invested by the state government in developing the local forest industry, attracting outside companies and developing certified timber management in the Antimary State Forest and in private forested areas through public-private partnerships. In 2006 a private timber company was recognised by winning second place in the Chico Mendes sustainable businesses prize awarded by Brazilian Ministry of the Environment, as well as the Planeta Cláudia Prize, based on its timber partnership with the rubber tapper com-

Box II 1.6 Technologies being developed and used for sustainable forest management in Acre

- *Modeflora*: In this planning method, permanent protection zones in which no harvesting is allowed are established around riparian areas and for areas with slopes greater than 20%. Individual trees (DBH≥35 cm) that will be harvested are identified during the forest inventory process. The locations of the protection zones and harvest trees are collected using global positioning system (GPS) receivers. The protection zone maps and GPS tree coordinates are then used in planning and execution of harvest operations
- *LIDAR for forest planning and monitoring*: The use of LIDAR (Light Detection and Ranging, an optical remote-sensing technology) in forest management is not new. It has been successfully used in temperate forests with similar restrictions to those of the Amazon. The experience obtained in those regions indicates that LIDAR is an efficient technology for producing high-quality ground information at relatively low cost. The technology has been used in managed areas in the Antimary State Forest. With the data obtained from these LIDAR flights, researchers developed a regression equation and generated digital models for: forest coverage, logging impacts, aboveground biomass and carbon stocks, determination of permanent preservation areas, watersheds, and high-resolution topography.

munity of São Luiz do Remanso, in the municipality of Capixaba (Xangai 2006). The Xapuri Industrial Complex, including a flooring factory, has adapted to shifting global markets by seeking new products such as doors and windows; meanwhile Xapuri carpenters producing furniture for local markets were reduced to illegality due to the state's focus on high-end export products (de Araújo 2011, 2012). Acre's designation as an Export Production Zone (ZPE) is designed to attract Brazil's logging companies interested in new markets such as China (GoA 2011). In 2011 sales by Acre's forestry sector to other states amounted to USD 33 million, with processed wood and Brazil nuts representing 70% and 26% of the total, respectively (GoA 2012.). From 2009 to 2011 the Natex factory produced 60 million condoms that were absorbed by the National STD/AIDS Program of the Brazilian Ministry of Health.

1.3.4 Trees outside forests, including agroforestry

Agroforestry programs have been promoted by both local and national NGOs and the state government's extension agency (Nobre 1998, de Araújo 2010). In 1998, the Rio Branco municipal government began planning a series of agroforestry poles to resettle rural-to-urban migrants and recuperate degraded lands through production for urban consumers (Slinger 1997, 2000), which were expanded throughout the state after 2000. Since 2011, state programs have been developed to promote planting of 25 000 ha of trees, including rubber trees to serve as a future source of supply for the state's condom factory (which uses regionally produced local latex) and to increase the potential to capture environmental services payments (GoA 2011).

Current government support programs focus on developing markets for aquaculture and for fruit pulps. In 2010 the state government launched a very ambitious USD 125 million aquaculture program involving small, medium, and large farmers that aims at producing, processing, and exporting 20 000 tons per year of fish products to other regions of Brazil and to other countries. This project includes a fish seed production unit and a fish processing and packing plant.

Since 2003 Embrapa Acre and the government of Acre, with the financial support of the Ministry of Agriculture, Livestock, and Food Supplies, in partnership with local NGOs and farmers, has developed a program to integrate trees into pastures (Arbopasto Program) that planted more than 50 000 trees into pastures to provide shade and improve live weight gains of crossbred Nelore x Aberdeen steers (Pereira 2004). Since 2001, Embrapa has also been developing an on-farm research program in partnership with the Federation of Rural Workers of Acre (FETACRE) aimed at developing integrated crop-livestock-forestry production systems adapted to the socio-economic and environmental conditions of small farmers in Acre. This research program is supported by the Brazilian National Environmental Fund (de Oliveira et al. 2012).

1.4 Research and monitoring

1.4.1 Research programs

Acre's SFM efforts have been supported by technological research carried out by Technology Foundation of the State of Acre (FUNTAC) and Embrapa, as well as research by professors and students at UFAC and by international collaborators. WWF had a regional office in Acre and has provided important supports to the Acre programs on SFM, especially certification. The University of Florida has collaborated with UFAC, PESACRE, CTA, and Embrapa since 1987 on interdisciplinary research and training (Schmink 1992), producing more than 100 research publications by 2012, including new research on methods for estimating Acre's carbon stocks (Salimon et al. 2011) and on the impacts of the paving of the Interoceanic Highway (Southworth et al. 2011, Perz et al. 2012).

Since 1995, Embrapa has carried out research and training activities to develop and adapt new techniques and sustainable production systems of wood and non-wood tree forest products designed for small-scale production (Stone 2003). These efforts resulted in recommendation and adoption by Cooperacre of good production and processing practices for Brazil nut production that reduced aflatoxin contamination, which previously restricted exports of the product, thus adding value and ensuring product safety. Embrapa Acre also recommended precision forest management (already adopted in more than 80 000 ha of managed forests by large producers) and low-impact forest management systems for small farmers (with limited adoption by settlers and extractive families). The latter program included research on forest dynamics of logged areas; ergometric and economic studies on forest operations, logs processing and transportation; and portable sawmill and micro-tractors use and adaptation. Training was provided to smallholders in forest inventory; chainsaw and portable sawmill use and maintenance; handicrafts and woodworking; rural business; and community organisation. The Chico Mendes Institute of Conservation of Biodiversity (ICMBio) is considering applying this method in RESEX, in order to avoid using heavy machines. In other areas, community forest management is performed through contracts between the community and forest companies.

1.4.2 Monitoring programs

The monitoring and evaluation of SISA will be based on a variety of institutional partnerships. FUNTAC tracks deforestation, fires, and forest degradation through National Institute for Space Research (INPE) remote sensing technology, as well as using more accurate higher-resolution images of the state (EDF n.d). In terms of measurement, reporting, and verification (MRV) of carbon emissions, Acre is using the baseline created for the State Plan for Control and Prevention of Deforestation, which is based on historical deforestation and emissions-reduction targets. The second version of the baseline will include future projections based on a scenario without governance, to be validated through the use of data from the Basin Restoration Program (PRODES), the ZEE Plan database, and state vectors of deforestation. Monitoring emissions reductions over time will involve partnerships with Woods Hole Research Center (to monitor land use), Amazon Environmental Research Institute (IPAM) (to monitor forest degradation), and Embrapa (to elaborate a forest biomass inventory), among others. Acre also is purchasing a LIDAR-equipped airplane (see Box II 1.6) and has signed an agreement with the Carnegie Airborne Observatory for training in the use of CLAS-lite systems to measure forest carbon and forest cover change (EDF n.d). Additionally, Acre's government is conducting a social-environmental monitoring and evaluation initiative in the Zone of Priority Assistance (ZAP) BR-364, between Feijó and Manoel Urbano, through a partnership with the WWF Sky project.

1.5 Projected future trends in the conditions considered

Stabilisation of deforestation is a key achievement in Acre, which was possible due to several interacting policy factors at federal and state levels. These included: 1) the increased governmental (both federal and state) capability to monitor, identify, and penalise farmers who deforest illegally; 2) the decision of the National Monetary Council to prohibit public credit for farmers on the list of illegal deforesters; 3) the legal actions of the federal and state public defenders offices prohibiting the use of fire in Acre; and 4) the social policies implemented by the federal government that supply low-income families' with monthly cash transfers through programs such as Bolsa Familia and Bolsa Floresta. With the effective prohibition of new deforestation, and the support of a multitude of new programs and technologies, a promising sustainable development scenario has been launched in Acre. The challenge now is to ensure its continued sustainability and equity.

Projected increased demand for wood in national and international markets provides opportunities for Acre's timber exports in the future through the continued management of certified public forests (SFB and IPAM 2011), still controversial as a sustainable project (Zimmerman and Kormos 2012). Signifi-

cant advances have been made in establishing and supporting innovative approaches to forest-based development in Acre, but significant challenges remain. The ongoing emphasis in national policy on agricultural and infrastructural expansion through the Growth Acceleration Program (PAC) (de Castro 2012, Salas 2012) is mirrored in modernising efforts in Acre. Land-use and livelihood shifts from forest product extraction to agriculture and cattle, even among smallholders, have triggered deforestation in many areas, raising questions about the long-term viability of RESEX as a sustainable-use reserve. Expansion of larger clearings in Amazonia has been effectively halted by Brazil's Forest Code (which requires that 80% of each holding be kept in forest), whose terms were approved by the National Congress and sanctioned by the president of Brazil in 2012, with many parts pending further regulation by the federal government. Climate extremes such as Acre's drought in 2005 and heavy flooding in 2012 could exacerbate the environmental effects of changing land-use trends. The recent completion of the Interoceanic Highway, which connects Brazil with Peruvian ports via Acre, presents new challenges and opportunities for the state (Hamilton 2006, Southworth et al. 2011, Perz et al. 2012).

Rapid socio-political changes also pose new challenges, including the political weakening of the rubber tapper social movement, the decline in rubber tapping and of the rubber tapper identity, the lack of interest in tapping rubber by younger rural populations, continued rural-to-urban migration, and the growing influence of urban and "cowboy" cultures over the forest-based identity, still kept alive by the government's strong emphasis on Acrean cultural pride (Wallace et al. 2008, Schmink and Cordeiro 2009, Hoelle 2011, Schmink 2011, Vadjunec et al. 2011, Gomes et al. 2012). Ironically, the government's embrace of the goals and ideals of the rubber tapper social movement and involvement of key leaders in government positions and councils has weakened the social movement itself, contributing to the changes in perspective between older activists and younger generations. Despite strong potential for carbon marketing and for new pharmaceutical products (Martins et al. 2008), proposals for environmental services programs, and other market-based mechanisms remain controversial, criticised by some for "commodifying nature" (Conant 2012, Lang 2012, Letter from the State of Acre… 2012, Paula 2012).

1.6 Conclusions

Acre's experiments in forest citizenship policies have been designed to encompass a comprehensive approach to building institutional capacity, linking policies across sectors, and involving civil society in decisions. Tensions remain both inside and outside the government between politically popular "developmental" measures, such as road building and industrial development, and environmental enforcement and attention to small producer needs (Sant'Ana 2004), especially with the weakening of the rubber tapper social movement. These tensions underscore the ongoing difficulty of balancing long-term sustainability against the changing short-term demands of electoral cycles and the need to provide immediate social benefits.

The Acre experiment with long-term investment in forest-based development, implemented in close synchrony with national and international policies and pressures for SFM over the past two decades, represents the most sustained and comprehensive approach to sustainable development in the Amazon basin; it is an important example for understanding the local impacts of global issues and policies focused on forest management. An impressive new set of laws and institutions have regularised, strengthened, and expanded forestry production and state economic development. Modernisation of public administration and the opening of policy-making to citizen input, as well as improved infrastructure and institutions, all contributed to the impressive gains in expansion and improvement of forest-product market chains in the state, stabilisation of deforestation, and measureable improvements in life quality for many Acreans, despite many remaining gaps and weaknesses. The state constitutes a laboratory for experimentation with many forms of forest-based development currently being proposed by international and national actors.

Several factors have favoured success in Acre, including its intact forests, strong social capital, and manageable size. The mobilisation of forest-dwelling communities and their strong alliances with environmental and human rights activists provided the impetus and the vision of an alternative development approach based on the forest. An enduring favourable political conjuncture (over a decade) and capable leaders were able to place Acre at the centre of new proposals for sustainable development in the tropics, with all the inherent risks and uncertainties – not least of which is the impact of the very changes unleashed by development on Acre's changing society and landscape.

Given the rapid socio-economic and environmental changes underway in Acre, the remaining challenge is to sustain these impressive achievements – both the commitment to curbing deforestation and to

forest-based development, as well as the strong social compact based on equitable participation that underlies it. Both depend on maintaining political support and collaboration between state leaders and the social groups they represent within the reality of new generations of Acreans living in cities and removed from the historic battles and victories that changed Acre's history. To continue to build and sustain technical and political support for Acre's Forest Government experiments will require a sustained refocus on the forest sector and continuing long-term investments in the development of human and technical capacity in public, private, and community sectors.

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Model Forests in Argentina: Creating place and time for participatory sustainable forest management

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Abstract: This chapter presents the Argentine experience in fostering sustainable forest management (SFM) through the construction of a shared forest culture and the creation of spaces for participation. This ongoing process began 18 years ago, when the Directorate of Forestry of the Secretariat of Environment and Sustainable Development adopted the Model Forest (MF) concept that was first initiated by Canada in 1991. Stakeholders' participation proves to be a critical factor in advancing forest culture and promoting SFM. The Federal Government endorsed legal instruments providing for SFM, forest plantation and provincial capacity-building and institutional strengthening. This institutional framework allows MFs to reinforce their role in providing spaces for stakeholders' participation, particularly marginalised and vulnerable actors. MFs address SFM and promote sustainable livelihoods by enhancing entrepreneurial and accounting skills, fostering production diversification, increasing awareness of traditional and scientific knowledge, and involving the input of more stakeholders into forest land-use planning. Networking activities let MFs exchange experiences and carry out joint activities related to SFM.

Keywords: Forest policy, participatory governance, sustainable forest management, local level indicators, stakeholder, Model Forest

2.1 Introduction

During the period of colonisation of the area that became Argentina, indigenous traditions and culture became less prominent as the colonial perceptions became more dominant. From the actions of the colonialists, it is evident that they considered forests an unproductive use of land in contrast to agriculture and ranching (Gabay et al. 2011). As the global demand for Argentina's agricultural products rose, the pressure to convert native forestlands to agriculture uses increased resulting in the loss and degradation of much of Argentina's forests (SAyDS–Dirección de Bosques 2007).

Well aware of this heritage, the Directorate of Forestry of the Secretariat of Environment and Sustainable Development in Argentina recognised the benefits that Model Forests (MFs) could bring to its own sustainable forest management (SFM) effort (see Box II 2.1 for MF concept). In 1995, the directorate contacted the International Model Forest Network (IMFN)[1] and organised the inaugural Argentina MF (AMF) workshop in early 1996 to establish a national network of MFs.[2] There are currently six MFs and one under development in Argentina (Figure II 2.1, Table II 2.1). AMFs, like other MFs around the world, have governance structures that involve stakeholders from the public sector, farmers, academia, private sector, civil society, grassroots organisations, and indigenous communities. Participants work as equal partners to reach consensus on their organisational vision and on strategic lines of action to achieve local-level sustainable development (SD) with an emphasis on sustainable livelihoods and poverty alleviation based on SFM and the diversification of forest-based products.

[1] More information at www.imfn.net.

[2] For further information, visit www.ambiente.gob.ar/bosques_modelo.

Source: Unidad de Manejo del Sistema de Evaluación Forestal (UMSEF) – Dirección de Bosques de la Nacion, Secretaría de Ambiente y Desarrollo Sustentable de la Nación (SAyDS) (2014).

Figure II 2.1 Map of Model Forests in Argentina.

MFs foster the involvement of stakeholders having a wide range of forest values and interests into equitable and inclusive processes related to developing sustainable forest landscape planning and local forest-based development. At the same time, each site achieves a global connection with peers through their involvement in the IMFN and the Ibero-American Model Forest Network (IAMFN). In 2002, Argentina proposed a joint initiative together with Chile and the Dominican Republic to facilitate the exchange of information and experiences at the regional level. With the involvement of more MFs having Spanish as their common language, this sub-network evolved into the present-day IAMFN.[3]

There is neither a textbook nor an instruction manual that outlines the formula for SFM of any given area, so MFs, as experimental organisations themselves, must develop and try different ways to discover how best to contribute to the practice of SFM. By observing and reflecting on their activities, MFs gather insights into what is possible to do and what is not and hopefully gain understanding of why and how their actions affect progress towards SFM. This chapter provides insights into the MF SFM experiences in Argentina since 1996.

[3] For more information, visit www.bosquesmodelo.net.

Box II 2.1 The Model Forest concept

"*A Model Forest is a large scale, forested landscape identified by a group of stakeholders who represent a variety of forest values, land uses, resource management administrations, and land ownership arrangements. The stakeholders voluntarily collaborate to develop and demonstrate Sustainable Forest Management practices relevant to the Model Forest area through those who have land use decision authority. All Model Forests are active members of the International Model Forest Network*"*

The implementation of the concept of Sustainable Development in forestry, which became known as sustainable forest management (SFM), was a proposition that held great attraction among the public in the late 1980s and early 1990s (Hall 1996/97). The implementation of SFM posed a series of operational challenges. At that time there was no comprehensive understanding of the breadth of values held for forests. Estimating future forest values was problematic. It was also difficult to assess the impact possible forest management decisions would have on the complexity of social, economic, and environmental circumstances and on the associated diversity of forest values. It became necessary to involve the public in SFM in a meaningful and accountable way to determine and to manage for the breadth of forest values beyond timber extraction and that required the creation of a new approach to forest management.

The solution proposed was to establish a network of organisations based on an iterative round table of stakeholders representing a broad array of forest values and bringing intellectual, practical, and legal authority to the table. These groups were called Model Forests (MFs) in reference to the intent that they provide innovative approaches to SFM that others could learn from or model. Participation in MFs is voluntarily and each participant agrees to work together over time in a self-organised, respectful, equitable, and learning culture to develop, implement, and report on acceptable, credible, and practical approaches to SFM within the social, environmental, and economic circumstances of interest to the group. MFs, as organisations, have no management authority over the land nor do they hold tenure; rather, they strive to include in their round tables those having such authority. Governments and the participants provide funding and expertise to support logistics and activities related to SFM and each MF employs a small number of staff to manage its activities. A national secretariat coordinates network-level activities with support from the federal government. As a process with primarily a practical, local focus, MFs by definition participate in the MF network to gain and share experiences at the broader and more global scale and to help each other progress towards SFM (IMFN 2008b).

* Personal communication with John E. Hall, former National Manager of Canada's Model Forest Program, Natural Resources Canada, Canadian Forest Service, Ottawa, Canada.

Table II 2.1 Argentine Model Forests.

Name	Launch	Approval	Area (ha)	Forest region
Formoseño MF	1996	2001	800 000	Parque Chaqueño
Futaleufú MF	1996	1998	736 000	Bosque Andino Patagónico
Jujuy MF	1999	2002	130 000	Selva Tucumano Boliviana
North of Neuquén MF	2001	2007	1 500 000	Bosque Andino Patagónico
San Pedro MF	1997	2007	443 500	Selva Paranaense
Tucumán MF	2005	2008	180 000	Selva Tucumano Boliviana
Malargüe MF	2011	Under development	To be defined	Monte

Source: SAyDS – Dirección de Bosques – PNBM 2010. Iniciativa de la Red Nacional de Bosques Modelo sobre Criterios e Indicadores de Manejo Forestal Sustentable. Note: There were two previous initiatives to create San Pedro MF: in 1997 and in 2001. The economic and political crises then interrupted the process. In 2007, a new and successful process was launched.

2.2 Policies, institutions, and governance

2.2.1 Land tenure and rights to forests and trees

Over the past 20 years, the legal context of forestry in Argentina has changed. New national laws and adjustments in the constitution support the resolution and clarification of rights of tenure of indigenous communities to ancestral land[4,5,6] and surface rights to trees to promote an increase the area of forest plantations[7], and formalise in law the constitutional right of Argentineans to a healthy environment[8,9]. These new laws and rights create the regulatory foundations that are the prerequisites for the development and implementation of SFM strategies and practices[10] and have created a supportive policy context for MFs.

Historically, forests and forestry-related issues lacked visibility on the national agenda; therefore, the enactment of the new laws referred to in this chapter mark an important milestone regarding SFM and conservation. However, the implementation process is complex and demands a sustained effort in order to strengthen the national and provincial authorities and enhance inter-jurisdictional coordination. The challenge, once such laws are enacted, is to translate their intent into changes in the decisions and actions on the ground that affect progress towards SFM; this is where MFs have focused their attention.

2.2.2 Public administration and law enforcement

The essential prerequisites of SFM are political will and established tenure. The expression of and respect for the forest values held by stakeholders over time is also necessary to build the complex processes and practices that lead to SFM. These values must be considered within an understanding of the potential intended and unintended impacts that actions to meet stakeholder interests can have on progress towards SFM (Hall 1993). MFs are designed to discover the balance among these considerations.

MFs are voluntary associations that agree to work together towards SFM in their areas. MF organisations do not hold tenure nor do they have land management authority; however, they do seek out and encourage those with such authority to become participants. In this way, MFs help develop and provide the information decision-makers (individual or groups) need to make decisions that support or contribute to SFM within their own areas of jurisdiction and responsibility. MFs articulate knowledge and provide advice and information that supports SFM to administrations responsible for law enforcement.

As participants or close collaborators, tenure holders can share their practical experience and perspectives in the SFM dialogue to help ensure that MF project design and objectives for SFM include practical and realistic constraints and opportunities. Organisations and individuals with tenure that are involved in MFs can also provide opportunities for field tests and inform reporting on SFM trial projects.

[4] A consequence of Argentina's endorsement of the International Labour Organisation (ITO) Convention 169 in 1992. The National Constitution of Argentina recognises indigenous peoples' rights and provides them legal entity (article 75, paragraph17).

[5] Law No 26,331 (2007), Minimum Standards of Environmental Protection for Native Forests, establishes rules for the use of land for the rational and sustainable management of native forests and provides for financial support to the provinces to compensate for forests' environmental services. Provinces classify native forests in three conservation classes according to ten criteria set forth by the law.

[6] Law No. 26,160 provides for a nationwide survey to define indigenous territories and established a blanket ban on evictions of indigenous communities from 2006 to 2013 that was extended until 2017 under Laws No. 26,554 and 26,894.

[7] Law No. 25,080 (1999) and Law No. 26,432 provide regulations with financial support for doubling the area of industrial plantation forests (to 3M ha) over 10 years, a plantation inventory, technical transfer agreements with international organisations and tax benefits and economic support for Argentine and foreign investors in establishing plantations and developing timber industries.

[8] Law No. 25,675 (General Environmental Law) regulates the constitutional principles described in Article 41 of the Constitution and determines the minimum requirements for environmental management that are sustainable and suitable for the environment, preserving and protecting biological diversity, and implementing sustainable development to provide basic environmental conditions that are equal throughout Argentina.

[9] National Constitution of Argentina, Article 41 (added by the constitutional Reform of 1994): "All inhabitants have the right to a healthy and balanced environment, suitable for human development, so that productive activities satisfy present needs without endangering those of future generations; and have the duty to preserve it."

[10] Available at http://www.infojus.gov.ar/legislacion/ley-nacional-26331-presupuestos_minimos_proteccion_ambiental.htm?3.

MFs promote SFM and play a role in enhancing the awareness of those in public administration and law enforcement that there are new laws for SFM and that there are changes in tenure arrangements and rights of MF stakeholders as well as new practices in resource management for SFM as a result of activities of the MF(s).

MFs hold no authority over the decisions of individuals nor do they have any authority over the choices made by other organisations. Participation in a MF does not mean that any individual or organisation relinquishes its autonomy nor are they obligated to follow MF findings or recommendations. Rather, the MF is an organisation that aspires to include all stakeholders that can affect the goal of SFM either positively or negatively. MF participants understand that it is just as important to include those who can detract from SFM as it is those who can support it because changing the attitudes and behaviour of detractors can often reduce their potential negative impact on SFM. Inclusion is an important avenue towards understanding what motivates stakeholder behaviour.

Through collaboration among their participants, MFs seek to develop practices that contribute to broader community aspirations for SFM, ideally by satisfying the needs of those who hold land tenure and those with decision-making authority so those with authority choose to adopt and implement the proposed SFM practices because they make sense. In practice, MF organisations must often work towards SFM without the involvement of all desired stakeholders. MFs keep their doors open to demonstrate that new stakeholders are welcome to enter the MF SFM dialogue at any time. In this way, the MF is able to offer insights into local circumstances and provide direct or indirect assistance to the efforts to implement new national laws aimed at supporting SFM.

2.2.3 Direct actions towards SFM at the Model Forest level

Law No. 26,331, Minimum Standards of Environmental Protection for Native Forests, approved in 2007, provides incentives for SFM and for forest conservation by prescribing mandatory forest categorisation according to a set of criteria related to the environmental, social, and economical value of forests. The application of this law covers a wide range of forest uses, ranging from preservation to land-use transformation for agriculture.

MFs, as a network of local, practical, inclusive, consensus-based platforms for SFM planning at the landscape level are well-positioned to participate and often to lead in the development and implementation of initiatives under these laws. MFs can help identify local issues and build acceptable ways to support implementation on the ground of the new laws regarding tenure and SFM. For example, MFs are active participants in the process of forest categorisation and land-use planning within the framework of Law No. 26,331(RIABM 2009, 2010, 2011, 2012). Formoseño MF took part in the development of the Province of Formosa land-use management plan, particularly in the Strategic Plan for Local Development (Provincia de Formosa 2007), as well as the workshops leading to the forest categorisation prescribed by Law No. 26,331. Tucumán MF offers another good example of MF involvement in public policies through its support of the organisation of forest categorisation workshops throughout its home province[11]. Moreover, Tucumán MF collaborates with the provincial government in development of management plans for two protected areas: Ibatín Provincial Park and Santa Ana Provincial Nature Reserve (Tucumán MF General Manager's Progress Reports 2012–2013, RIABM 2012).

To help encourage SFM and conservation, Law No. 26,331 also recognises that native forests provide environmental services and provides for compensation for protection of these services under the National Fund for the Enrichment and Conservation of Native Forests. These funds are provided to the provinces to support the implementation of SFM and conservation plans. Landowners can apply to their province for support for SFM or conservation plans that meet the minimum standards under guidelines of the Federal Council for the Environment (Consejo Federal de Medio Ambiente 2012). There has been substantial interest in this fund and widespread improvement in sustainable land-use decisions is expected since 2475 plans received support from the fund in the first three years of implementation (2010–2013), totalling USD 116.8 million.

Before the enactment of these new laws with the attached funding, effective law enforcement by habitually poorly funded public agencies was difficult. Under Law No. 26,331, 30% of the National Fund is designated for institutional strengthening to enhance monitoring of native forests and assisting indigenous and peasant communities to participate in SFM. It is expected that reinforced provincial monitoring and enforcement capacity will advance forest governance to reduce illegal logging and other informal activities detrimental to SFM. Furthermore, the Secretariat of

[11] Personal communication with Daniel Manso, former Director of Flora, Wildlife and Soil – Ministry of Production Development, Province of Tucumán.

Environment and Sustainable Development is coordinating a regional initiative aimed at producing a unified mechanism to ensure legal timber chain of custody. This System of Forest Management, Control, and Verification[12] has been launched for Chaqueño Park, the region where Formoseño MF is based. MFs are contributing to this effort by promoting awareness about Law No. 26,331 and facilitating development of and helping in implementation of local SFM and conservation plans.

The MFs contribute to the land-tenure regularisation process under the new laws, giving particular attention to the need of indigenous communities and Creole farmers to formalise their traditional property rights. By establishing a process to support a program of soft loans as provided by the provincial government, the Formoseño MF created opportunities for small-scale farmers to purchase land and regularise their tenure claims.[13] Formoseño MF has also mediated negotiations between two indigenous communities to agree on their respective use of ancestral land in Tres Palmitas.[14] Similarly, San Pedro MF has helped in articulating land-tenure issues of indigenous communities (Arce 2013).

MFs are aware that their influence has limits: not all tenure situations have been resolved. For example, a large proportion of land tenure around the Futaleufú MF remains concentrated among a few large-scale foreign landowners that have not yet engaged in tenure discussions as proposed by the MF. The main challenge in the ongoing tenure review processes is that land uses are changing due to the expansion of the agricultural frontier into marginal forest areas (Brown 2013). Marginal forestland without clearly described tenure is where indigenous communities are often located. These lands are also commonly used for formal ranching. Those who can take advantage of rising commodity prices are converting marginal forestlands to agricultural uses, which, in turn, uproots indigenous and peasant communities and eliminates grazing access. As a result, new settlements and formal grazing activities are located even further into the native forests, resulting in more widespread ecological degradation.

Laws No. 26,331, 25,080 and 26,432 provide a federal framework for the implementation of SFM and plantation forests. These laws have proved to be effective in advancing SFM and conservation. Small-scale landowners and indigenous communities struggle to support themselves from traditional methods. Some provinces have developed strategies, in collaboration with MFs, aimed at achieving sustainable economic units based on diversification that include forestry as a key activity (e.g. Province of Misiones and San Pedro MF). Formoseño and San Pedro MFs, have been working with their medium- and small-scale farmers in diversifying their range of economic activities by taking advantage of funding for forest plantations. Formoseño MF helped locals establish 160 ha of plantations (Formoseño and San Pedro MF General Manager's Progress Reports 2007–2013), and in the San Pedro MF area, there are 14 557 ha of plantation forests for which tax incentives will be sought).[15]

The forest plantation subsidies under Laws No. 25,080 and 26,432 help small-scale Creole farmers and indigenous communities implement silvopastoral projects and improve the availability of fodder for cattle in ways that do not lead to deforestation (Formoseño MF General Manager's Progress Reports 2010–2013, RIABM 2009, 2010, 2011). The pilot projects show that improved cattle management techniques put less pressure on the natural forest for fodder and enabled farmers to improve income with reduced numbers of animals. Tucumán MF has brought stakeholders from the public and private sector to participate in planning and conducting SFM activities and organising workshops for forestland categorisation within the framework of Law No. 26,331.[16] Futaleufú MF partners developed best practices for cattle management within forestlands attaining results similar to those of Formoseño MF (SAyDS–Dirección de Bosques–Programa Nacional de Bosques Modelo 2011, 2012) and is active in the development of a regional forest plan for Patagonia (SAyDS–Dirección de Bosques and CIEFAP 2010, Van den Heede et al. 2011).

Local culture and traditions often treat natural resources as inexhaustible, resulting in unsustainable choices. These engrained habits must be changed for SFM to occur. To address this, Formoseño MF is engaged in an ongoing strategy of capacity-building for SFM that includes local people in SFM research, local consultation processes, and workshops that bring experts and locals together to identify and compare the impacts that browsing by indigenous herbivores and cattle has on natural regeneration over time.

The Argentine Model Forest Program (AMFP)

[12] More information available at: http://sacvefor.ambiente.gob.ar/

[13] Personal communication with Noel Carlos Paton, Formoseño MF general manager.

[14] Personal communication with Noel Carlos Paton, Formoseño MF general manager.

[15] Further progress is expected through the implementation of the Project ARG/12/013, Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

[16] Personal communication with Daniel Manso, former director of Flora, Wildlife, and Soil, Ministry of Production Development, Province of Tucumán.

helped develop the Argentine System of Forest Certification (CERFOAR), which is currently being reviewed for certification by the Program for Endorsement of Forest Certification (PEFC).[17] The Argentine Model Forest Program (AMFP) developed a capacity-building project to prepare the MFs to implement CERFOAR locally. The AMFP is a member of the national Forest Stewardship Council (FSC) framework.[18]

2.2.4 Participation and stakeholder cooperation

Stakeholder participation in the MF

At its core, the MF is a local, inclusive stakeholder group with a focus on SFM and sustainable local development. MF organisations are enabling spaces that foster the meaningful involvement of stakeholders in their participatory governance structures based on equitable, respectful, and responsible dialogue (Cornwall et al. 2011). MFs work to provide all stakeholders with equitable opportunities to have a meaningful role in developing, testing, and assessing approaches to SFM (Gabay 2013a). MF capacity-building initiatives help participants become more effective by helping them gain more knowledge and insight into a broad range of SFM issues and experiences. This helps those who have normally been marginalised or consistently excluded from collaborative processes to strengthen their voices in the SFM dialogue.

MFs also include representatives from all levels of public administration (e.g. the Secretariat of Environment and Sustainable Development; Ministry of Agriculture, Livestock, and Fisheries; National Institute of Agricultural Technology; National Parks Administration; and provincial Ministries of Production, Environment, Rural Development) as stakeholders. These public employees bring to the MF table their interest in pursuing the constitutional mandates of their organisations to promote progress and well-being while preserving the environment as well as their professional expertise, leadership, and intellectual resources. These mandates align with the MF objective of SFM. Governments at all levels are responsible for enforcing implementation of public regulations that govern natural and plantation forests and land tenure in indigenous communities. They also foster SFM and rural development through capacity-building and technological innovation programs targeting small- and medium-sized farmers and indigenous communities. Provincial organisations also deliver SFM-related programs and often channel national SFM program funds into their local areas. Municipal representatives with MFs are important collaborators, project leaders, and supportive participants in the governance structures of all MFs.

Farmers, indigenous communities, and grassroots organisations are MF key stakeholders because they make decisions every day that affect natural resources. Most intervention approaches to SFM and local development usually consider this population simply as beneficiaries or recipients of projects, often relegating them to a passive and unproductive role. MFs involve these stakeholders in the dialogue, empowering them to be protagonists of their own development needs and to articulate the impact land management decisions (both their own and those of others) have on them. Many farmers tend to adopt the stance that forests are unproductive and only good for converting to croplands or for forage and fuel wood extraction. MFs work to change this cultural view by fostering a broader understanding and acknowledgement of the role and value forests provide to all. In contrast, many local, indigenous communities value forests as their home and main source of food, medicine, energy, and craft and construction materials. Forests are crucial in their culture and spiritual beliefs. MFs encourage cooperation among small-scale Creole farmers through the development of grassroots organisations that empower them with more effective bargaining skills to protect their resources while helping make changes that improve their productivity.

Academics participate in MFs and contribute their expertise in research, innovation, and improvement of local production and SFM. They often take leadership roles in capacity-building and field activities. Civil society organisations related to forests, rural development, and indigenous communities are valuable MF members and bring funding and support for capacity-building related to environmental issues, participatory planning and local economic development.

Developing and reporting on local-level indicators to measure MF progress towards SFM

A good example of the MF participatory approach is the collaborative and inclusive process used to develop, test, and report on a suite of local-level indicators (LLIs) to measure progress made towards SFM in MF areas. MFs, like any responsible publicly funded organisation, need such a monitoring and reporting system to demonstrate accountability and

[17] PEFC 2013. Argentina seeks PEFC endorsement. Available at: http://pefc.org/news-a-media/general-sfm-news/1325-argentina-seeks-pefc-endorsement.

[18] It has been organised as a non-profit organisation called Asociación Civil Consejo de Manejo Responsable de los Bosques y Espacios Forestales.

efficiency (Principle 5 Program of Activities, IMFN 2008a). By late 2005, the AMF organisations had matured and were capable of effectively engaging in and benefitting from a large-scale technical transfer and networking activity. The AMFP requested and received technical support from the Canadian Forest Service (CFS) and Canada's Model Forest Network (CMFN) to transfer CMFN experiences and expertise to the Argentine Model Forest Network (AMFN) related to development and implementation criteria and SFM LLIs based on the Montreal Process criteria and indicators (Proceso de Montreal 2009) and MF principles-and-attributes framework (RIBM 2007) of the International Model Forest Network Secretariat (IMFNS).

The LLI project objectives are:

- Build and implement, through a participatory process, an LLI framework for monitoring and reporting on progress towards SFM across the AMFN that satisfies the IMFNS principles-and-attributes framework and reflects the internationally accepted definition of SFM agreed to by Argentina and the countries in the Montreal Process and Argentina's other international SFM commitments
- Strengthen local capacities to enable active participation in the ongoing development and implementation process for LLIs within Argentine MFs
- Contribute to and combine knowledge from local, national, and international levels to provide inputs for policies aimed at improving SFM

The AMFs produced their LLIs for the SFM framework through a series of participatory joint workshops with representatives from all the AMFs and experts from the CFS and the CMFN (MF of Western Newfoundland and Labrador). These joint workshops shared the LLI experience from Canadian MFs. Members of the CMFN had benefitted from the deep commitment of many stakeholders that brought a broad array of forest values, skills, and perspectives to Canada's MF LLI process. The AMFs sought similar engagement from its MF stakeholders though a series of national and local participatory workshops. The LLI process entailed the active involvement of local stakeholders working together with the AMFP team to develop this SFM monitoring tool to be implemented in their MF (Box II 2.2).

After a series of alternating joint, national, and local MF workshops over three years, the MFs completed and implemented a framework of six criteria (adopted from the Montreal Process) and 31 MF LLIs (Table II 2.2). The LLI process and the results of the LLI application were presented by a number of MFs at the XIII World Forestry Congress (2009), Buenos Aires. By 2011, all 31 indicators were measured in the six active MFs, which established a baseline for monitoring progress towards SFM. Work has begun on a second round of LLI measurements for a national report.

2.2.5 Reconciliation of different land uses

MFs are designed to proactively seek out and work with stakeholders who represent the breadth and depth of land uses. MF Principle 2 requires that MFs comprise "a large-scale biophysical area representing a broad range of forest values, including social, cultural, economic, and environmental concerns". MFs therefore focus on "a working landscape reflective of the diverse interests and values of the stakeholders and the uses of the area's natural resources". MF Principle 3 requires MFs to commit to "the conservation and sustainable management of natural resources and the forested landscape" (IMFN 2008a).

To affect progress towards SFM, MF participants seek to understand the choices of land use as well as the conditions under which those choices are made. With this knowledge, MFs develop and test choices in land use that will best bring balance to the sustainability and distribution of social, economic, and environmental benefits derived from the land over time. Change for SFM is incremental within the dynamic social, environmental, and economic systems that define MF circumstances. Argentina's new forest laws and their accompanying funds have invigorated the pursuit of SFM by the MFs. The MF conceptual framework and the availability of human and financial resources help MF participants identify and, where necessary and possible, reconcile land uses within the MF area in support of SFM.

When the general manager of the Tucumán MF was appointed director of Flora, Wildlife, and Soil of the province's Ministry of Production Development, the result was a higher profile for the MF approach within the provincial government, at a time when Law No. 26,331 required the provinces to classify their forestlands. Tucumán MF worked closely with the province to organise workshops for public participation in forestland categorisation, using the MF methodologies that engage stakeholders in informative dialogue (RIABM 2010). The MF approach successfully gained effective participation of a wide range of stakeholders that helped articulate the land uses in the area and led to a better stakeholder understanding that their inputs are valuable and essential for SFM (RIABM 2009). In a similar way Formoseño and Futaleufú MFs helped the forestland categorisation process launched in their areas (Formoseño MF General Manager's Progress Reports 2007–2010).

Table II 2.2 Argentina's National Model Forest Network's criteria and local-level indicators.

Criteria	Local level indicators
Criterion 1. Conservation of biological diversity	• Area by vegetation type • Surface of protected areas in IUCN categories • Effectiveness in managing protected areas
Criterion 2. Maintenance of the condition and productive capacity of forest ecosystems	• Area of forest designated for production of timber and/or non-timber forest products • Area of forest affected by processes or destructive agents • Area of forest designated for timber production and/or non-timber forest products, under responsible forest management • Area of vegetation by types, classified according to their primary use
Criterion 3. Conservation and maintenance of soil and water resources	• Area of forest designated primarily for protection of soil and water, over the total land area designated primarily for protection of soil and water • A landscape-scale plan that includes the use and conservation of soil and ground water, based on the watershed approach • Land area with serious land erosion problems • Area with changes in land use risking alterations in surface runoff
Criterion 4. Multiple benefits for society	• Number of primary wood products extracted by type and species • Number of direct beneficiaries by type of project developed by the Model Forest • Percentage relationship of surfaces according to land tenure regime • Traditional cultural practices are identified, maintained, and respected • Number of direct jobs in the forestry sector • Percentage of primary production locally industrialized • Area of forest designated for recreation and tourism • A plan in place for education, awareness, and community sensitization on key aspects of sustainability of natural resources and the plan is implemented • Gross Geographic Product (GGP) of the Model Forest area, broken down by sector
Criterion 5. Legal, institutional, and economic framework for forest conservation and sustainable management	• Existence of laws and regulations that promote SFM and their effectiveness • Annual detailed Model Forest budget • Yearly state budget execution, classified by jurisdiction, for activities related to SFM in the area of Model Forests • Management capacity of the provincial forest authority • Number and type of organisations representing producers
Criterion 6. Governance and networking	• Degree of participation in the development of the strategic plan of Model Forest: a) approval of the strategic plan by board members and percentage of participants in relation to the total membership of the board b) strategic plan validation by Model Forest partners, detailing the methodology for and the % of partners involved in relation to the total • Relationship between strategic plan objectives and Model Forest plans and/or programs in other jurisdictions • Type and degree of consistency of implementation and monitoring mechanisms of the strategic plan of the Model Forest • Type, number, and frequency of communication and dissemination activities of the Model Forest • Type and number of actions of cooperation among Model Forests • Model Forest membership by type of partners: a) percentage of members by sector over the total of organisations interested in the issues associated with the Model Forest concept present in the territory of the Model Forest b) degree of correspondence between the profile of the Model Forest members and stakeholders of the territory c) degree to which the composition of the Model Forest in terms of sector affiliation of its members is reflected in the composition of its board

Source: SAyDS – Dirección de Bosques - PNBM 2010.

Box II 2.2 Background note to the cooperation of Canadian and Argentine Model Forest Networks in development of SFM local-level indicators for the AMFN

Canada has played a prominent role in bringing SFM into being and in promoting it as a wise modus operandi both across the country and internationally. Canada has developed and acted upon an innovative framework of criteria and indicators (C&I), a key tool that is now helping to make the practice of SFM a reality (CCFM 2008).

In response to the Forest Principles declared at the United Nations Conference on Environment and Development in Rio de Janeiro, June 1992, the Montreal Process Working Group (MPWG) was formed in 1994. The 12 member nations of the MPWG represent 90% of the world's temperate and boreal forests and understand the need for credible, science-based, socially acceptable, and international agreed-upon measures of progress towards SFM at the national level. They consented to work together to create a voluntary process to develop a comprehensive set of criteria and indicators for use by their respective forest conservation and sustainable management policymakers and to define, measure and report on progress toward SFM. In February 1995, the 12 countries of the MPWG, which include Canada and Argentina, endorsed the C&I of SFM.

Canada developed and released its domestic C&I framework in 1995 though the Canadian Council of Forest Ministers (CCFM). These C&I represented the forest values, or criteria that Canadians wanted to enhance or sustain and were accompanied by an initial suite of indicators to report progress towards SFM at the national level. By 1997, the CCFM and the Canadian Forest Service (CFS) recognised a unique opportunity with Model Forests (MFs) across Canada to pioneer and apply methods for developing a local-level version of C&I using the multi-stakeholder approaches at the heart of MFs that could be linked with national and international C&I processes.

Through the Canadian Model Forest Network (CMFN), individual MFs were challenged to begin independently to develop local-level indicators (LLIs) for reporting local progress towards SFM using the national criteria as a common suite of forest values. Canada understood, as a participant in the MPWG, that global perspectives and technical help were key elements of success and that MFs would gain these benefits through an active association with a broader network of peers. Thus funds were provided to MFs to enable them to work together on LLI issues that more than one MF group found to be a challenge. This approach encouraged local innovation while simultaneously facilitating the sharing of LLI challenges and their solutions across the CMFN. The LLI initiatives in each MF helped local stakeholders to forge long-term relationships and discover meaningful ways to adapt national frameworks for planning and monitoring progress toward SFM to local perspectives. Through the use of the same, overarching set of criteria, these LLI suites remained relevant at different scales. Across Canada, each MF began developing its LLIs and found innovative approaches tailored to their diverse and broad partnership base and unique combination of perspectives, forest needs, and circumstances.

The Model Forest of Newfoundland and Labrador (MFNL) in Canada's eastern Province of Newfoundland and Labrador was selected by the CMFN to represent Canada's LLI experience in the Canada-Argentina LLI project. The MFNL had an exemplary record of achievement in developing LLIs that were adopted by managers and decision-makers into the day-to-day management of the province's forests.

The MFNL participants began their LLI process by building onto work they had done to develop their Integrated Resource Management (IRM) Plan. The IRM and the C&I framework were fairly similar in structure. The IRM required a focus on forest values, goals, indicators, objectives, and specific practices that were applicable to LLIs. The MFNL had established a process to explore forest values and practices through Value Groups and their work was periodically reviewed at plenary sessions with more than 40 stakeholders. They also established a formal data management structure and assigned measures to responsibility centres, using these methods to smoothly integrate their IRM experience and work into a process to develop LLIs for SFM.

An important step in the LLI approach used by the MFNL was creation of the Criteria and Indicators Steering Committee (CISC). The CISC strategic work plan for the development of its suite of LLIs involved a comprehensive series of focus group meetings and partnership workshops. Participants improved their knowledge of indicator development by first developing "easy to assess" indicators. These indicators were not necessarily functional at first but gave the CISC the ability to share ownership of the process with its diverse range of participants and ideas. In hindsight, this approach brought a long-lasting strength to the MFNL partners and is considered by some to be a more important outcome than the actual LLIs that were produced. As part of the LLI process, the forest industry (Corner Brook Pulp and Paper Inc. and Abitibi Bowater Inc.) and government representatives were tasked to explore possible mechanisms for forest certification. For most certification schemes, performance indicators are the most effective way of tracking management impacts upon forest resources and communities.

Over a period of three years, the CISC facilitated

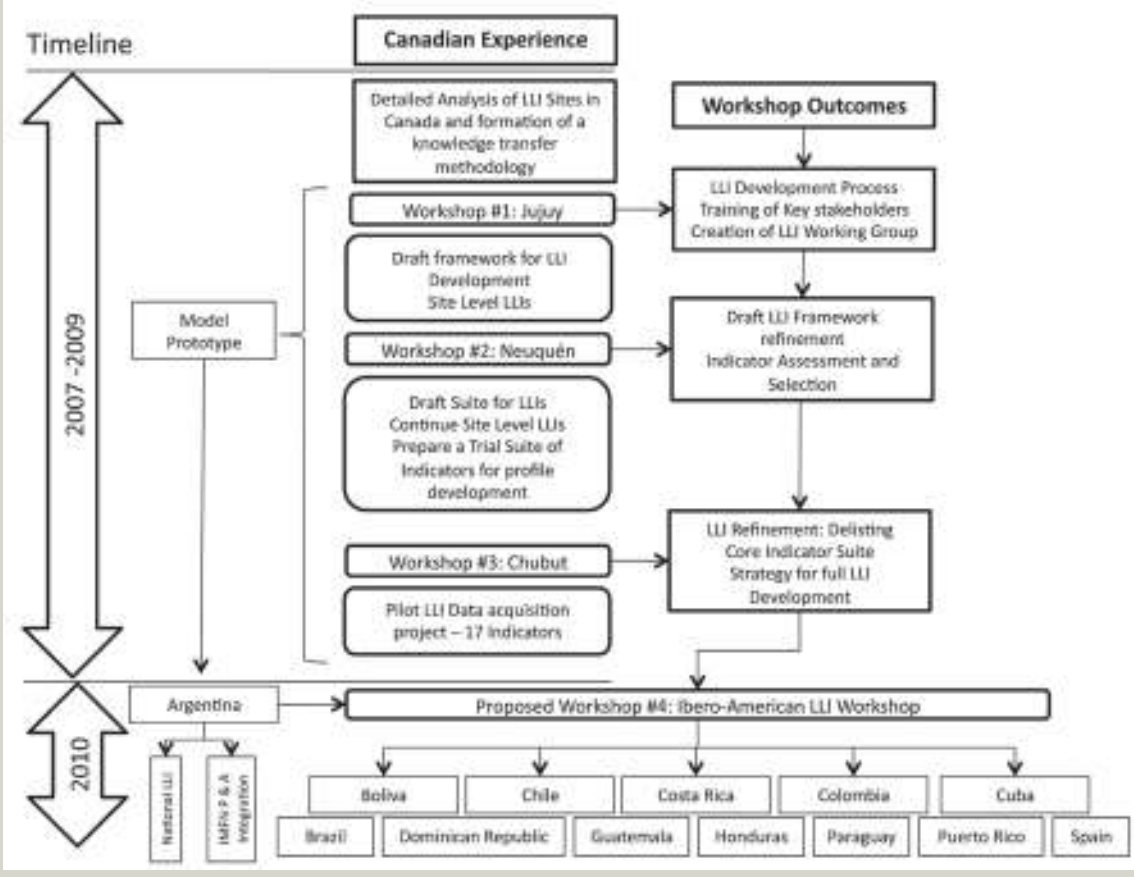

Figure A. Schematic representation of the process of transferring LLI expertise from the Canadian Model Forest Network to Argentina's Model Forest Network and beyond. Source: Hall et al. 2009.

the development of Newfoundland and Labrador's first suite of indicators using its consensus-based, multi-stakeholder approach. From this process, both pulp and paper companies developed their own suites of tenure-based indicators and were later successful in integrating these LLIs into Canadian Standard Association's Z809 forest certification standard. In 2003, the government of Newfoundland and Labrador developed, with the assistance of the MF, its own suite of SFM indicators for the province (Newfoundland and Labrador Forest Strategy, 2003). The province was not alone in this evolution of applications. Across Canada, C&I can be seen in national forest strategies, State of Forest reporting by other provinces, data collection and management frameworks, research, and international trade support.

Since 2007, CMFN, the MFNL, Natural Resources Canada–Canadian Forest Service (NRCan-CFS), the Argentinean Ministry of Environment and Sustainable Development, and AMFN have been working to transfer the Canadian experience in LLIs to help develop an effective LLI process for Argentinean circumstances (Figure A). Emulating the Canadian approach through the assistance of experts from the MFNL and the CFS, annual workshops involving the six Argentinean MFs were held and a suite of local-level indicators were developed (Hall et al. 2009). The AMFP hosted workshop in Buenos Aires in March 2012 to the transfer Argentina's MFs LLI experience to the MFs from the other countries of the southern cone of South America*. Those participating MFs obtained insights into how to initiate the process of catalysing the adoption of the LLI process at their sites to help in their progress to SFM.

The LLIs developed through Canada's Model Forest Program (Canadian Model Forest Program 2000) were adopted into the process developed for forest certification across Canada. Canada is the nation with the greatest area of third-party independently certified forests. There are currently 153 million ha of certified forests in Canada (FPAC 2014).

* Personal communication with Brian J. Wilson, Director of Canada's Model Forest Program, Natural Resources Canada, Canadian Forest Service, Ottawa, Canada.

Formoseño, Futaleufú, San Pedro, and Tucumán MFs are involved in SFM and conservation plans, receiving support from the National Fund for SFM and conservation planning activities (SAyDS 2013b). The AMFP and the MFs are also implementing projects related to SFM with support from the National Program for the Protection of Native Forests.[19] These projects deal with a wide range of issues, including implementation of geographical information systems, forestland and cattle management, certification, LLIs, traditional forest-related knowledge, sustainable livelihoods, local capacity-building, and public awareness.

The AMFP and MFs organised workshops to explain the provisions of Law No. 26,331 to local stakeholders regarding their rights and obligations concerning SFM (Formoseño MF General Manager's Progress Reports 2007–2013). As a result, small-scale Creole farmers and indigenous communities were able to obtain support to improve their forest-related productive activities. MF workshops across the network involve training activities regarding seed harvesting and production of seedlings, plantation establishment, silvopastoral production, beekeeping, handicraft production, water management, food security and charcoal production[20], and integrated SFM techniques.[21]

The National Institute of Agricultural Technology (Instituto Nacional de Tecnología Agropecuaria – INTA), and the Futaleufú MF partners developed best practices for cattle management within forestland (Tejera et al. 2006, Hansen et al. 2009). INTA tested these practices with farmers, who received training and allowed INTA to implement them with their cattle on their farms. Most farmers adopted the recommended practices after concluding that good silvopastoral management improved beef production. Futaleufú MF and its partners conducted research, expert consultation, and workshops concerning the effects of grazing on natural forest regeneration. The AMFP, together with Futaleufú MF, organised expert workshops on forest degradation and the impact of grazing on forest ecosystems (SAyDS–Dirección de Bosques–Programa Nacional de Bosques Modelo 2011, 2012; Van den Heede et al. 2011, Van den Heede 2012).

[19] Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

[20] For more information, visit http://www.ambiente.gov.ar/default.asp?IdArticulo=293.

[21] See more information at http://www.patagoniaandinaforestal.blogspot.com.ar/2014/02/jornada-de-capacitacion-en-cosecha-y.html. http://www.patagoniaandinaforestal.blogspot.com.ar/2013/11/gira-tecnica-de-bosque-modelo-del-norte.html, http://www.patagoniaandinaforestal.blogspot.com.ar/2013/11/1-taller-de-produccion-de-plantas.html.

2.2.6 Long-term societal commitment to SFM

MFs have been committed to SFM for almost 20 years in Argentina and the number of sites has increased. The realisation of the MF concept is a work in progress that has attracted and retained many participants over the long term. MFs have put many tools in place and are in a mode of continuous improvement. They have committed to provide, on an ongoing basis, a place for people to join with others to promote their interests in SFM. MFs have worked at the field level with people from all levels of society to create and share relevant SFM information; identify and communicate forest values and suggested SFM practices to local people; and undertake research, surveys, and trial projects to help stimulate awareness. MFs activities show both the need and the opportunities for society to provide continued support to SFM and have helped implement existing and new laws that support SFM.

Argentina has demonstrated its long-term commitment to SFM through the adoption of laws and policies aimed at promoting SFM. For example, federal forest Law No. 26,331 recognises forest environmental goods and services and Laws No. 25,080 and 26,432 support increasing the area of forest plantations.

The Secretariat of Environment and Sustainable Development has provided support to the AMFN since its inception. Participants that support MFs over the long term are empowered and gain pride of proprietorship as pioneers in MF initiatives. For example, main partners of Formoseño MF include academic institutions (Centro de Validación de Tecnologías Agropecuarias – CEDEVA, INTA, National University of Formosa, Instituto de Formacion Docente Continua y Técnica Ingeniero Juarez, Escuela Agrotécnica Provincial No. 11 Pozo de Maza), the public sector (Secretariat of Environment and Sustainable Development, Ministry of Agriculture, National Parks Administration, Provincial Ministry of Production and Environment, Municipality of Ingeniero Juárez), grassroots organisations (Asociación El Algarrobal, indigenous communities' organisations), and civil society (Arandú Foundation, EPRASOL). There is a similar diversity of participants in all MFs and their long-term support of the shared vision of each MF is a demonstration of long-term commitment.

MFs also support each other within the framework of the AMFP. A good example is the collaborative project on sustainable livelihoods by Formoseño and San Pedro MFs that exchanged knowledge and experiences to improve the forest-related economic activities in both MFs.[22]

[22] For more information visit http://www.ambiente.gob.ar/?idarticulo=12227.

2.2.7 Influences of regional/global processes on forest-related policies and behaviour

MFs, by definition, must be part of a network of MFs to ensure that each is engaged globally to gain perspectives, insights, and expertise that informs and shapes SFM activities locally. Activities in MFs across Argentina are influenced and affected by processes beyond their borders. The MFs have a strong record of engaging with numerous international organisations to address issues that emerge from both local and international SFM communities. The MFs and the AMFP have also been active in contributing their understanding and experience of SFM processes internationally. In 2002, under leadership of Argentina and Chile, the governments of Argentina, Chile, and the Dominican Republic launched the Latin American and Caribbean Regional MF Network. The regional initiative stimulated exchange among the MFs of Latin America and quickly attracted participation of other countries to become the Ibero-American Model Forest Network (IAMFN), which currently includes 15 countries.[23]

Argentina's MFs actively contribute and benefit through their regular interaction with participants in the IAMFN and IMFN. The AMFP also links with international donor agencies to address international issues of mutual interest that include the local perspectives and solutions from the MFs.

The AMFP participates in consultations and internal coordination meetings with Argentina's representatives to the Montreal Process.[24] This connection has helped strengthen linkages between the Montreal Process and the AMFN LLIs. The lessons learned while the MFs were developing their set of LLIs were shared with the international forest community at the XIII World Forestry Congress (2009) in Buenos Aires.[25] Also, AMFN's methodology for developing the set of LLIs was shared with Southern Cone countries through two workshops hosted by the AMFN, which resulted in establishment of a sub-regional MF LLI working group to advance the implementation of common LLIs across the Southern Cone and aligned with the Montreal Process.[26]

The effects of climate change are expected to affect the forests and their potential to provide resources and services in the MFs. Futaleufú MF, through the Patagonian Andes Forest Research and Extension Center (Centro de Investigación y Extensión Forestal Andino Patagónico – CIEFAP), one of its partners, helped implement a collaborative project with the federal Secretariat of Environment and Sustainable Development and the Japanese International Cooperation Agency (JICA)[27] within the context of the United Nations Framework Convention on Climate Change (UNFCCC) to better understand the local effects of climate change. Futaleufú and Jujuy MFs explored the possibility of developing forest-related Clean Development Mechanism (CDM) projects, but they were not feasible due to high transaction costs (SAyDS 2007). Some MFs are currently doing cost- benefit analyses to determine the feasibility of deploying MF projects within the framework of Reduced Emissions from Deforestation and Forest Degradation (REDD). As well, AMFP officers, with the San Pedro and Formoseño MF participants, are working to determine options for the AMFN within the framework of the preparation phase for a REDD strategy for the country, with support from ONU-REDD (SAyDS 2013a).

2.3 Livelihoods, capacities, cultural, and socioeconomic aspects

2.3.1 Contribution of forests and forest resources and services to livelihoods

Within MF areas, the forest provides resources for a diversity of social, cultural, environmental, and economic activity. Local people often have no choice but to derive their livelihoods from the forest resource by applying their varying levels of abilities and skill sets. The view that natural resources are limitless is a popular misconception resulting in practices that do not contribute to SFM. It is beyond the scope of this paper to fully quantify the contribution of forests to livelihoods within the MF areas. However, it is known that natural resources within the focus areas of MFs are used for timber, food products from agroforestry, cattle ranching, forest fodder, beekeeping, and a wide range of non-timber forest products (such as fruits, nuts, handicrafts, textiles, flowers, plants and medicines), and tourism.

MFs seek to discover how the resourcefulness and technical and entrepreneurial skills of forest users can be directed to enhance SFM. The expectation

[23] For more information, visit www.bosquesmodelo.net and www.imfn.net.

[24] More information available at http://www.ambiente.gob.ar/?idseccion=166.

[25] Information on this side event is available at http://www.ambiente.gob.ar/default.asp?IdArticulo=9464.

[26] For more information visit ttp://www.ambiente.gob.ar/default.asp?IdArticulo=11071.

[27] Cooperation Project "Fomento de las Actividades de Forestación y Reforestación dentro del MDL'". For more information, visit http://www.ambiente.gov.ar/?Idarticulo=5073.

of the MF is that the entrepreneurs, given correct training and motivation, could optimise the value of the forest resources they extract while their extraction practices contribute to SFM. MFs also seek to find ways that would help entrepreneurs increase their revenues by improving access to capital. Ideally these small loans would encourage entrepreneurs to increase the resilience of the natural ecosystem by using forest management techniques (including harvesting and regeneration practices) that help achieve SFM. MFs are also looking for effective means to promote the connection between forested lands and those socio-economic activities beyond the edge of the forest that depend on forest-provided ecosystem goods and services, such as forest-based water supply and habitat for crop pollinators.

The key purpose of each MF is to enhance stakeholders' abilities so that they can more effectively work together and engage in addressing the complex and complicated challenges posed when attempting to incorporate SFM into local day-to-day forest-based activities. Ultimately, the activities that the MFs undertake, such as regular meetings, workshops, field reports, and research projects, are intended to overcome social stigmas and help MF participants recognise and integrate useful information and strategies for SFM from many sources. These sources include academia, government officials, business people, and those with traditional knowledge and local, practical experience.

Indigenous communities and small-scale farmers at MF sites have a long history of using forestlands for a significant portion of their income and for their quality of life; therefore, many MF activities for SFM practices are geared towards meeting these needs. Traditional knowledge is considered an important asset in SFM planning and there are ongoing initiatives to collect that knowledge and make it available now and for future generations. The AMFP and San Pedro MF are implementing a project to collect, verify, store, and share traditional forest knowledge and management experiences from indigenous communities and farmers in the MF area.[28] Futaleufú MF is collecting and verifying information about traditional wicker weaving practices and about local medicinal herbs in the Percy River community (Futaleufú MF 2013) for the purposes of enhancing forest resource use for local benefits. This information will be shared among MF participants across the network (RIABM 2009).

In the Formoseño and Futaleufú MFs, forest-based income is often the sole source of livelihoods for a substantial number of indigenous communities, many of which depend on income from cattle ranching within forestland. These MFs are working on capacity-building for SFM with an emphasis on silviculture for native forests, rehabilitation planting, timber and non-timber forest products[29] (RIABM 2009, 2010, 2011), and sustainable cattle management in forest ecosystems. In order to advance this work, the MF is implementing silvopastoral projects with technical support from CEDEVA (RIABM 2009, 2010, 2011) and financial support from the Secretariat of Environment and Sustainable Development under forest incentives from Laws No. 26,331, No. 25,080, and No. 26,432.[30] In contrast, income derived directly from forests is less important in the Tucumán MF area; instead, income comes mainly from sugar cane, lemon and berry production, and tourism. Tucumán MF therefore focuses on promoting public awareness and environmental education about the important contributions the forest makes to productivity of the agriculture sector through its provision of ecosystem services.[31]

Forest-based textiles and handicrafts featuring ancestral designs and techniques are a traditional source of income among Qom and Wichí women within the Formoseño MF, which has projects to preserve and enhance these activities (JICA 2005, 2009; JICA and Formoseño MF 2008). Also, Formoseño MF has projects underway related to the domestication of *chaguar* (*Bromelia* sp.), to increase the quality of handicrafts, and to build capacity for micro-entrepreneurship and marketing of handicrafts to increase revenues[32]. This MF has extensive experience in beekeeping with Creole farmers and indigenous communities[33] and has compiled information on melliferous plant species identified by Wichí communities (Pedretti 2004).

[28] UNDP Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

[29] UNDP Project ARG/12/013 Apoyo a la Implementación del Plan Nacional de Protección de Bosques Nativos.

[30] Former projects on this issue had financial support from JICA (JICA 2005a, 2005b, 2009). Current support includes the UNDP Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos; GEF Project Manejo Sustentable de Bosques en el Ecosistema Transfronterizo del Gran Chaco Americano; and the aforementioned laws.

[31] UNDP Project ARG/12/013, Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

[32] UNDP Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativosand GEF Project Manejo Sustentable de Bosques en el Ecosistema Transfronterizo del Gran Chaco Americano.

[33] JICA 2005a, 2005b, 2009. Apicultura en el Monte Project (2004–2008), implemented with support from the Asociación Franco Latina para el Desarrollo Humano (AFLDH); see http://www.ambiente.gov.ar/?idseccion=161. UNDP Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

The AMFP has been coordinating an ongoing pilot initiative with Formoseño and San Pedro MFs to promote forest-based sustainable livelihoods (i.e. contribute to the improvement of local production and value-added while promoting SFM). Local cooperatives (e.g. Cooperative of Artisans–indigenous women, the Formoseño MF Association of Beekeepers) have been brought in, and they have been successful in helping MF participants strengthen the value chain from raw materials to final products, commercialise their handmade products, and gain access to national and international markets through existing co-op channels. The transfer and application of lessons learned from this pilot has improved food security in rural and indigenous populations in other MFs (SAyDS–Dirección de Bosques–Programa Nacional de Bosques Modelo 2013).

The forest-timber industry does not play a significant economic role in the Argentine MF areas with the exception of San Pedro MF, which is taking steps to improve local sawmills by developing capacity of prospective workers and encouraging business to improve their technology to enhance product quality and reduce waste[34] (San Pedro MF General Manager's Progress Reports 2007–2013). These small producers will design and implement SFM through projects supported under the framework of Laws No. 26,331, 25,080, and 26,432 and will receive other sources of public revenue that will contribute to further local capacity-building and production strengthening efforts[35] (San Pedro MF General Manager's Progress Reports 2007–2013, RIABM 2009, 2010). In Tucumán MF, a local timber-based business has little impact on the local forest resource since its timber is supplied from outside the province.

With the help of MF network colleagues and NMFP officers, each MF sets its own rhythm of activity based on local capacity; social, economic, and environmental circumstances; opportunities; and timing.

2.3.2 Local development and capacity-building

Capacity-building for MF participants and their associates through technical courses, seminars, workshops, and scholarships is an ongoing preoccupation of the IAMFN and AMFP because abler and better-informed stakeholders lead to better SFM strategies and practices. The AMFP channels grant opportunities offered by organisations such as the IAMFN, JICA, Tropical Agricultural Research and Education Center (CATIE), the UN Food and Agriculture Organization (FAO), and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), dealing with SFM, climate change, forest culture, forest policy, resource mobilisation, and knowledge management. The AMFP also organises capacity-building activities in cooperation with the European Commission, Ministry of External Affairs and International Trade, government of Austria, government of Navarre (Spain), government of Castile and León (Spain), and government of Südtirol (Italy), among others. These seminars focus on environmental goods and services, bioenergy, SFM, forest policy, C&I and LLIs, forest certification, and water governance (SAyDS–Dirección de Bosques–Programa Nacional de Bosques Modelo Annual Reports 2002–2013).

At the local level, MF participants include organisations with strong technical knowledge about forest ecosystems and SFM. Members of these groups often take on leadership roles and mentor others in MF communities to bring technical assistance and capacity-building activities to the participants and other interested people. The Formoseño MF organised a number of short technical courses and workshops on animal health with support from the Ministry of Production and Environment, CEDEVA, and the National Service of Animal Health (Servicio Nacional de Sanidad Animal-SENASA) (Formoseño MF General Manager's Progress Reports 2007–2013, RIABM 2009, 2010, 2011). The Ministry of Production and Environment supported workshops on beekeeping and, in collaboration with CEDEVA, INTA, the National University of Formosa, and the Institute of Technical and Continuing Teacher Education, Municipality of Ingeniero Juarez, led capacity-building activities on SFM (ibid.). The National University of Formosa led special courses for carpenters to enhance their employment opportunities and to improve utilisation levels of timber resources.

San Pedro MF is developing a fuel wood certification scheme with the Undersecretariat of Forest Development, Ministry of Ecology and Renewable Natural Resources, National University of Misiones, Executive Committee for Technological Development and Innovation (Comité Ejecutivo de Desarrollo e Innovación Tecnológica-CEDIT), and CERFOAR. They also engage in courses for carpenters with the Municipality of San Pedro, National University of Misiones, Undersecretariat of Forest Development, Montecarlo Wood Technology Center, and CEDIT (San Pedro MF General Manager's Progress Reports 2007–2013, RIABM 2009). San Pedro MF has launched an initiative on bioenergy with cooperation from the Secretariat of Environment and

[34] UNDP Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

[35] UNDP Project ARG/12/013 Apoyo a la Implementación del Plan Nacional de Protección de Bosques Nativos.

Sustainable Development, Undersecretariat of Forest Development, government of Navarre (Spain), National University of Misiones, CEDIT, National Industrical Technology Institute, and the Municipality of San Pedro. [36]

Tucumán MF conducts environmental education with a focus on opportunities for SFM in local forests with local elementary and high schools for the Municipality of Yerba Buena, the ProYungas Foundation, the Ministry of Labour and Social Security, and the Sierra de San Javier Park and Horco Molle Experimental Reserve (RIABM 2009, 2010). In the field of public awareness, Tucumán MF carries out events together with the Municipality of Yerba Buena, ProYungas Foundation, and Colegio San Patricio (Tucumán MF General Manager's Progress Report 2013). This MF also coordinated activities to introduce environmentally responsible practices in forest-sector production enterprises with the Secretariat of Environment and Sustainable Development (RIABM 2009) and collaborated in the organisation of a workshop on bioenergy with participation of a San Pedro MF partner, the Undersecretariat of Forest Development (Tucumán MF General Manager's Progress Reports 2012–2013).

Securing adequate financial support for activities related to forest production is a hurdle often faced by local entrepreneurs, hampering implementation of their development ideas. Local entrepreneurs associated with the MFs do have the opportunity to access funding for activities that contribute to local SFM through national and provincial government programs. Laws No. 26,331, 25,080, and 26,432 provide federal funds for approved SFM-related investments, and the provincial governments have similar programs. MF organisations work with local proponents to help them develop plans that will meet SFM requirements. An important instrument for SFM is provincial bridge funding that enables medium and small woodlot owners to implement SFM practices before receiving federal support.

An important factor that contributes to the success of MFs and the national MF program is the intellectual leadership and professional dedication provided by the staff. Each MF has a general manager and some administration and technical personnel. The national office has a network coordinator and a small team. These positions provide technical guidance, continuity, communication, and project development skills, organisational management, and leadership for the participants as well as liaison functions with governments, international organisations, and other expert groups for the benefit of the network. MF staff receives salary and some travel support and project implementation funds from the Secretariat of Environment and Sustainable Development. The network coordinator reports to the Secretariat and is responsible for tracking progress, representing the network nationally and internationally, reporting policy-relevant information, and mobilising funds. The network coordinator also organises some training activities and workshops and initiates and implements network-wide initiatives like the multi-year LLI development and monitoring program and the national program on sustainable livelihoods. MF participants also contribute time and funds to support MF work plan activities and projects.

2.4 Natural resource base

2.4.1 Extent and condition of forest resources

By definition, the land base of a MF must include forested lands but the extent or condition of the natural forest base for any MF is not prescribed, rather the participants within each MF organisation agree upon it. MFs work towards incorporating the concept of SFM into the management practices that suit the social, economic, and ecological circumstances within their area and in this way demonstrate, or model, what is possible to achieve and identify what issues remain to be overcome to enable the practice of SFM. This demonstration by the MF is done for the benefit of the people in the MF area and beyond it. MF forest resources can include native forestlands, land with trees not within the forest, and forest plantations. (SAyDS–Dirección de Bosques Área de Ordenamiento Territorial 2013). In general, MFs consider that their forests have the potential to be sustainably managed and to provide goods and services over the long term (Gabay 2013b, Manso 2013, Paton 2013, Van den Heede 2013). There are examples where people persist in undertaking activities that affect the extent and condition of the forest in ways that hinder SFM. MFs continue to work towards minimising these negative effects, which are usually the result of unmanaged cattle grazing in forests, land use conversion from forest to agriculture and fruit production, encroachment by residential housing, and repetitive anthropologic forest fires that pose challenges to the development of SFM practices.

2.4.2 Trees outside forests, including agroforestry

MF participants recognise the contributions that trees outside the forest and agroforestry practices can have in an integrated approach such as SFM. Trees outside

[36] UNDP Project ARG/12/013 Apoyo a la Implementación del Programa de Protección de Bosques Nativos.

the forest within the agricultural land base contribute to local livelihoods and to crop production through nitrogen fixation, humus development, and the provision of partial shade and fodder. The various MF projects are being studied by other MFs in the network in anticipation of adaption and adoption of best practices locally (see sections 2.2.3, 2.2.4, and2. 2.5; Formoseño MF General Manager's Progress Reports 2007–2013; RIABM 2009, 2010, 2011).

2.5 Research and monitoring

2.5.1 Research programs

Universities and other institutions conduct ongoing SFM research in MFs. MFs are viewed favourably by researchers as living laboratories with local participants willing to become involved in issues concerning best silvopastoral practices, genetic conservation, improved tree breeding (selecting superior quality trees for regeneration programs), best silvicultural practices, non–timber forest products (e.g. apiculture, mushrooms, ferns), and basic ecological research, among others (SAyDS - Dirección de Bosques - Programa Nacional de Protección de Bosques Nativos 2013). Participation by locals in extension and field-assistance activities associated with research in the MF in many cases helps to build capacity in local communities where new practices from their experiences are often applied, bringing immediate improvements to local sustainable livelihoods.

Most MF projects are applied research. The topics are usually tied to the immediate interests of MF stakeholders. For example, in Formoseño MF, projects and research focus on economic production, particularly cattle ranching, apiculture, and silviculture and handicraft production. In Futaleufú MF, there is a wider scope of research supported through the strong research capabilities of its key partner CIEFAP. [37] The CIEFAP, INTA, and National University of Patagonia San Juan Bosco are dynamic research centers that conduct applied forestry research and sustainable cattle management in Antarctic beech, or *ñire* (*Nothofagus antartica*) forests (Tejera et al. 2006, Hansen et al. 2009) and share their knowledge through extension activities providing valuable inputs for the development of guidelines for sustainable silvopastoral systems at the regional level (Quinteros and Bava 2012, Van den Heede et al. 2011).

2.5.2 Monitoring programs

All MFs and the AMFP staff collaborated to create and report on LLIs for SFM. These form a framework for monitoring progress towards SFM at the local and network levels. MFs are experiencing positive results from their LLI exercise (SAyDS-Dirección de Bosques-PNBM 2002–2013. Annual Reports). These results include:

- The opportunity for stakeholders with conflicting views to share ideas in dialogue and reach agreements on a minimum common base for monitoring
- Stakeholders with no technical background begin to better understand SFM and have a say in the LLI process
- MF participants now have access to data sources and information that was not available before the implementation of the LLI initiative, which has increased the potential of MF participants to develop better approaches to SFM
- MF partners have a sharpened focus on progress to SFM locally, and through the amalgamation of data, a better idea of progress across the Argentine MF network, the impact of their actions on SFM, and a greater awareness of what is not being done to further SFM in their area
- There is a better sense across the AMFP of costs and benefits to help optimise investments in SFM
- A more clear context and identity of funding opportunities is provided and a means to describe priorities among the various issues involved in developing, implementing and monitoring SFM to support the business case for monitoring that carefully demonstrates to local stakeholders–especially those lacking a technical background–the usefulness and importance of identifying, measuring, monitoring, and reporting on LLIs.

All MFs organisations report annually on their activities plans and accounts.

[37] CIEFAP's research priorities are set by its executive board. Members include national public sector and Patagonian provincial forest authorities. Key areas of interest include mushrooms for commercial production, forests pests and diseases, forest fire management, and climate change. CIEFAP projects can be viewed at http://www.ciefap.org.ar/index.php?option=com_jresearch&view=projectslist&Itemid=32 http://www.ciefap.org.ar/index.php?optionojectslist&Itemid=32

2.6 Intersection among diverse policies and institutions

Both conflict and synergies can emerge from the intersection of diverse policies and institutions and have an impact on the SFM aspirations of MFs. Within the iterative forums that MFs provide, stakeholders, through collaborative dialogue, examine their circumstances and needs to determine their best courses of action to achieve SFM. For example, in Tucumán MF, land-use conflicts have arisen where land conversion to support accelerated urbanisation and the expansion of fruit and sugar cane crops is taking over lands traditionally used for grazing and gathering fuel wood and other forest produce and, as land-use change and populations grow, informal settlements are established within national parks (Tucumán MF 2008).[38] Tucumán MF has successfully brought together a broad range of stakeholders that traditionally were in conflict and did not share a culture of participation in dialogue as a first step to find ways to resolve these issues and support SFM goals (Tucumán MF 2008, Manso 2013). The AMFP coordinator participates in the Synergy Group made up of representatives from directorates and programs under the federal government Undersecretary of Environmental Planning and Policy. This group meets regularly to share information about the design, experience, and results of the various SFM initiatives that they are aware of or have undertaken. This conduit has been an effective way for MFs to provide and receive knowledge and experience related to SFM. This group is often the starting point for synergies that result in joint projects, such as a current example of handicrafts production using forest-based *chaguar* (*Bromelia* sp.) and *palo santo* (*Bulnesia sarmientoi*) that brings new economic activities based on sustainable forest use to MF areas.

San Pedro MF integrates key local and provincial stakeholders in its dynamic management board that mobilises strong support for MF projects. This MF is working with the local forest industry to improve overall added value of forest products with the larger-scale operators. The ongoing workers training program, combined with small farmers and indigenous communities support for SFM and the strengthening of San Pedro's forest industries, will enhance local livelihoods by improving its competitiveness and market access.[39]

North of Neuquén MF, participants include INTA, municipalities, and producer organisations that are working to attract additional local stakeholders to MF governance involvement to help implement SFM and reinvigorate the development of local, sustainable forest industries (North of Neuquén MF General Manager's Progress Report 2013). The MF is developing a sustainable multiple-use land management plan for the communal forests in the Department of Minas, an enhancement project for the Chos Malal tree nursery to produce native tree seedlings, and a collaborative project with a neighbouring sawmill enterprise.[40]

In Formoseño MF, interactions among partners and third-party organisations are synergistic. The land-management planning process triggered by the provincial Ministry of Production and Environment and reinforced by the approval of Law No. 26,331 helped create relationships with organisations based in the provincial capital (some 400 km away). The provincial government implements some of its production development programs through the MFs. CEDEVA works with the MFs to design new guidelines for SFM and other production activities such as cattle ranching (RIABM 2009, 2010, 2011; Formoseño MF General Manager's Progress Reports 2007–2013; Proyecto GEF Manejo Sustentable de Bosques en el Ecosistema Transfronterizo del Gran Chaco Americano report[41]). The Federal Environment Council (COFEMA)[42] is currently developing a framework to regulate minimum requirements for silvopastoral SFM plans under Law No. 26,331.

2.7 Projected future trends

The increase in policy instruments aimed at promoting SFM marks a new phase in forest management and conservation in Argentina. One trend will be a greater focus paid to factors affecting the country's progress towards SFM. MFs will continue to build on past achievements (including their successful engagement with government initiatives to regularise land tenure) and use the increased technical and financial support from national, international, and provincial programs to strengthen the capacity of their participants and their contributions to SFM. With the increase in SFM funding and the need to implement

[38] Fruit and sugar cane exports account for 67% of the total provincial exports (Subsecretaría de Planificación Económica–Dirección Nacional de Desarrollo Regional and Dirección Nacional de Desarrollo Sectorial 2011).

[39] UNDP Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

[40] UNDP Project ARG/12/013 Apoyo a la Implementación del Programa Nacional de Protección de Bosques Nativos.

[41] More information at http://www.ambiente.gob.ar/?idseccion=25.

[42] Established under the Federal Agreement for the Environment (1993), ratified by General Environmental Law No. 25,675 (2002).

new laws, the vital forums that MFs provide for the involvement and enhancement of stakeholder contributions of knowledge and skills in informing the decision–making processes concerning SFM, will become increasingly needed and valued more and by more people.

This chapter has referred to the legislation, regulations, and activities enacted since the MF program started in Argentina and that have contributed to improving social, environmental, and economic conditions as Argentina seeks progress towards SFM (Laws No. 26,331, 25,080, and 26,432). A foundation to trend positively into the foreseeable future has been laid by the national consensus on forest management and conservation guidelines, within the framework of COFEMA; recognition of indigenous communities' ancestral land possession rights and Creole farmers land possession rights '(through land-tenure regularisation processes); and increased availability of technical and financial support from national[43] and provincial programs containing conditions that support SFM.

MFs will continue their support to increase new initiatives for capacity-building related to SFM based on the new laws and funding as well as use this increased activity to attract further participation in their programs. These actions will include enhancing entrepreneurial and accounting skills at the local level, increasing awareness of traditional and scientific knowledge, and involving the input of more stakeholders into forest land-use planning for SFM. MFs expect to be well positioned to report on their impact and progress towards SFM in Argentina through the application and ongoing refinement of the AMFN LLI framework (RIABM 2009, 2010).

[43] Over the past 10 years, the National Public Administration implemented a process of decentralisation. National public organisations such as the Secretariat of Environment and Sustainable Development, the Under secretariat of Family Farming, the National Institute of Agricultural Technology, and the National Institute of Industrial Technology currently carry out actions in the territory in an increasingly coordinated fashion.

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Current barriers threatening income generation from community-based forest management in the Brazilian Amazon

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Abstract: Community-based forest management (CBFM) is seen as an alternative to protect forests and at the same time to provide income for smallholders. Since the mid-1990s, the number of CBFM projects has rapidly increased in the Brazilian Amazon although most of them still face several difficulties despite significant public support. Five CBFM projects, located in the states of Pará (eastern Amazon) and Acre (western Amazon) were analysed between 2008 and 2010. These cases highlight some main barriers threatening CBFM long-term financial viability with effects on cash income received by communities from timber harvesting. Moreover, despite external – national and international – financial support as well as technical assistance, timber harvesting only accounts for limited cash income for smallholders, even though forest covers 80% of their landholding. The disparity suggests that it is necessary to invest in research-development activities to support other land uses, such as sustainable cattle ranching and agriculture, as part of household livelihood strategies on the 20% of the total landholding that can legally be deforested. Market access for timber is very uncertain and smallholder communities often do not succeed in selling their timber at remunerative prices. Minimum remunerative public prices and support for timber marketing need to be provided to make CBFM a truly economic alternative. The complex and cumbersome legal framework results in relatively high transaction costs for permit approval. Thus, more simple and flexible procedures are required to enhance smallholder involvement in legal forest management for commercial purposes. Finally, the timber potential in smallholder forest reserves is largely unknown. Given the large initial fixed cost for formulating, submitting, and implementing a collective forest management plan, a better assessment of such potential through systematic inventories is needed.

Keywords: Brazilian Amazon, community-based forest management, tropical timber

3.1 Introduction

Based on evidence from five cases studies, this chapter assesses the contribution to income generation of sustainable forest management (SFM) for commercial timber production by communities in the Brazilian Amazon. It discusses the several barriers threatening the financial viability of community-based forest management (CBFM) and some proposals to overcome them. The Brazilian Amazon has been chosen because, according to official estimates (SFB 2009), at least 40 million ha of forests are held by several types of smallholder settlements and communities that could potentially be managed through CBFM initiatives, contributing significantly to the expansion of SFM and an increase in smallholders' income in Brazil.

The expectations from CBFM – defined here as collective forest management involving several households or communities that is undertaken for commercial purposes – are significant given the current worldwide trend towards the recognition of local tenure rights in lands often covered by forests (White and Martin 2002). Since the mid-1990s, the attempts

to implement sustainable CBFM have increased, in part due to the efforts of international donors and environmental NGOs. However, only a few tropical countries have conditions that enable their effective development (Bray et al. 2003).

Several studies have explored some of the conditions that enable or prevent successful outcomes for CBFM projects (Scherr et al. 2003, Bray et al. 2006, Molnar et al. 2007, Donovan et al. 2008, Louman et al. 2008, Medina and Pokorny 2012, Pacheco et al. 2008, Porro et al. 2008, Cronkleton et al. 2011, Humphries et al. 2012, Radachowsky et al. 2012). In Central America, particularly Mexico and Guatemala, many success stories are reported (Bray et al. 2006, Taylor et al. 2008, Cronkleton et al. 2011). However, even in these countries, the on-going initiatives face many difficulties. Main challenges are related to organisational capacity and access to markets, affected by regulatory frameworks that in many countries disadvantage CBFM projects and greatly reduce their potential profitability. For example, from the experiences in 12 community forest concessions in the Maya Biosphere Reserve (Guatemala), Radachowsky et al. (2012) show that forest management, has provided significant income and social benefits to almost all community members in some of the concessions but that some of the concessions failed. They also show that market fluctuations had important impacts on concession revenues, partially offset by increased product diversification. In Africa and Asia, several case studies suggest that the household incomes derived from CBFM are limited with respect to total income (Mahanty et al. 2009), and are often too low to have an impact on household assets (Schreckenberg and Luttrell 2009).

In the Brazilian Amazon, according to the Brazilian Forest Code, 50% to 80%[1] of all landholdings must be conserved as forest, where only sustainable management of timber and non-timber forest products is allowed. In some states, the existing demand for timber may only be met in the future with an expansion of CBFM or small-scale SFM (Sablayrolles et al. 2013). However, currently, smallholders in the Amazon tend to sell timber to loggers and intermediaries both legally, often through acquiring cutting authorisations aimed at converting forests to croplands, and illegally, which is likely the greatest portion, in order to obtain immediate cash (Pacheco 2012). Some authors claim that SFM of legal smallholder forest reserves could support equitable development on forest frontiers (Amacher et al. 2009). This assumption is also shared by national and international networks supporting CBFM.

Public incentives to promote CBFM in Brazil started in the mid-1990s. The Promanejo Programme (Programme to Support Sustainable Forest Management in the Amazon), as a component of the PPG-7 (Pilot Programme to Conserve the Brazilian Rainforest), supported several so-called Promissory Initiatives. Between 1997 and 2007, 11 CBFM initiatives in four Brazilian States (Acre, Amazonas, Rondônia, and Pará) were supported. According to official data, there were 127 timber CBFM projects submitted to environmental public agencies in the Amazon in 2010, 48 in Pará, 36 in Amazonas, 23 in Acre, 16 in Rondônia, and in Amapa. However, most of them were not yet approved: only 53 plans were active in 2010 (Pinto et al. 2011). In the states of Acre and Amazonas, CBFM plan formulation and submission have been financially supported by public and NGO funds (World Wildlife Fund, WWF; International Union for Conservation of Nature, IUCN, etc.). In the state of Pará, many CBFM plans in agricultural settlements have been submitted through partnerships between private timber companies and communities (Amaral Neto et al. 2011). Outside PPG7, another significant institutional factor has been the creation of new settlement models, such as Extractives Reserves (Portuguese acronym RESEX), Agro-Extractives settlements (Portuguese acronym PAE), or Sustainable Development settlements (Portuguese acronym PDS), in regions still having large continuous forested areas and a clear potential for CBFM. These models clarified land and resources rights for the communities. More recently (2010), a federal program to support family- and community-based SFM was established[2]

Brazilian CBFM projects still face many barriers. For example, Hajjar et al. (2011) analysed three case studies in the Brazilian Amazon in 2008. The challenges faced by the cases assessed are similar. Besides the financial requirements, the long and bureaucratic process for obtaining the required legal documents is a hindrance to many communities. Undertaking forestry operations is also costly. A community can decide whether to harvest timber on its own or to contract a timber company. Both schemes have advantages and disadvantages. In the case of harvesting by the community, the building and maintenance of physical infrastructure is very costly. Usually, by the time external financial support comes to an end, timber sales have decreased. In the second case, building a partnership with a timber company helps to overcome these difficulties but decreases the potential economic return for the community. According to Hajjar et al. (2011), none

[1] When the landholding is located in a consolidated area for agricultural purposes, as defined by the state's Ecological-Economic Zoning plan, the share is 50%.

[2] http://www.florestal.gov.br/florestas-comunitarias/programa-federal-de-manejo-florestal-comunitario-e-familiar/programa-federal-de-manejo-florestal-comunitario-e-familiar.

of the three cases succeeded in developing into a self-sufficient community enterprise, independent from the support of an external agent, an issue also raised by Medina et al. (2009).

Medina et al. (2009) suggest that without subsidies, few initiatives in the Brazilian Amazon can cover their operational costs without difficulties. Moreover, attempts to enhance profit margins by using appropriate technologies that comply with legal requirements often involve high costs and are not always successful (Pokorny and Johnson 2008, Drigo et al. 2010).

Understanding monetary costs and benefits is central to developing equitable benefit sharing arrangements and assessing whether the net benefits gained from timber harvesting under CBFM are sufficient to encourage community's long-term commitment to SFM for commercial purposes. Only a few studies have focused on assessing this specific issue. Recently, Humphries et al. (2012) conducted a financial analysis of three CBFM projects based on the results of one-year assessment of their operations. Two out of the three achieved profitable annual harvests but their financial viability remained fragile, and all of them needed new subsidies or access to credit in order to cover fixed costs of salaries. Unlike other available studies, the authors included the cost of technical assistance and concluded that subsidising technical assistance may boost CBFM financial viability. Improving access to low-interest loans is recommended in order to decrease dependence on buyer financing. Investing in wood processing does not necessarily appear as the best option for small-scale CBFM financial viability but may translate into greater employment and larger salaries. The main limitations of the study are that the results were based on a one-year assessment and, as pointed out by the authors themselves, costs and benefits may vary greatly from one year to another. Moreover, the authors do not detail and extensively discuss the cash-income level that communities may expect from CBFM in the largest portion of their landholdings.

Our paper sets out to complete the issue through a detailed analysis of the annual cost and cash income provided by CBFM in the Brazilian Amazon. It is now quite obvious that without external financial support CBFM in this region will probably not generate reasonable profits, and may sometimes be unprofitable. Consequently, the following analysis does not aim at revising the estimation of CBFM financial viability by including some overlooked variables such as technical assistance that communities do not directly pay. Rather, we aim at assessing what level of additional income communities achieved through subsidised CBFM initiatives. Based on the data, we then discuss some of the existing subsidised costs. Three of the CBFM initiatives presented were followed during both the development and exploitation phases. This enabled to expand the perspective regarding the current economic results, and the barriers that threaten the financial viability of these initiatives and to present some proposals for overcoming them.

Section 3.2 presents the case studies selected and the economic assessment methodology. Sections 3.3 and 3.4 detail and discuss the cost and benefit of each CBFM initiative. Finally, a short conclusion synthesises the main lessons learned and the proposals to support communities expecting additional incomes from CBFM for timber production.

3.2 Study site and methods

3.2.1 Case study selection

This paper focused on five CBFM initiatives, three located in the state of Pará in the eastern Brazilian Amazon and two in the state of Acre in the western Brazilian Amazon (Table II 3.1). Four out of the five cases constitute official smallholder settlement projects established by the National Land Reform Institute (Portuguese acronym INCRA), and one is located within a national forest (Portuguese acronym FLONAS). The cases selected represent different forest management models and illustrate the diversity of CBFM initiatives in the Brazilian Amazon. The selected case studies are introduced below.

The state of Acre was a pioneer in promoting CBFM, so the oldest projects are found in this state. The Porto Dias and Chico Mendes Associations were pioneers in implementing forest management plans. Their members live in settlement models called Projetos de Assentamento Agro-Extrativistas (PAE) (Figure II 3.1). In 2007, they joined a cooperative called Cooperfloresta that today manages all CBFM projects in Acre.

According to official data, about 160 families live in these two settlements in Acre. Two types of families are found: traditional rubber tappers and former landless farmers from different regions in Brazil. The two settlements cover relatively large areas: the Porto Dias settlement covers 24 349 ha while the Chico Mendes settlement covers 24 098 ha. Each family holds about 300 ha of land, but they do not have private property rights over the land. The area belongs to the federal government. The tenure rights, which are held collectively by the families belonging to the settlement, are defined through a contract between the settler association and INCRA.

Family incomes depend mainly on rubber tapping and Brazil nut extraction. Agriculture is mostly for subsistence. Cattle-ranching is a secondary income source. When the CBFM initiatives were launched in 1996, rubber tappers were experiencing a significant drop in income from Brazil nuts as well as a decline in rubber prices that shrunk cash income from forest-

Table II 3.1 Main features of the analysed CBFM initiatives.

	Chico Mendes	CANOR	Porto Dias	Virola Jatobá	Coomflona
State	Acre	Pará	Acre	Pará	Pará
Land tenure	Concession	Individual	Concession	Concession	Concession in national forest
Number of households	45	6	12	183	180
Area (ha)	12200	364	3100	23000	32000
Annually harvested area (ha)	500	74	120	500–1000	500–1000
Logging intensity (m^3/ha)	10	15	10	16	12
Harvesting method	Partnership logging company in 2009	CBFM mechanised	CBFM mechanised harvesting; transport sub-contracted	Partnership logging company	CBFM mechanised

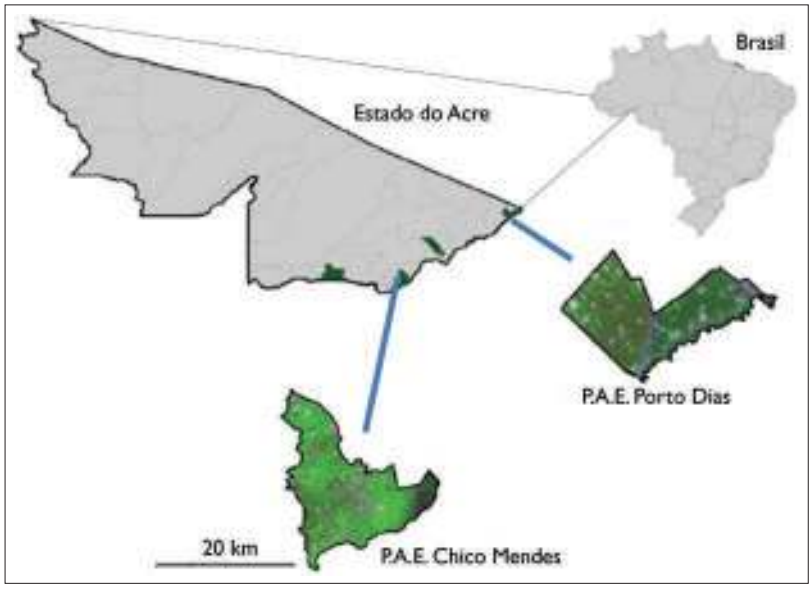

Figure II 3.1 Localisation of Acre case studies.

based activities. In order to counterbalance the risk of cattle-ranching expansion, NGOs started to promote and support forest timber management inside extractive reserves and PAE.

The history of CBFM in Acre can be divided into two periods: before and after the foundation of Cooperfloresta. During the first period (between 2000 and 2006), the forest producers in the Porto Dias and Chico Mendes settlements were supported by the Centro de Trabalhadores da Amazônia (CTA), a local NGO, and WWF. They provided initial support in the preparation of forest management plans and certification. The objective was to prepare community members to perform all forestry activities: settlers were trained on subjects ranging from logging to selling processed timber. Afterwards, the Porto Dias Association purchased an old-fashioned sawmill while the Chico Mendes settlers tried instead to contract out to external sawmills. However, this operational model did not survive. Facing difficulties in negotiating their contracts, the settler associations joined the Group of Forest Producers of Acre (GPFAC), an action sponsored by WWF. The aim of the informal organisation was to find buyers and act as middleman in contracts to sell timber from the CBFM areas in Acre. In 2007, this informal group was dissolved, and a single cooperative (Cooperfloresta) was established to assist existing CBFM projects in the different phases of forest management.

The foundation of Cooperfloresta constituted a new phase in the development of CBFM initiatives in Acre. Since 2007, the cooperative has been in charge

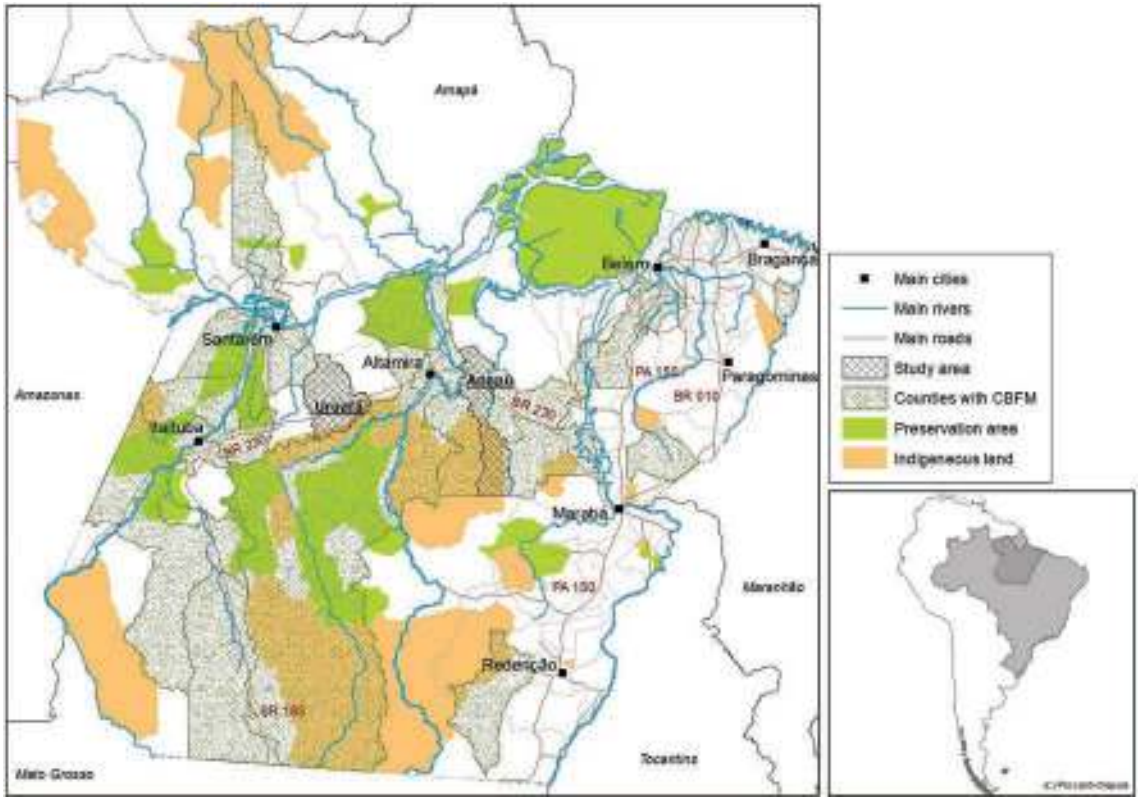

Figure II 3.2 Localisation of Para case studies.

of planning, monitoring, transporting, sawing, and trading all the timber production originated in all the CBFM projects of the state. Nonetheless, the production models have changed significantly over time based on decisions from the associations and negotiations with timber companies, which act as partners. Until 2008, the community members were still in charge of certain forestry activities, such as cutting trees, but some other services were already contracted out, such as transportation. Since 2009, both associations decided to subcontract a timber company to carry out timber harvesting and transport.

In Pará, the Agro-Extractivist Cooperative of Novos Rumos (CANOR) is a cooperative of smallholders, settled at the beginning of the 1970s in the municipality of Uruará in the Transamazon region (Figure II 3.2). These smallholders hold plots that average 100 ha, for which they are entitled to have individual tenure rights, though many have not yet received a formal title. The Brazilian Forest Law requires that these smallholders maintain 80% of their plots as legal forest reserves. However, they can extract the timber and non-timber forest products of these reserves under an approved forest management plan. On the remaining 20% of the land cattle ranching is the main income source, but farmers also produce corn and rice. Slash-and-burn practices are common. CANOR's members intended initially to saw all the timber from their landholdings, so they acquired a Lucas Mill sawmill with public funds from the Ministry of Agrarian Development (Portuguese acronym MDA). For transporting the sawn wood out of the forest, they decided to combine the use of animal traction with tractors. Sawn wood had to be transported to buyers in rented trucks since the original idea was to sell all the sawn timber on local and regional markets.

However, CANOR's members had to reconsider these initial plans due to several factors. First, the forest management plan submitted in 2004 to the state environmental agency was only approved in 2008. From that year onward, with the technical support of the Floresta and Agricultura (Floagri) Project (Sist et al. 2010), they decided to shift to a more prudent scenario and to harvest 15 instead of 29 m^3/ha. Furthermore, they abandoned partially the idea of selling all the timber as sawn wood: only the three most valued species were to be sawn after negotiating a subcontract with an industrial sawmill.

The second case in Pará is the Virola Jatobá Association initiative. The Virola Jatobá is a special category of settlement known as PDS, located in the municipality of Anapu in the Transamazon region (Figure II 3.2). The settlement was created in 2003 and covers 29 000 ha. The legal forest reserve (23 000 ha or 80% of the settlement) is a continuous area that is accessed collectively. The remaining

area is divided into individual plots averaging 30 ha each, where farmers can raise cattle and grow crops. The available official data lists 183 families living in this settlement. But, according to NGOs and settlers, many families have already abandoned their plots and some new families have arrived to occupy these plots without official permission. The settlers do not have individual land titles since the association signs a concession contract with the government. The contract guarantees long-term user rights over land and forests under specific rules. Another distinctive feature is that with the support of several local entities (i.e. the Rural Union, the Pastoral Land Commission, NGOs), the association has invested in building a community-enterprise partnership. In 2007, it signed a contract with a tropical wood flooring firm, located in Belém, the capital of the state. The contract length was initially agreed on for 15 years (2008–2023). During this period, the firm is in charge of all production activities and supports all logging costs. The price per cubic metre for each species was previously negotiated between the enterprise and the association. The Virola Jatobá Association, with the assistance of its sponsors, negotiated some other social and economic clauses to enhance benefits to the community. One of the contract clauses states that the enterprise has to employ some community members. The firm must also maintain the internal settlement roads.

The third case located in Pará has a particular history and is located in the Tapajos National Forest, in the Santarem municipality (Figure II 3.2). The forest management for timber production started in 1999 as a project supported by the International Tropical Timber Organization (ITTO) aimed at assessing whether industrial Reduced Impact Logging could be profitable. Some communities established around this project claimed that they could sustainably manage the forest. In 2001, the Promanejo programme proposed a CBFM plan. Finally in 2005, COOMFLONA, a cooperative with 180 members made up of local farmers was created to manage the CBFM project. The plan received support from the Brazilian Forest Service (Portuguese acronym SFB) and international funds (Fond Français pour l'Environnement Mondial FFEM) (Cruz et al. 2011). The model adopted is that most forestry operations are carried out by some cooperative members.

3.2.2 *Economic assessment methodology*

In Pará, the annual production costs supported by the communities, selling negotiations, and benefits obtained were monitored during 2007, 2008, and 2009 through two research-development projects financed by international funds (European Fund and FFEM). In Acre, Cooperfloresta reports were used since this cooperative has been in charge of the forestry projects since 2007, thus registering annual costs and gross receipts. Moreover, in 2010 and 2011, additional interviews were carried out with association leaders in order to have a qualitative assessment of the ongoing projects.

The reported annual costs are solely those covered by the communities, i.e. those paid on an annual basis by the communities. The cost paid by development projects and public funds are not included because 1) it was not possible to get rigorous data for all the contribution from different sources and at different periods, and 2) the focus of the paper is on the estimation of cost covered by members of the communities and additional incomes generated by CBFM given such external supports – not to question the relevance of such supports. Since each plan has its own specificities and has benefited from different types of external support, it means that each cost category level must be cautiously compared. Moreover, in two case studies, timber was sold as standing trees and the harvesting cost of the timber company was not assessed since it was not supported by the community. The detailed production costs are thus only presented for three case studies and have been distributed among 1) administration, 2) preharvesting phase, covering license fees and procedures, inventory, and road/patio opening for the parcel to be harvested during the year, 3) harvesting phase covering equipment rentals or depreciation and labour costs for logging, skidding, cubage, and technical assistance, and 4) transport costs to the mill, again when supported by the community. Certification costs have been added when they were supported by the community.

Potential household income derived from each project comes from two main sources: 1) the net benefits of timber production (i.e. gross annual benefits from timber selling minus annual production costs supported by the community), and 2) salaries for community members involved in administration or forest management operations. The distribution of benefits among the community members depends on each scheme since in some cases, such as in Virola Jatobá or Chico Mendes, the benefits are not distributed but rather invested in collective goods. However, we decided to distribute the net benefits among all the families involved in order to fully discuss the potential cash income a family can expect from such a CBFM plan. As the data was collected in 2008, 2009, and 2010, we adjusted 2008 and 2009 values with the observed IPC (Consumer Price Index) up to 2010 (5.9% between 2009 and 2010 and 10% between 2008 and 2010) in order to correct for inflation. For all the calculations, the following exchange rate was used: USD 1/BRL 1.72 in 2010.

Table II 3.2 Production costs supported by the communities in COOMFLONA, Porto Dias, and CANOR (USD).

	COOMFLONA 2008*	CANOR 2008*	Porto Dias 2010
Administration	130038	10552	31758
Preharvesting	78324	2974	12149
Harvesting	85637	8476	70965
Skidding	74378	6044	
Transport	85695	39067	34813
Certification			4585
Association			2846
Total	379694	61069	157116
m^3 harvested	7843	1048	1326
Cost/m^3	48	58	119

** cost in 2008 adjusted by the inflation rate between 2008 and 2010 (10%)*

3.3 Results

3.3.1 Production costs

Table II 3.2 shows that the total production cost covered by the communities varied from USD 48/m^3 harvested up to USD 119/m^3. Two main reasons explain such a large variation. The Porto Dias community subcontracted a timber company for log harvesting and transport. The negotiation was not favourable for the harvesting phase since the firm quoted USD 53 983 to harvest, or almost USD 41/m^3, whereas the cost was only USD 18/m^3 and USD 11 / m^3, respectively, in the COOMFLONA and CANOR cases (harvesting cost and trail opening). Moreover, technical assistance supplied by Cooperfloresta during the exploitation phase was included, as it was charged by the cooperative, whereas such assistance was financed through external funds in the other two cases. For CANOR and COOMFLONA, skidding was the largest share of the production costs. Skidders were rented in both cases and the rental rate alone amounted to 70% of the skidding costs.

The significant variations found in the share of preharvesting costs were only linked to the fact that, for COOMFLONA, they covered trail and patio opening, inventorying, and the formulation and submission of the annual harvesting plan. In CANOR, inventorying and annual operational plan formulation and submission costs were fully supported by external funds. In Porto Dias, road and patio opening was included in the activities of the subcontracted timber company. Thus the level of annual preharvesting cost, when fully covered by community members, was about USD 9–10/m^3.

Log transport (including timber loading) was in every case a major share of the production cost, but it was largest in CANOR (61% of the total cost). The unit log transport cost varied from USD 11/m^3 in COOMFLONA up to USD 37/m^3 in the case of CANOR. In CANOR and Porto Dias, log transport and loading were contracted out at an average price of USD 37/m^3 and USD 26/m^3, respectively. In COOMFLONA, a loader and a truck were rented. The loader rental rate accounted for the largest share of log transportation costs (USD 10/m^3) and the transportation costs supported only covered log transportation to the patio.

Administration costs were substantial in COOMFLONA and Porto Dias because they covered the salaries of the team in charge of plans, responsible for all the procedures, tax/fee regularisation, sales negotiations, and accountancy as well as the running costs for the building and equipment (truck, chainsaw) of the association and cooperative.[3] It was clearly a major fixed cost, but it also had some important benefits since there was a full team dedicated to management and operational planning from one year to another. In the case of CANOR, until 2009, the plan benefited from the support of an external team, financed by an external project, but in practice only one person, the association president, was in charge of plan management: the submission of each annual operational plan, harvest planning, sales negotiations, taxes payments, services contracting, etc. are difficult for one person to manage. Even in this last case, the administration cost was substantial, covering several trips to the state capital (Belém) made by the manager to formalise the plan and the association, as well as to pay annual taxes/fees.

A major initial cost not included in the data was the cost of drafting and submission of the management plan. Such initial costs were funded mainly by the Promanejo programme (cases: CANOR, Virola Jatobá, Porto Dias, Chico Mendes) or by an external funding agency such as ITTO, in the case of COOMFLONA. It was very difficult to obtain data on the cost of this first phase. However, the interviews conducted and data collected provide an idea of the level of this initial cost. CANOR received USD 265 116 in 2004 from Promanejo and about 50% of this amount was used to pay for the delimitation and forest inventory of the 24 blocks (a prerequisite for preparation of a technical forest management plan)

[3] The detailed distribution of such cost is only available for COOMFLONA: 28% for administrative staff salaries, 30% for office expenses, 27% for equipment depreciation and running costs, 10% for taxes/fees, 5% external consultancy (more details in Santos Melo et al. 2011).

Table II 3.3 Benefits from CBFM in the five cases studied (USD).

	Coomflona 2008**	Canor 2008**	Porto Dias 2010	Virola Jatobá 2008**	Chico Mendes 2009***
Total cost	379694	61069	156535	27014	108713
Sales	693224	77090	192794	139794	203848
Subsidy			17811		53095
Net benefit	313530	16021	54070	112780	148230
Net benefit/m³*	40	15	41	28	31
Net benefit/household	1742	2670	4506	616	3294

** m³ harvested*
*** for the production cost, all values for 2008 have been adjusted by the inflation rate between 2008 and 2010 (10%)*
**** all values for 2009 have been adjusted by the inflation rate between 2009 and 2010 (5.9%)*

and the elaboration of the forest management plan and the first operational plan by a forest engineer. The same level (USD 136364) was reported by Virola Jatobá Association.

3.3.2 *Benefits*

Table II 3.3 shows the total benefits for each plan, the annual benefits for each cubic metre harvested, and the annual benefits obtained per household, assuming that the total benefit was distributed among all households involved in the association holding the plan. As mentioned previously, each community decided to distribute the whole or part of the benefit obtained or to invest in collective goods. Only CANOR and Porto Dias completely distributed the total benefit among all the households holding the plan.

All of the plans ultimately provided a net benefit and thus succeeded in selling timber at a higher average unit price than the average unit production cost supported by the community. The lowest benefit per cubic metre was obtained for CANOR. In fact, the situation remained quite critical until the end of 2010 because the total timber volume sold up to 2010 was only 551 m³ (gross sales: USD 40517) and thus the cooperative remained for some time with a negative balance. Amaral Neto et al. (2011) carried out a survey on behalf of SFB and reported that the community ultimately succeeded in selling the remaining harvested timber. The lowest net benefit per household was calculated for Virola Jatobá. Timber production was lower than expected; instead of harvesting 8000 m³ from 500 ha, the enterprise harvested only 4054 m³of round timber because of an overestimation of the timber potential by the previous forest inventory. Some trees that had been marked for harvesting were located in preservation areas so were not removed and there was also a higher occurrence of hollow trees than anticipated.

The highest net benefit per cubic metre harvested was calculated for COOMFLONA and Porto Dias, despite their relatively high production costs. The high sales prices negotiated explain the positive results. COOMFLONA and Porto Dias succeeded in negotiating prices of USD 122/m³ [4] and 145 USD/m³ (including transport costs), respectively, whereas the sale price for CANOR was USD 73/m³.[5] Moreover, Porto Dias and Chico Mendes settlements benefited from a significant additional subsidy from the state government of Acre. COOMFLONA benefits could have been much higher because they harvested 7843 m³ but succeeded in selling only 5704 m³ of round logs in 2008.

Some additional income is derived by households with members involved in plan administration or forest management operations (Table II 3.4). For Chico Mendes and Porto Dias, none of the community members were employed by the timber companies in charge of the harvesting phase, and plan administration was exclusively ensured by Cooperfloresta. Table II 3.4 shows that the additional income was quite significant for households involved in administration or forest operations and often surpassed what might be expected from the net benefit distribution of the plan. (Figure II 3.3)

3.4 Discussion

In our case studies, the total additional income per family varied from USD 616/family up to USD 5347/family. Such values are equivalent respectively to 0.16% and 1.4% of the minimum salary[6], a rela-

[4] USD 110/m³ in 2008 adjusted at a 10% inflation rate between 2008 and 2010.
[5] USD 67/m³ in 2008 adjusted at a 10% inflation rate between 2008 and 2010.
[6] The Brazilian minimum salary in 2010 was USD 297 / month distributed over 13 months (http://www.portalbrasil.net/salariominimo.htm#sileiro).

Table II 3.4 Total income per family including salaries (USD).

	Number of households	Net benefit per family	Salary	Total income per family
COOMFLONA				
With member involved in administration	10	1742	3605	5347
With member involved in forest management	42	1742	3000	4742
Virola Jatobá				
With member as permanent worker for the timber company	2	616	2895	3511
With member as temporary worker for the timber company	10	616	3837	4453
CANOR				
With member involved in forest management	4	2670	469	3139

tively low value when one considers that 80% of the land is locked up and cannot be converted to other uses. In the state of Pará, Sablayrolles et al. (2013) show that on a per-hectare basis, incomes from agriculture are often higher than incomes from timber harvest. Higher additional income only occurred for community members directly employed by a private timber company or involved in plan administration or forest operations. Moreover, CBFM positive net benefits are not always sustained each year. A look at the history of some of the case studies reveals several years without benefits following plan approval: four years for CANOR and Virola Jatobá; two years for Porto Dias and Chico Mendes. The reasons are linked to the difficulties in initiating forest operations and to market uncertainty. Sometimes it is not possible to reach an agreement for timber sales, harvesting becomes very risky, and the community lacks capital to cover preharvesting and harvesting costs. After 2010, all initiatives except that of CANOR succeeded in renewing their forest operations, highlighting the importance of internal organisation schemes (such as COOMFLONA, Cooperfloresta), and/or partnerships with a private timber company even though this may appear somewhat costlier in the short term.

Market conditions are still unfavourable to CBFM projects that lack support in the commercialisation phase. Despite the federal government's effort to fight illegal logging, local sawmills are still supplied by illegal sources. Timber from indigenous lands and settlement areas continue to supply many sawmills with or without the cooperation of the indigenous people and settlers, pushing timber prices down. The case of CANOR illustrates this situation. Several attempts were made with various timber companies to negotiate and sign a sales contract before harvesting, but not even an oral agreement was reached. The cooperative only succeeded in selling its production after harvesting at a lower price than in the other case studies. The sales price did not differ because CANOR sold predominantly less-valued species: 51% of the timber sold for CANOR was of the highest valued species[7], compared to 52% of highest value timber sold for Porto Dias[8]. Cooperfloresta intermediation and the fact that the Porto Dias plan was certified by Forest Stewardship Council (FSC) clearly made the difference during sales negotiations.

Reaching national or international markets remains a challenge for such communities. The buyers of Brazil's central region (Brasilia) and southeastern region (São Paulo) demand processed wood that is costly and risky to produce. They are very strict about timber quality and the communities are not equipped or prepared to produce high-quality processed timber.

Even with strong support for marketing, the existing market chains lead to some difficulties in selling the entire production harvested at a remunerative price. The legal requirements of the forest management plan forbid harvesting the same parcel twice without waiting for the legal rotation period. Thus, communities often prefer to harvest all species even if they have not yet found a buyer for some of them. Thus, significant timber volumes can remain unsold, significantly decreasing the final benefit, which is what occurred for COOMFLONA. Community-enterprise partnerships may help reduce such risks, as timber companies are more skilled at processing logs and finding suitable markets for the end products. However, a community member of the Virola Jatobá Association claimed the enterprise tried also to harvest the most valued species to the detriment

[7] Maçaranduba (*Manilkara Huberi*), jatoba (*Hymenaea courbaril.*), muiracatiara (*Astronium lecointei.*)

[8] Cumaru ferro (*Dipteryx odorata*), garapeira (*Apuleia olaris*), ipê amarelo (*Tabebuia serratifolia*), ipê roxo (*Tabebuia impertiginosa*), angelim pedra (*Hymenolobium petraeum*), and maraçanduba (*Manilkara huberi*).

of other species that the community was interested in selling.

Given such market uncertainty, it is important to enhance communities' knowledge of the market value of timber stock in their legal forest reserve areas. In general, each community, supported by donors, manages to inventory the first parcel to be harvested. However, an extensive inventory in the entire forest reserve might avoid false expectations regarding potential benefits and prevent investing in elaboration of a plan with very limited financial viability. A full forest inventory can enable settlers and communities to better plan future timber sales and better guide logging operations. Markets need to be developed for the numerous less-valued species that are always difficult to sell since timber companies, as main direct buyers, are not interested in these species.

Securing market access at prices that make CBFM plans financially viable may be the first step to enhance CBFM potential in the Amazon and allow for more efficient use of public funds. For example, when the local or regional governments need to buy timber to build schools, medical centres, public housing, and other projects, they could preferentially buy it from areas under CBFM plans at guaranteed prices. The current procurement mechanisms do not allow this because the supplier chosen is usually the one offering the timber at the lowest price. Furthermore, establishing an official list of minimum prices for timber from CBFM projects may help CBFM managers reduce speculation while negotiating with buyers[9]. Public bidding systems, such as in COOMFLONA could also offer a mechanism for improving market access.

Looking at cost issues, it is clear that initial costs (i.e. inventory costs, preparation of forest management plans and annual operational plans, costs to start the bureaucratic process of approval, and follow-up) are prohibitive for the communities. In the cases where information was available (Virola Jatobá and CANOR), it seems to have exceeded USD 130 000. Though community members can possibly be betrayed by unethical professionals who overcharge for their services, particularly once they know that public funds are available, it is also true that contracting the services needed to draw up a forest management plan in the Amazon region is expensive. There are few forestry engineers and technicians available and their fees are usually high. Besides such services, the community members incur costs for travel to register documents in the state capital. For the Virola Jatobá plan elaboration and submission, travel expenditures and taxes/fees amounted to USD 9800 and USD 10 900, respectively. In 2010, a new INCRA regulation made forest management plan approval even more complicated by increasing the control over potential illegal arrangements between smallholders and loggers. Forest management plans in settlements must be evaluated by INCRA to obtain full approval, which means a double approval process. Unfortunately, in Brazil, very little data exists on the cost of drawing up a forest management plan, even for private companies (Sabogal et al. 2006). The smaller the volumes available for harvesting, the greater the weight of this fixed initial cost.

Such initial costs could be reduced with a more efficient administrative system and the possibility of registering forest management plans without travel to the state capital. As such a phase is systematically covered through the use of public funds, it could be argued that a public institution or an organisation directly paid by a public institution ought not to be entirely in charge of CBFM plan drafting and submission. For example, in Acre, the state government implemented a bidding system to contract forestry services to draw up, submit, and monitor CBFM plans.

In some cases of community-enterprise partnerships, the timber company supports the cost of formalising the forest management plan. But such cases can be expected to remain limited to communities with large forest reserves or, as in some cases, when the timber company plans to obtain legal access to the timber for the first harvest without taking care of post-silvicultural treatments (Amaral Neto et al. 2011).

Preharvesting and harvesting costs are substantial and there is little room to reduce such costs, except perhaps by investing in skidding equipment. Santos Melo et al. (2011) estimated that COOMFLONA could decrease skidding costs by 30% by investing in a skidder, which would also provide more flexibility for this phase and could be rented out to other communities.

The poor condition of internal settlement roads and external roads raises transportation costs. The case of CANOR is critical, but the situation may be the same for all smallholders with separate plots willing to invest in CBFM. Road improvement is necessary, as the poor conditions impose high sales costs for everything that settlers produce, including timber. However, road improvement cannot greatly reduce costs because the major share of transportation costs come from the rental of transportation and loading equipment.

Finally, looking at tenure issues, even if there has been significant improvement in legal access of communities to large forest areas, particularly through the expansion of RESEX, PDS, and PAE, it does not necessarily guarantee substantial additional income at the family level or full property rights. The issue

[9] In Brazil, a system of minimum guaranteed price already exists for smallholders' agricultural outputs.

Figure II 3.3 Community workers measuring logs. ©Isabel Driego

of benefit sharing from CBFM in PDS is not clear and a potential source of conflict. Moreover, communities are still vulnerable to invasion from illegal loggers: in Virola Jatobá for example, the association complained regularly about illegal extraction in their forest reserve but control and sanctions were insufficient.

3.5 Conclusions

In the Brazilian Amazon, CBFM initiatives for timber production can be financially viable subject to significant public financial support and/or partnerships with private companies. Even with such support, the cash income a smallholder can gain from CBFM on 80% of his land is not sufficient by itself to sustain the family's livelihood. If smallholders are assumed to improve their incomes from their landholdings, while preserving 80% of the forest, it thus seems necessary to invest in research-development activities to support the implementation of sustainable cattle ranching and agricultural activities in the limited area allowed to be deforested or to find a way to increase SFM profitability. Other benefits from SFM are provided (some employment generation, income diversification) but they were not systematically studied in this contribution.

Guaranteeing market access at remunerative prices for timber from CBFM projects is a priority for enhancing CBFM financial viability. The options to reduce production costs are limited, but some of the case studies illustrate that, even with high production costs, CBFM projects may succeed in producing net benefits when the communities have support in negotiating sales prices. Many communities, however, are not in such a situation.

Timber potential in smallholder forest reserves is unknown. Given the large initial fixed cost of drawing up, submitting, and initiating a collective forest management plan, a better assessment of such potential is required through a systematic inventory.

Keeping within the forest law is quite a long and costly process for communities that are often in very diverse situations in terms of such factors as land tenure, cooperation with private firms, and public and private technical support. The current legal framework can be simplified and should keep a certain level of flexibility to enhance smallholder investment in SFM for timber production.

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New opportunities for small-scale farmers of the Amazon to strengthen hazards resilience while preserving forests – field experiments combined with agent-based modelling

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Abstract: This paper introduces a simulation model focused on smallholder practices and labour management that is used to assess the long-term impacts of alternative land-uses in the Amazon region. Our objective is not to provide a tool for decision-makers but rather to inform the debate on rural practices and their likely consequences on forests resources, income generation, and land-use trajectories. We discuss the advantages and limitations of forest management (FM) for timber and permanent field of annual crops (PFAC), based on conservation agriculture, and the way in which they constitute management options with potential to protect forests while improving smallholders' livelihoods. Our model shows that subcontracted sustainable FM for timber (logging operations outsourced) in legal reserves and PFAC are not miraculous solutions that allow smallholders to prosper while preserving their forests. However, the additional earnings originated from FM facilitate the family's installation phase, which is often a critical period. Since income from FM can help farmers cultivate productive crops and pastures, it improves resilience to hazards (sickness and accident) that are frequent in the Amazon. In addition, since PFAC is an intensification technique, it has positive effects but only when adopted after the installation phase. In that case, it provides some additional profits by recovering degraded pastures. Considering a scenario with hazard probability and where 50% of smallholders' lands have to be dedicated to forest protection, adopting FM and PFAC appears to be a win-win solution for smallholders.

Keywords: Brazilian Amazon, forest management, tropical timber, conservation tillage, agent-based model, multi-agents system

4.1 Introduction

With an extensive surface of 7 million km^2, the Amazon plays a major role in water and carbon cycles, therefore deforestation occurring in the region may have severe impacts on these cycles at both regional and global scales (Davidson et al. 2012). Smallholders are responsible for substantial amounts of forest clearing (20% to 30% according to Fearnside 2008). Colonisation of the Brazilian Amazon started in the early 1970s and led to the creation of more than 500 000 km^2 of agrarian settlements occupied by small farmers (Menton et al. 2009). Deforestation mainly occurred in three states: Pará, Mato Grosso, and Rondônia (INPE 2011). The Brazilian Forest Code states that 50% to 80% (according to local regulations) of landholdings must remain permanent forest reserve in which forest management plans can be executed only after approval by the local authorities. Although in practice, many landholdings have already been deforested beyond these limits,

more than 12 million ha of permanent forest reserves are still held by small farmers (Amaral et al. 2007).

In the eastern Amazon, where cattle breeding is a common farming activity, traditional extensive livestock systems have expanded on smallholdings, which has resulted in significant deforestation. This expansion has enabled the smallholders to maintain their production in a context in which productivity tends to decrease over time. Pasture degradation regularly occurs due to inadequate pasture management practices or repeated burning, which in turn affects ranching productivity (Vosti et al. 2002, Walker et al. 2002). Therefore many smallholders with farms originally under forest cover have rapidly become limited in terms of profit accumulation without land expansion (Pacheco 2009). Although conservation agriculture techniques could be an alternative to preserve soil fertility and avoid deforestation, small-scale farmers usually do not have the technical knowledge or the financial capacity to implement such an alternative.

In the framework of the Forest and Agriculture (FloAgri) project funded by the European Union, such alternatives, called forest management (FM) for smallholders and permanent field of annual crop (PFAC), were tested with smallholders of the Transamazon highway (Pará state) through the implementation of FM plans and conservation agriculture systems (Sist et al. 2010, Scopel et al. 2013).

In order to assess the long-term impacts of the adoption of these alternative land uses, we adapted an agent-based model (ABM), initially developed to explain deforestation processes and describe the expansion of pioneer fronts in the Transamazon Highway region (Bommel et al. 2010). By adding new land-use activities (FM and PFAC), we discuss the advantages and the limitations of such alternatives and the way in which they can help protect forests while improving smallholder livelihoods.

The aim of this chapter is to test whether FM may be appropriate for smallholders and to identify the most important conditions that foster FM adoption in the Brazilian Amazon, our ABM helps to inform the debate on rural practices and their likely consequences at the farm level. Unlike top-down approaches often directed to policy-makers, our model focuses specifically on smallholders' decisions to better understand the constraints they experience in farming and the challenges they face in adopting more sustainable practices. Thus, this chapter aims to shed new light on how FM can contribute to the income of small farmers and why, in some cases, FM improves the resilience of these families against hazards such as illness or accident. By assessing the range of choices smallholders have and under which conditions they can integrate forest management, livestock, and agriculture, this chapter gives new elements to what seem to be the prerequisite conditions for positive changes. These issues are currently important in the debate around the new reform of the Brazilian Forestry Code. The model helps in consideration of future scenarios of FM by smallholders in the Amazon region, providing a different perspective on sustainable FM related to broader land-use decisions at the farm level.

This chapter is organised in five sections, including this introduction. The second section briefly describes the structure of the model and the dynamics of the entities. The third section presents some results of six land-use strategies in various circumstances. Then, before the conclusion, the fourth section discusses the relevance of such a model to point out how and why different contexts and policies can enhance or curtail the adoption of FM.

4.2 Comparing various land-use strategies using an ABM

The ABMs facilitate the understanding of human-environment interactions by pointing out the implications associated with various options for action. By designing the basic entities of a system and describing their distinctive behaviours, it is possible through the simulations to observe what can emerge at the global level of the system (bottom-up principle). When including the spatial dimension (with localisation of agents' activities), we obtain some dynamic maps. Because few ABMs have been designed for the Amazon region (Deadman 2005, Aguiar et al. 2012), this paper contributes to a better understanding of the underlying processes involved in land use.

4.2.1 Purpose of the model

ABM can be useful in management decisions (Bousquet and Le Page 2004). Yet it is important to stress that our ABM is not intended for optimisation of land uses. The purpose is not to predict the best way to achieve a desired situation but rather to explore the feasibility of various land-use strategies and their implications for smallholders (see Börjeson et al. 2006). Thus, the model seeks to evaluate the strict compliance with environmental law and the long-term effects of two alternative land-use activities. These land uses are PFAC based on conservation agriculture systems (no-tillage) and FM for timber in forest legal reserves (LRs). In our model, a logging company contracted by the farmers carries out FM. These partnerships or subcontracts between farmers and logging companies are very common in the region although they are usually quite informal. The model outputs allow us to compare the

Table II 4.1 Description of the six scenarios to assess the economic and ecological viability.

Initial conditions	Strategy	LR compliance	Specific activities
◆ Same family structure (ex: 3 adults + 3 children) ◆ Same initial cash ◆ Same farm size ◆ Same initial land cover ◆ Same soil types	Breeder	*No*	A: Standard activities
		Yes	B: A + Forest management
		No	C: A + Permanent crops
		Yes	D: B + C
		Yes	E: A + LR compliance
		Yes	F: C + LR compliance

economic performance and environmental impacts of smallholders' practices. We did not use sophisticated agent approaches (such as BDI architecture[1]) but a heuristic household decision-making structure based on observations in the field, interviews with famers, and experts' descriptions of rural practices (Moran 1989, Veiga et al. 2003, Veiga et al. 2006).

4.2.2 The overall methodological approach

The main principle of our modelling approach is to compare various production activities starting from the same initial conditions. Considering that small-scale farmers in the Amazon are mainly focused on livestock production, each agent adopts cattle breeding as the main production strategy along with a set of specific additional activities.

From each initial state, identical for each agent, six simulations are run in parallel according to a supplementary specific activity that the agent has to perform (Table II 4.1). The first scenario (*StandStrat*, considered as the control scenario) corresponds to the business-as-usual breeder strategy, for which the agent invests mainly in livestock without preserving his LR. When an FM activity is included (*FmStrat*), the agent has to delimit and protect a part of the forest within his landholding, from which he can extract and sell timber according to the rules of selective logging techniques. The PFAC strategy (*PfacStrat*) requires the agent to cultivate 4 ha of PFAC (see Scopel et al. 2013). The *Fm+Pfac* strategy aggregates the two previous ones: the agent has to cultivate PFAC and to manage his forest, in addition to the basic breeder activities. The last two scenarios simulate a strict compliance to environmental law: the agents do not touch their LRs: the *StandLR* agent performs his breeder standard activities on his authorised surface while the *PfacLR* agent is also obliged to cultivate 4 ha of PFAC. When a scenario is assigned to an agent, he is obliged to carry out the additional activities of this scenario, even if they are unsustainable for him. For example, in addition to his breeding activities, the agent with *PfacStrat* has to cultivate 4 ha of PFAC each year, even if he does not have enough resources for that. He is not allowed to change his assigned strategy during the runtime.

At the beginning of a simulation, the six agents are strictly identical, differing only in their strategy. Because the principle is to compare the results between the agents according to the scenarios, they cannot change their strategy during simulation and they do not interact.

4.2.3 Model description

Main principle

Many elements of the reality were not taken into account during the design process to keep the model as simple as possible.[2] In order to focus on the primary goal of the model, which is assessing land-use options, we kept only the entities and the operations related to the agricultural activities, thus omitting many other elements that are part of the daily life of the farmers (e.g. regular off-farm work, member aging, marriage, etc.). In this regard, the focus of our analysis is to better understand and assess the feasibility of each new activity with respect to the control scenario in terms of family labour management, availability of land, and economic profitability. These three elements are schematised in the flowchart of Figure II 4.1.

[1] BDI (for belief–desire–intention) is presently a common architecture for cognitive agents. Based on a practical human reasoning developed by M.E. Bratman (1987), it provides a deliberative mechanism for selecting concurrent plans, then executing the active ones.

[2] A full description of the model is available in Bommel et al. 2012.

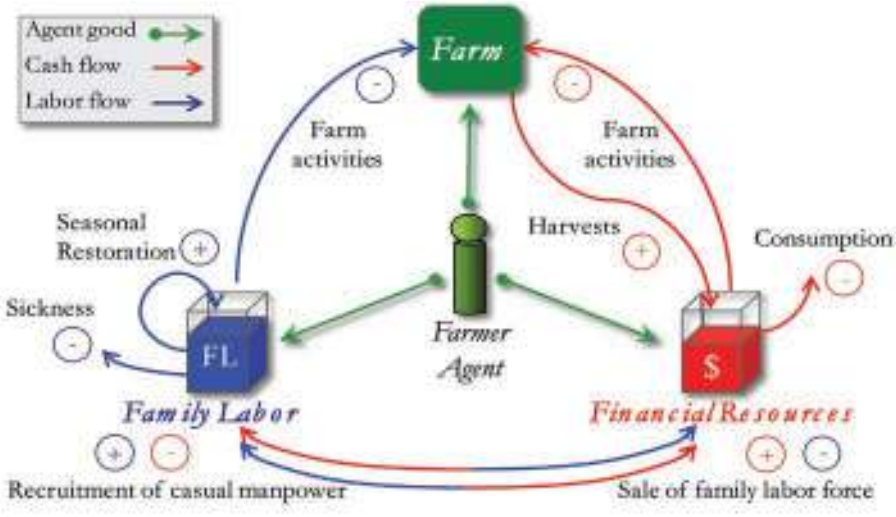

Figure II 4.1 Systemic diagram presenting the cash and workforce flows.

According to its structure, a family is endowed by a given quantity of labour (i.e. a given number of available working days per season). As any activity requires time, the stock of available working days decreases with addition of agricultural activities. Thus, an agent is constrained by his labour endowment. The agent is also constrained by the access to and disposal of financial resources. Therefore, to manage his farm, the agent owns two limited and interchangeable stocks: when he lacks labour force, he can hire temporary workers if he has financial resources, and conversely, when he needs money, he can sell a part of his available workforce as outside labourer days (without exceeding 90 days/season/worker). Available financial resources are systematically actualised according to the financial results of the preceding period.

Model structure and dynamics

The main elements of the model are grouped in two packages. The first contains the structure of the farm and the dynamics of its vegetation, and the second package contains the family, its labour force, financial resources, and farming activities.

A family is composed of children (0 to 4) and workers (2 to 4) with a landholding that encompasses 100 ha. Each plot (1 ha) is covered by forest, fallow, annual crops, or pasture. Annual crops (rice or corn) can be cultivated in a traditional way or using PFAC techniques. An unmaintained crop or pasture degrades progressively until it reaches a threshold where it becomes a fallow.

The technical and economic parameters (e.g. unitary prices and costs, labour demand by activity, and yield are available on the model web page, see footnote 2) have been set by looking at data from field surveys (Barbosa et al. 2008), experts' knowledge, and comparison of findings from other studies (de Reynal 1995, Vosti et al. 2002). The PFAC parameters have been obtained from data generated by the FloAgri project.

The simulations are run for 40 years. As the Amazon climate is clearly divided in rainy and dry seasons[3], the simulations are scheduled by an annual time step divided in two sub-steps with distinct seasonal farming practices. At the end of the year, each agent performs an annual balance to level the accounts and make specific purchases.

For each season, the land cover evolves naturally and the agent performs his seasonal activities as a sequence of three phases: spends money for the semester consumption; works on his land to produce agricultural goods; harvests and sells the production.

Vegetation dynamics

Each hectare of land cover evolves naturally with age and according to the activities carried out in the plot (Figure II 4.2). For example, an abandoned crop encroaches gradually (i.e. its abandonment level increases with each season) until, beyond a threshold, it turns fallow. After 30 years, a fallow turns to young forest, which requires 30 years more to provide harvestable trees (3 trees/ha). An unmanaged

[3] In the Pará state, the rainy season usually starts in December and stops in June, so the farmers plant their crops by the end of November. The dry season is from June to November, when the slash-and-burn activities occur (Moraes et al. 2005).

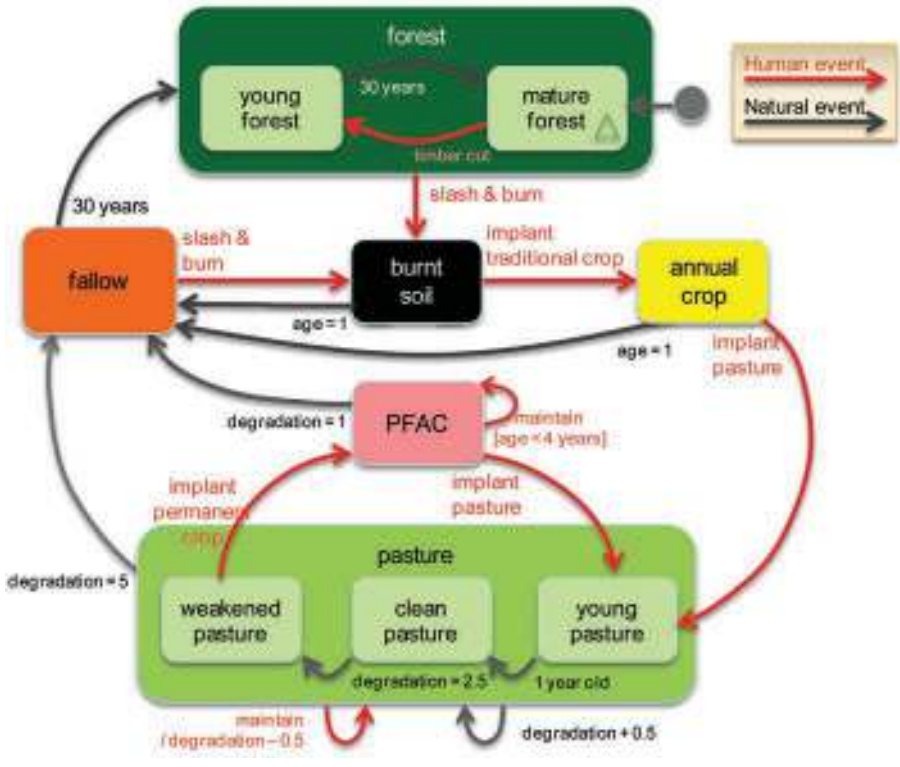

Figure II 4.2 The land cover state-transition diagram.

crop or pasture produces less than a managed one (15% drops per abandonment level):

$$\textit{actual production} = \textit{optimal production} \times \textit{neglected factor} \quad (1)$$

where: *optimal production* = *production/ha done by the model data* and: $\textit{neglected factor} = (1 - \textit{degradation loss factor})^{\textit{abandon level}} = (1 - 0.15)^{\textit{abandon level}}$

On any plot, the smallholder can suppress a cover and plant a new crop. To counteract the natural degradation of the crops, pastures, and cattle, some activities are required to maintain their productivity. The Figure II 4.2 shows all the vegetation types and the different ways (by natural transitions or by smallholders actions) through which land cover changes its state.

The cattle dynamic is very similar to the vegetation dynamic: when it is adult, a cow produces a quantity of meat per year, depending on the pasture quality and on its level of maintenance (see equation 1). In actual terms, this production matches a gain of body weight and the birth of a calf. But the model aggregates this production as a quantity of meat harvested and sold by the farmer. If the herd is neglected, it produces less and less and finally dies. Because all the cattle production (i.e. the calves) is sold, the farmer has to buy new cows during the annual balance stage in order to increase the size of the herd.

Farmer activities

After consumption expenses (cost: individual consumption × family size), the farmer performs his seasonal agricultural activities. Although breeding is a preferred investment, the agent dedicates a part of his labour force for self-consumption (only when his cash is lower than twice his consumption expenses): he cultivates half a hectare per family member of annual crops that will be harvested in the next season.

Then, the smallholder spends time and money on upkeep of the pastures and cattle. With the remaining cash and manpower, he performs an expansion loop, whose actions depend on each scenario. The expansion loop is constrained by forest or fallow availability, possibility to expand in case of constraint scenarios (*FmStrat*, *Fm+Pfac*, *StandLR*, *PfacLR*), and the availability of family resources.

At the end of a season, the remaining workforce is sold (max 90 days/worker). Here it should be noted that the sale of manpower might be unrealistic: in case of comfortable savings, smallholders would probably rather seek to improve their standard of living. Nonetheless, because we wanted to compare the results of each strategy on the same basis, we

removed this option and the sale of extra manpower was kept for all agents without taking into account any limit of savings.

Farmer specific activity: FM on LR (*FmStrat and Fm+Pfac*)

The FM supplementary activity requires the agent to protect his LR (80%). But while performing the FM scenario, he is authorised to extract and sell timber (3 trees/ha or 16 m^3/ha) that is sold at BRL 54/m^3, or USD 27/m^3 [4]. A company performs this activity and the charges are already deducted from the sale price. After having cut down the mature trees of one-third of the LR, the logged forest plot is protected during the next 30 years, meaning that the entire LR is logged for three years and then no timber harvest occurs during 27 years. Because farmers are authorised to slash and burn the forests located outside the LR to plant crops, timber extracted from this activity is also sold at 54 BRL/m^3, or USD 27/m^3. In contrast, agents who do not perform FM sell their trees as uncertified wood at BRL 27/m^3, or USD 13.50/m^3.

Farmer-specific activity: permanent field of annual crop (*PfacStrat, Fm+Pfac and PfacLR*)

The supplementary activity PFAC requires the agent to cultivate 4 ha of permanent crops. Normally, PFAC allows recovering degraded pastures by using no-till techniques. But if there is no degraded pasture around the house (500 m), the agent looks for an old pasture still producing, close to the house.

In order to remain homogeneous with the other crop management, the modelled activities of PFAC consist in planting crops, upkeep, and harvesting. In reality, a farmer harvests his PFAC main crops (½ ha of rice and ½ ha of corn) at the end of the wet season and then sows a leguminous cover crop to control soil erosion and weeds, increase organic matter and water in the soil, and fix nitrogen. So, in a one-year cycle, both crops are produced. In the model, we consider one harvest per season that aggregates both crops (main and cover crop) into one (production: 1425 kg/ha/season and price: BRL 0.835/kg, or USD 0.418/kg).

To maintain the PFAC, the farmer has to buy fertilizer (BRL 357/ha, USD 178.50/ha), urea (BRL 80/ha, USD 40/ha), and herbicides (BRL 310/ha, USD 155/ha), considering that the seeds have been stocked from the previous harvest. Thus, the agent spends an average of BRL 373.5/ha/season (USD 186.75/ha/season) for keeping up the PFAC. To plant it, the agent buys limestone (BRL 420/ha, USD 210/ha) and phosphate (BRL 400/ha, USD 200/ha), plus the maintenance products (1193.50/ha, USD 596.75/ha).

The PFAC has a lifetime of four years. During its last season, the cover vegetation sown is pasture that will be productive in the next season.

In interviews, farmers involved in the project have recognised PFAC as greatly advantageous. They explained that they earn in comfort by working near their homes. This aspect is, however, not taken into account into the model.

4.2.4 Main principles of simulation

Each farmer owns a single lot of 100 ha and he is not allowed to move to another farm or to expand by buying new land. Each lot has a similar vegetation cover. The agents vary only in their specific activities (FM, PFAC, and/or LR compliance). For standard simulations[5], each family has three workers and three children. It starts with BRL 7200, equal to USD 3600, (members × initial cash/person = 6 × BRL 1200 (USD 600) and 468 available workdays (workers × work days per season = 3 × 156). In its standard version, the model is deterministic: no randomness is involved during the simulations. Thus, from a given initial state, it will always produce the same output for each strategy[6].

Starting from the same state, the land cover at the end of a simulation (40 years) is quite different depending on the performed scenario. After 12 years (Figure II 4.3 bottom), the conventional breeder (*StandStrat*), for example, has converted all his land into pasture (this period is called the installation phase). In contrast, the agents in charge of FM as well as the agents who are artificially obliged to respect the law, have maintained their LR (80 ha). Their installation phase is much shorter (five years).

By looking at the agents' incomes, as noted previously, the output data cannot be rigorously compared with real incomes since the agents keep their standard of living, whatever their savings. What is more relevant is to compare the economic results among the agents in order to rank the income levels according to the scenarios.

[4] Exchange rate is about 1 BRL (Brazilian real) = USD 0.50.

[5] The model has been implemented on Cormas, an ABM software dedicated to resources management (http://cormas.cirad.fr).

[6] A stochastic version (with randomness) will be used in the analysis in order to test the impact of sickness probability or when specifying a new initial land cover (see 4.3.3 and 4.3.4).

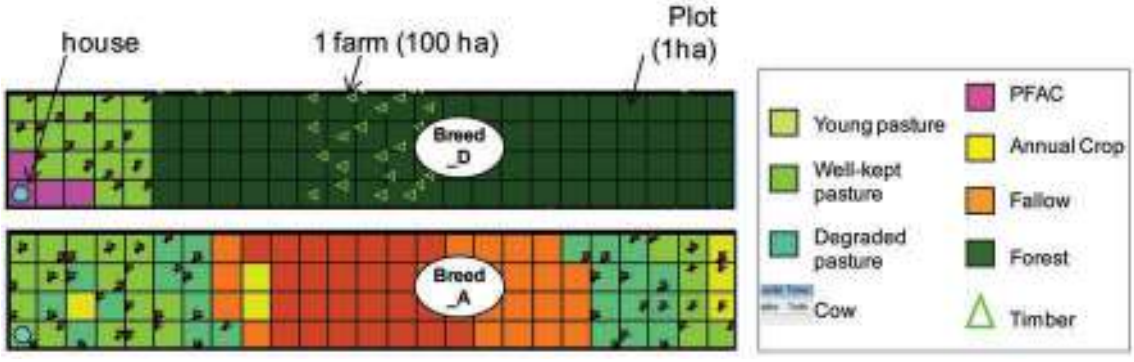

Figure II 4.3 Example of land cover for a standard simulation for two different farms after 20 years.

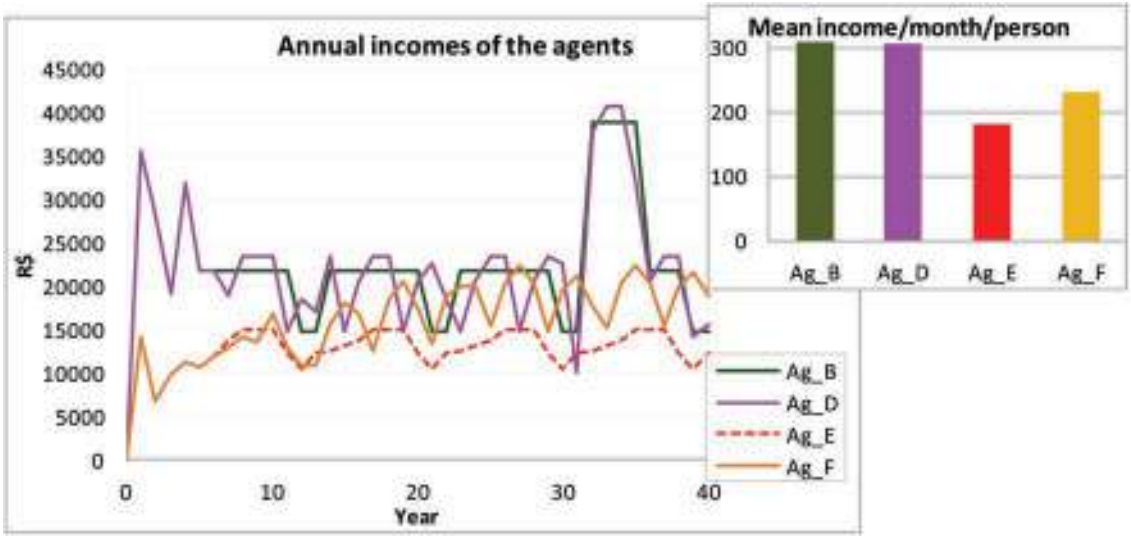

Figure II 4.4 Evolution of the annual incomes of four agents respecting their LRs, during a standard simulation of 40 years.

4.3 Scenarios results

4.3.1 The impacts of FM and PFAC for agents respecting their LR

Given the fact that the *FmStrat*, *Fm+Pfac*, *StandLR,* and *PfacLR* agents respect their LRs, the efficiencies are compared on the same area available for cultivation (20 ha) (Figure II 4.4). Indeed, at the end of the third year, each agent has deforested his authorised surface. The rest remains forest and only the *FmStrat* and *Fm+Pfac* agents can use it to harvest timber during the FM cycles.

The standard breeder obliged to preserve his LR (*StandLR*) without any alternative activity has an average income of BRL13 000/year for a six-member family, meaning BRL 361/month (USD 180/month) per worker, calculated from year 10 to 40, i.e. after the installation phase; this is a quarter below the minimum salary (the Brazilian minimum salary in 2009 was BRL 465/month, or USD 232.50/month, see Portalbrasil, 2009). During the first five years, the family income originates mainly from production of annual crops and timber sales while converting forest into pasture. During this installation phase, the smallholder invests intensively in livestock by buying cows and planting new pastures. When the authorised 20 ha are fully covered with pasture and because the smallholder cannot buy new land, he manages his herd and sells out the remaining available working days of the household. The regular fluctuations in livestock income are due to the sale of the cull cows and the purchase of heifer calves.

FM significantly increases the incomes of *FmStrat* and *Fm+Pfac* agents every 30 years (the duration of the forest rotation cycle). The first growth peak is smaller than the second one because the agents invest in livestock: while planting new pastures and buying many cows, they transfer a high part of the first FM profits into livestock capital. Accumulated cash income over 40 years for these two scenarios is about BRL 907 000 (USD 453 500), or

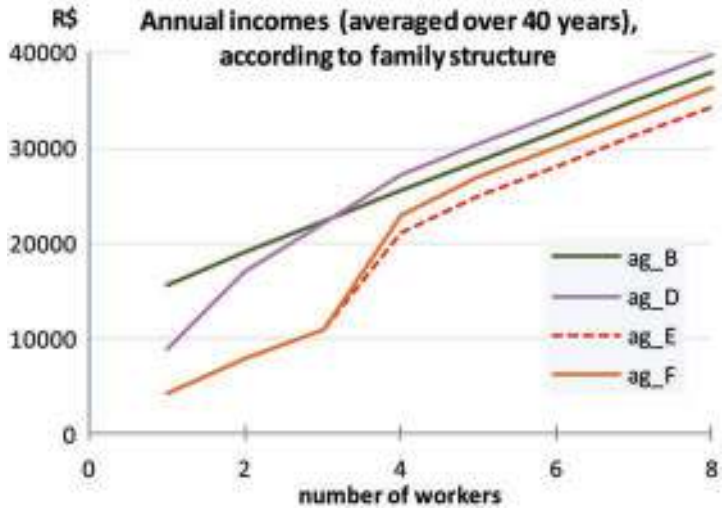

Figure II 4.5 Annual incomes of the agents according to the number of workers.

55% higher than for the breeder obliged to preserve his LR without FM.

Between the timber harvesting periods, incomes for *FmStrat* and *Fm+Pfac* agents drop to a value close to that of the *StandLR agent*. Nevertheless, even during this forest regeneration phase, FM has a positive effect: mean income during the renewal phase is approximately BRL 1090 (USD 545)/month for *StandLR*, while it reaches BRL 1670 (USD 825)/month for *FmStrat* and *Fm+Pfac*, which is 52% better. Such difference is linked with livestock and pasture quality: short of savings, the *StandLR* agent does not succeed in maintaining all the pastures and the cattle, which gradually become less productive (equation 1). Thus, the mean monthly income from livestock for the *StandLR agent* is BRL 344 (USD 172) while it is more than twice as high for the *FmStrat agent*: BRL 797 (USD 398.5). In this scenario, FM income provides some financial resources that allow the farmer to maintain the productivity of livestock and pasture.

The starting phase (first 10 years) for the *PfacLR* agent is as difficult as that of the *StandLR agent*. But, by adopting permanent crops, this agent succeeds in gradually recovering the degraded pastures and thus is able to reach higher cattle productivity. This agent also increases household income by harvesting his permanent crops. As PFAC requires more labour for planting and maintenance, the agent sells fewer working days. Nevertheless, after 12 years, the annual income becomes higher than that of the *StandLR* agent, and it is equivalent to agents involved in *FmStrat* and *Fm+Pfac* after 20 years. At midterm (15 years), PFAC provides positive effects on family income.

The diagram in Figure II 4.5 shows the annual incomes of the agents according to family structure. The same former simulations have been run but here for a family of eight members, with successively one to eight workers.

Not surprisingly, whatever the agent strategy, annual income increases as the family has more workers. This increase is mostly due to the higher number of working days available to be sold. However, for the breeders who do not perform FM (*StandLR* and *PfacLR* agents), an income shift is observed when there are more than four workers: above this number, the family is able to maintain and clean up all its pastures, thus the difference in annual income with agents performing FM is low and solely due to the timber harvest peaks. Below four workers, the family lacks the labour force to maintain all its crops and pastures, which causes a decrease in productivity. We can thus conclude that, when subcontracted, FM is mainly useful for families with few workers since it helps to compensate for the lack of manpower.

4.3.2 The cost of staying legal

This section assesses the cost of staying legal by preserving the LRs. As stated in the Forest Code, the law requires landowners in the Amazon to conserve 50% to 80% of their farmland in forest. The following simulations compare agents that respect their LRs (*FmStrat*, *Fm+Pfac*, and *StandLR* agents) with those who do not (*StandStrat* and *PfacStrat*). Figure II 4.6 shows the evolution of the agents' annual income. The installation phase (time to cut the forest) is much longer for *StandStrat* and *PfacStrat* agents – 12 years – compared to the five years for *FmStrat* and *Fm+Pfac* agents (and also for *StandLR* and *PfacLR agents*). During this phase, they face

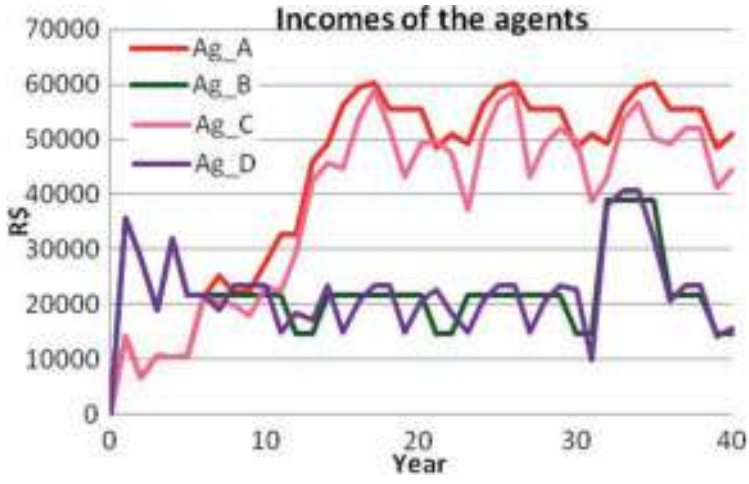

Figure II 4.6 Evolution of annual incomes during a standard simulation of 40 years, according to four agent types.

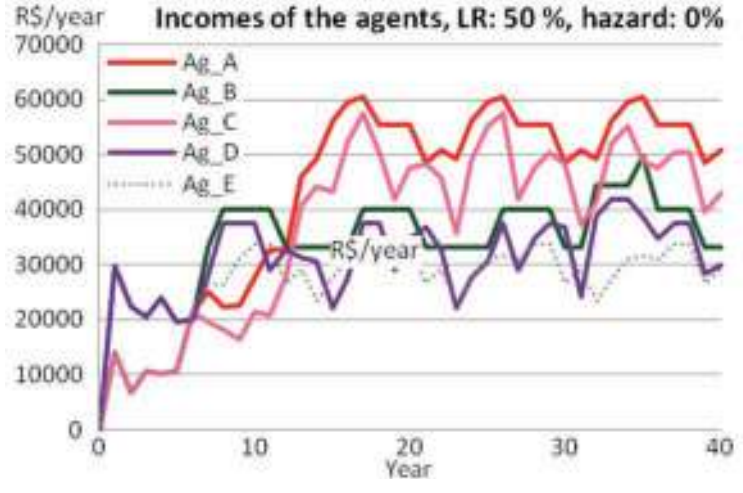

Figure II 4.7 The annual income of the agents when LR is set to 50%.

low income (short farm production and investment in livestock). But after this period, when they have completely turned their farm into pasture, *StandStrat* and *PfacStrat* agents succeed in increasing their savings more rapidly than the other agents who kept their LRs. Such a shift is linked with the livestock income on 100 ha instead of 20 ha and the fact that not much manpower is required for its maintenance (300 working days/year for 100 ha of pastures with cattle).

Once the standard breeder converts the 100 ha of his land to pastures, his activity consists mainly in managing his herd and selling the extra labour force. For these specific simulations, FM does not compensate the breeding loss due to pasture limitation. Excluding the installation phase, the monthly income of the *StandStrat* agent is about BRL 4250 (USD 2125), whereas it is only BRL 1670 (USD 835) for a breeder doing FM, i.e. 60% lower. Such results give an idea of the opportunity cost for smallholders to conserve the LRs even when FM is possible.

The *PfacStrat* agent has results similar to that of the *StandStrat* agent. Since he needs more manpower to plant and maintain PFAC, his income is a little lower than that of the *StandStrat* agent. Unlike the *PfacLR* agent on 20 ha (Figure II 4.4), PFAC has no positive effect when using the 100 ha, even after a long period.

The Brazilian Forestry Code allows, in certain zones (consolidated zones, defined by the ZEE plan: the state of Pará delineated its territory in Ecological-Economic Zones), to use and deforest up to 50% of the farm (Figure II 4.7).

Obviously, this modification of LR does not affect *StandStrat* and *PfacStrat* agents because they ignore these constraints. But for the agents that keep their LRs, this change of the LR ratio increases their monthly incomes: from BRL 1090 to 2500 (USD

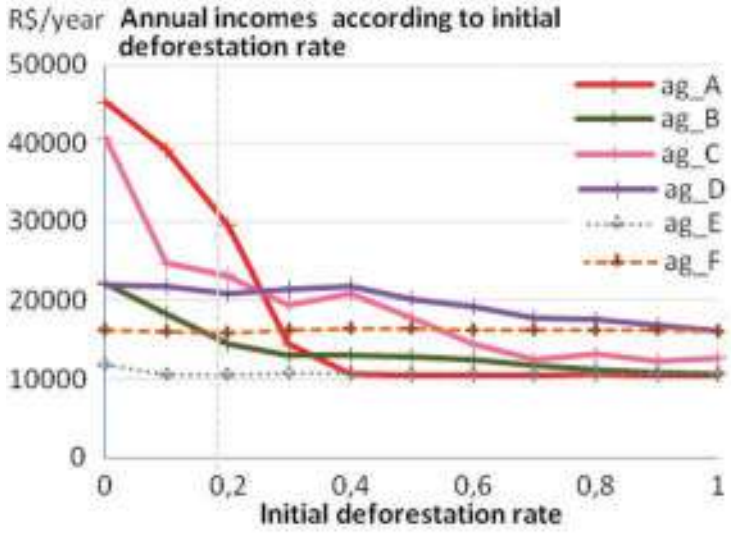

Figure II 4.8 Mean annual incomes according to initial deforestation.

545 to 1250) for *StandLR* (+130%); BRL 3035, or USD 1517.50 (+81%) for *FmStrat*; and BRL 2680, or USD 1340 (+74%) for *Fm+Pfac*. Compared to the *StandLR* agent obliged to protect his LR, the FM has a lower impact on income, except for the first years of installation.

Thus, economically speaking, a reduction of LR to 50% would help small farmers more than applying FM on 80 ha. On the other hand, if LR were complied with (which is seldom the case), it would decrease the forest size from 80% to 50%.

4.3.3 Portion of property initially deforested

To ensure a good understanding of the model, it is also necessary to begin the simulations from initial states with less virgin forest, as is presently the case for a majority of smallholders in Pará. Modifying the initial deforestation part, from 0% to 100%, has resulted in the following output. For each new initial state of the farms, deforested plots are randomly covered by an annual crop, pasture, or fallow, with a random degradation level. In the cases where the deforestation is greater than the authorised portion (20%), the agents that respect the law (FM and LR strategies) will not use a part of their land (covered by fallows and old crops) so that forests can regenerate. But because forest regeneration is a very slow process, the simulations show that full restoration of the LR comes after a long period (about 38 years according to the initial degradation level). In that case, the agents undertaking FM can harvest timber even if their forests are below 80 ha (which is something that is not authorised in practice). For each value of the initial deforestation portion parameter, 100 simulations are repeated in order to normalise the effect of the randomness (Figure II 4.8).

The analysis shows that the incomes of the *StandStrat* and *PfacStrat* agents, who do not respect the LR constraints, decrease rapidly with the initial degradation rate. This is because the farmer spends time and money to maintain degraded pastures that are basically unprofitable due to their poor productivity (the "initial deforested" parameter requires that a portion of the land cover is degraded, so equation (1) gives a lower production). Since the beginning of the settlement is very sensitive, losing time and money for land recuperation during the first stage holds back the development of the agents. When 40% of the farm is deforested, the standard breeder has the same income as the *StandLR* agent, i.e. he is mainly a farm labourer.

For the *FmStrat* agent, who is spending energy to maintain unprofitable pastures on 20 ha, the lack of preserved forest also reduces the FM profits and has a more negative effect on income compared with the *Fm+Pfac* and *PfacLR* scenarios.

The signatures of the agents doing PFAC (*PfacStrat*, *Fm+Pfac*, *PfacLR*) are dissimilar: *Fm+Pfac* and *PfacLR* agents that work on 20 ha are not affected by the initially deforested parameter. Because they do not spend much on livestock, they are able to recover their degraded pastures and manage a small area whatever the initial degradation level. *Fm+Pfac* provides the best income when initial deforestation is higher than 25%. On the opposite end, *PfacStrat* has low resistance to initial degradation, mainly for low deforestation rate. This is because the agent spends a lot of energy to plant permanent crops while investing at the same time in livestock and expanding

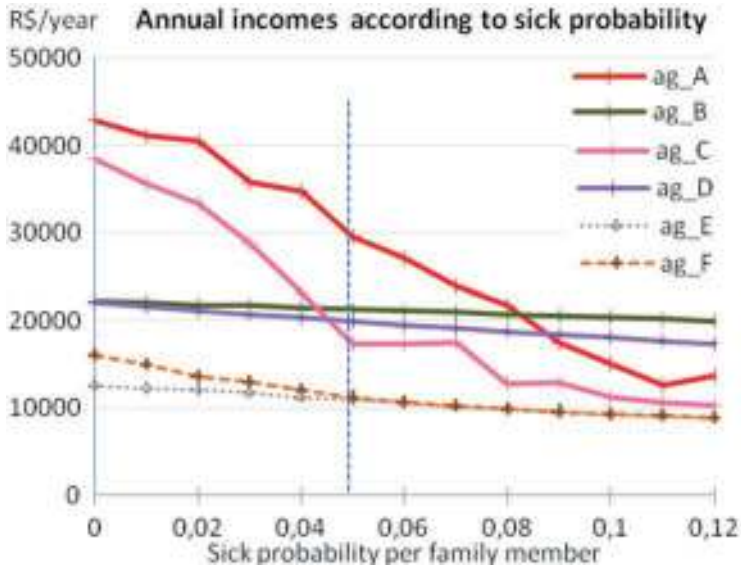

Figure II 4.9 Annual incomes of the agents according to sick probability per member; 0.05 is the standard risk from literature.

in the forest. So, when starting from degraded land, PFCA presents positive effects but solely when the farmer does not invest heavily in livestock at the same time. Depending on the degraded surface, the period to get PFAC positive effects can be long. By comparing, for example, the dynamics of *StandStrat* and *PfacStrat* from a 20% degraded farm, the mean income of *StandStrat* over the 40 years' simulation is higher than of *PfacStrat*. But *PfacStrat* has much better incomes only after a long period (20 years, not visible in Figure II 4.8).

4.3.4 FM, PFAC, and resilience

Analysing the effect of hazard (sickness and accident) on smallholders is important since the family workforce plays a key role in household strategies. For the previous analysis, the sickness probability was set to zero, but the available statistics show that, in Amazonian pioneer fronts, hazard is greater and the risk of becoming seriously ill or being injured is higher than elsewhere in Brazil. According to IBGE (2008) estimates a person stays in a hospital once every 10 years (5%/season/person).

For the current analysis, the sickness option has been activated. In the next graph, Figure II 4.9, the sickness probability has been tested from 0% to 12% per season (analysing upper probability is not useful since the available labour force is almost zero). For each season, every member of the family has a random chance to be sick and unable to work during this time. Due to stochastic events, the simulations are repeated 100 times for each parameter new value.

Obviously, all the agents lose income to the extent that hazard risks increase. Interestingly, *StandStrat* and *PfacStrat* agents who do not respect their LRs are more sensitive to hazard. They can hardly expand and maintain their pastures and cattle when they lose manpower. In contrast, agents managing their forests (*FmStrat* and *Fm+Pfac*) tend to be more resistant to hazards because of the extra revenues coming from FM that make them much less affected by a temporary loss of labour. As the PFAC strategy requires additional investments in money and manpower, *PfacStrat* and *PfacLR* are more sensitive to hazards. FM compensates this sensitivity in the case of the *Fm+Pfac* agent. So, these results confirm the previous ones (Figure II 4.5): when subcontracted, FM helps to compensate for the lack of manpower.

Figure II 4.10 shows the distribution of incomes when hazard probability is set to its standard value (5%/ season/person). In addition, it compares the effect of the LR authorised level for the two scenarios – 80% and 50%.

The bar chart (right) presents the average income over the 100 simulations of each agent. The *StandStrat*, $FmStrat_{LR:\ 50\%}$ and $Fm{+}Pfac_{LR:\ 50\%}$ agents have similar mean incomes (about BRL 30 000/year, or USD 15 000/year). But the standard deviations are quite different: *StandStrat* shows irregular incomes while *FmStrat* and *Fm+Pfac* are much more regular. This irregularity of incomes is more visible on the left chart: here, each point is the annual income of an agent for one simulation. By sorting these values for 100 simulations, the curves show how these incomes are distributed. For standard breeders exploiting 100 ha, the chances to succeed are spread from highest to lowest incomes (high variance): in more than 20% of the simulations, the *StandStrat* agent fails to manage his farm. When an accident or a disease

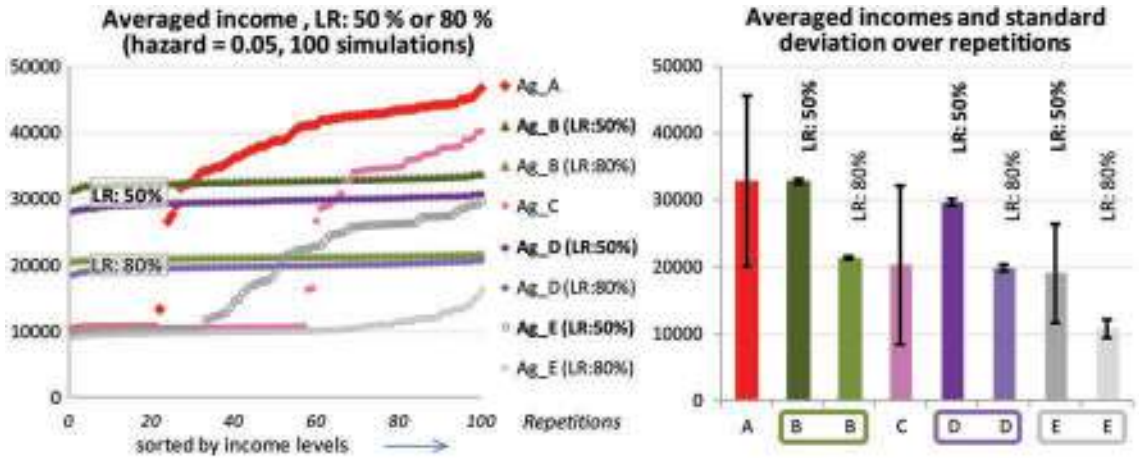

Figure II 4.10 Annual incomes when LR is set to 50% or 80%, with 5% risk probability; sorted distribution of incomes for each simulation (left chart); average incomes over 100 simulations and standard deviation (right chart).

occurs in the installation phase, the consequences strongly impact this agent's economic situation and his farm's productivity. This agent is more able to resist hazards when his expansion phase is complete. These results are worst for the *PfacStrat* agent, who fails in 60% of the cases: this agent is more sensitive to hazard during the installation phase. As PFAC requires investments, it is only profitable in the long term when the family is strongly installed.

In contrast, *FmStrat* and *Fm+Pfac* agents, who manage their forests, have very stable incomes. Even when a family member is unable to work, the quality of the farm production is such that the family can better resist a temporarily lower labour force. When the LR is set to 50 ha, the mean income is equal to that of *StandStrat*, but with low fluctuations (over 100 repetitions) and, above all, with 50 ha of preserved forest.

4.4 Discussion: Optimal conditions versus hazard and degraded lands

As stated by Popper (1963) for theories, a model cannot be validated in the sense of having complete confidence on its outputs. Like theories, a simulation model is inherently wrong (Bradbury 2002): sometimes it can be corroborated by data but in most cases, it is refuted by empirical observations. So, we consider that comparing the model outputs with data does not permit a conclusion that it is undoubtedly valid; the data comparison is just a way to increase the likelihood of its results. Furthermore, since the alternative practices developed in the FloAgri project are recent and not broadly used in the Amazon, it is also hard to compare the model outputs with real data. But while the lack of historical data prevents us from "validating" the model, its dynamics are coherent with observations and expert knowledge. Instead of comparing static data on each practice independently (performing a cost/production comparison is quite simple), the ABM helps demonstrate how various activities can interact. It helps explain why, depending on the context, some practices can either be efficient or fail. Of course, it would be interesting to compare our results with an optimisation model that aims to determine the best mixture of land-use patterns. Nevertheless, it should be emphasised that our ABM does not seek to optimise land-use distribution. Since it focuses on the behaviour of agents in a temporal dimension, it helps us understand the reasons for success or failure of a strategy in various situations.

Our results show that without any agricultural alternative, a small breeder compliant with LR has low income that comes mainly from the sale of his labour force. A change from 80% to 50% of LR would obviously increase his cash income (+130%) more than investing in FM of his LR (+52%, without hazard).

The model shows that FM and PFAC are not miraculous solutions that allow a smallholder to prosper while preserving his LR. Compared to a standard breeder artificially restricted on 20 ha (*StandLR*), the adoption of alternative practices like FM can increase his income (twice his standard income in the best case). But what he earns from 20 ha of crops and pastures, plus the revenue he obtains occasionally from FM, remains lower than the income he gets from 100 ha of pasture. However, in that case, the conventional breeder has deforested all of his land and he is illegal with respect to the Forest Code. In recent years, the controls have become more frequent and the sanctions have been tightened to such an

extent that farmers can no longer break the law as they did before.

The additional practices, however, may have positive effects when various types of hazard are introduced in the model. For example, the standard breeders are more sensible to sick probability than the agents performing FM. As the risk of being seriously sick or wounded is high in the Amazon, FM increases the resilience to hazards. The additional revenue generated by FM appears useful when the labour force is reduced because it helps with investments in productive livestock, which does not require a lot of work.

PFAC has positive effects when a reasonable part of the farm is degraded. By using no-till techniques, it allows recovering some productive pastures when the standard breeder can just maintain poorly profitable cattle. But PFAC is a risky activity because no-till farming needs competences, manpower, and financial investment. The model shows that PFAC weakens farmers when they are in the installation phase: they cannot invest in such techniques and livestock at once. By gradually recovering degraded pastures, PFAC can be seen as an intensification practice that improves cattle productivity over the long term.

As a result, when starting from a degraded farm and when taking into account hazard probabilities, the FM may offer equivalent mean income to that of an unrestricted standard breeder, but with higher stability. Finally, coupling FM and PFAC seems to be an interesting alternative that might make the farmers more resistant to hazards and provide higher income, while at the same time preserving the major part of their forests.

4.5 Conclusions

By implementing agricultural activities related to standard or specific strategies, an ABM offers the advantage of explaining how several actions can complement or compete. In contrast, a simple comparison of static economic returns between different activities does not inform about such complementarities. By targeting the model on the management of the labour force, the simulations allow us to explain how some actions may affect the achievement of others. Thus, our ABM helps to explain why some alternative practices can either be efficient or fail, depending on the context.

As several studies have already pointed out, succeeding in making a small-scale FM plan financially viable in the Amazon region remains a challenge and many barriers have yet to be removed (Hajjar et al. 2011, Drigo et al. 2013). It is considered relatively risky in the short term to invest in FM, whereas investing in cattle is often considered to be a safety option, at least in the short term. The latter situation may reverse in the long term, but only with stronger efforts to decrease the many barriers threatening the long-term viability of FM (see Part II, chapter 3, or Drigo et al. 2013).

However, standard breeding, which is the most common production system among smallholders in the Amazon, is also risky during the installation phase (Tourrand 2009). When taking into account the current available cash and manpower of a family, our ABM shows that a breeder quickly meets difficulties that prevent him from developing his operations as he would under optimal conditions. The model reveals that the agents that prefer to pursue ranching activities by converting all their land to pasture are economically vulnerable at the beginning and they can easily fail due to increasing risk and land degradation.

In contrast, the agents who are able to manage their forests tend to strengthen their resilience capacities against hazards, mainly when considering the sickness probability. Indeed, when subcontracted, the FM cannot improve the mean annual income of smallholders much in the Amazon, but it tends to stabilise the income and improves household resilience in the long term by helping to maintain good productivity from pastures and livestock on a reduced area.

Adding PFAC increases potential benefit for families to invest in FM, underlying potentially interesting complementarities. When few pastures are degraded, PFAC improves cattle productivity over the long term. Nonetheless, as PFAC is an intensification technique, it cannot be performed while investing in livestock.

Since controls and sanctions have been strengthened in recent years in the Brazilian Amazon, it is no longer viable to be illegal with respect to the Forest Code. But, without any agricultural alternative, a small breeder compliant with the Forest Code would have very low income, earning a living by selling his labour. In that situation, an investment in efficient FM could double the revenue. A change from 80% to 50% of LR would obviously increase his income. Thus, despite the precautions required in any modelling, our results allow us to conclude that FM associated with intensification practices such as PFAC may allow smallholders to achieve incomes equal to those of extensive ranching over all landholdings. Furthermore this production system is less sensible to hazards while it preserves the forest.

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Forest regulation flexibility, livelihoods, and community forest management in the northern Bolivian Amazon

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Abstract: Since the time when forests were recognised not only as a source of wood and fibre but as a complex system closely linked to human society and other biological systems, a number of efforts and initiatives have been developed to integrate forestry within other sectors of the economy and with livelihoods, and to improve the governance of forest resources. This case study looks at the outcomes and consequences of making forest regulations related to the use of timber resources and forest management among rural communities more flexible in the northern part of Bolivia. If forest regulations are made more flexible when the rights are granted , the informal mechanisms that have been developed to access timber and benefit from its sale become eventually legitimised, and the distinction between what is prohibited by law and what is sanctioned by tradition will be lost. Thus, communities can operate either as efficient promoters of sustainable forest use or as forest predators, innovating different strategies to use timber formally or informally. If a national or regional forest policy is going to be effective, it must have the commitment of the entire government and society-wide support based on a process of joint deliberation, assessment, and coordination rooted in the local realities of users.

Keywords: Regulations, formal, informal, legal, illegal, community, individual, collective, governance changes

5.1 Introduction

In the past three decades of the 20th century, forests became recognised for their provision of direct and indirect benefits to global society, to national and local economies, and to the livelihoods of millions of people (Mery et al. 2005), at the same time people's awareness of the increasing loss of forests and global warming was growing. This triggered initiatives to change particular social, economic, and political elements of forest management in many countries. Some of these changes were meant to favour poor people and improve their opportunities to benefit from the forests, as is the case of community forest management (Cronkleton et al. 2011) or co-management (Carter and Gronow 2005). Other changes were meant to allow governments to maintain or increase control over the forests.

Changes in the way policy-makers think about the role of forests in society can be observed by analysing the regulatory framework on forest use and management in a country. Worldwide, many examples exist that describe the effects of changes in legislation on forest and tenure rights. In Latin America, for example, the revision of policies, legislation, and forest institutions merits special attention when the consequences of those initiatives affect rights, the environment, and the countries' development (FAO 2010).

Within this legal context, we can analyse changes from different perspectives: for instance, the rise of informal institutions due to imperfections in legal changes (timber extraction within communities); illegal activities due to laws and regulations that do not fit local realities (the obligation to comply with expensive and bureaucratic forest-management in-

struments among small users); and circumstances that influence social behaviour related to compliance with the laws.

Scholars have developed studies on each of the cited perspectives. For instance Gel´man (2004), in his studies of Russia´s post-authoritarian transition (specifically in the formation of business networks during the process of privatisation), argues that informal institutions serve as a weapon of the weak when law is insufficiently applied. Roper (2003) shows what factors affect the ability of indigenous people to benefit from the new economic opportunities related to forest use. He mentions, for example, that people may not understand a law and may not foresee the social changes that could result from taking up certain economic opportunities.

When new economic opportunities to benefit from forest resources are created, communities and smallholders may experience problems in making use of these opportunities. Regulations often impose singular standards that are more difficult to comply with for smallholders than more economically powerful stakeholders, thereby creating access asymmetries (Larson and Ribot 2007).

Ramcilovic-Suominen and Hansen (2012) studied adherence to rules regulating local forest-based activities. They argue that compliance is influenced by numerous normative and instrumental factors, such as perceived fairness of the rules, the need for resources for livelihoods and domestic use, and the fear of sanctions. These factors affect behaviour differently in different legal and socio-economic contexts. Several scholars link the lack of compliance with the law to illegal activities, corruption, unequal benefit-sharing, and unsustainable use of resources that leads to forest degradation and, consequently, to a decline in forest-related goods and services, loss of revenues, and loss of forest-related livelihoods (Contreras-Hermosilla 2002, World Bank 2004, Contreras-Hermosilla and Peter 2005, Tacconi 2007, Ramcilovic-Suominen et al. 2010).

After important policy changes related to deforestation and forest degradation caused by private forest companies, agricultural companies, and cattle ranchers, Bolivia shows new patterns of local forest management by actors (rural communities) previously constrained or excluded from benefitting from the use of forest timber (Pacheco et al. 2010).

There are some references to rural populations in forest areas that have begun to play a key role in forest-use changes. Sierra (2001) studied the role of communities as suppliers of domestic markets. Sierra and Stallings (1998) studied local conditions in relation to export markets and the integration of local populations in an economic system. Pacheco et al. (2010) analysed the outcomes of rights exercised at the community level in the confrontation between private companies and the rural poor over access to land. However, there is little knowledge about normative changes as a driver for the development of local strategies to access and use forest timber resources, and to change related forest management strategies according to the local social context.

For the current work, we understand the flexibility of forest regulations as the design of complementary regulatory instruments that try to recognise local strategies for use of forest timber in an attempt to overcome the law's deficiencies in facilitating the exercise of use rights by small stakeholders and rural people. Within the literature, there is no reference to this topic as presented here. Most of the work related to law and regulations is developed within the focus of forest governance (Weiland and Dedeurwaerdere 2010), with emphasis on decentralisation processes as the prominent feature of forest governance (Ribot et al. 2006).

In this chapter we present empirical evidence related to the development of local strategies for use of timber resources based on the study of the normative flexibility imposed by social and political changes in Bolivia. The process of making forest regulations more flexible in Bolivia has resulted in a more complete set of local people's user rights over forest resources than before. Based on the theory that people with secure tenure and forest-user rights are more likely to use these resources in a sustainable way, the study looks at whether this tendency can be observed in Bolivia. Do people use their forest sustainably if they have more complete forest-user rights?

To answer this, we focus on the following questions:

1) What has motivated the government to apply forests regulations in a more flexible manner?
2) How has the rural population made use of this flexible application of forest regulations?
3) What contextual (site-specific) factors generate different responses in terms of forest use among different individuals and communities (access roads, agricultural opportunities, high-value non-timber forest products [NTFPs], community forest-management plans or individual authorisations)?
4) How can the changes and flexibility of forest regulations promote new strategies of forest management either leading to deforestation or sustainable forest management among rural communities?

The chapter is organised in seven parts, beginning with this introduction. The second part describes the methods used to collect data and information for our analysis, as well as some contextual aspects. The third part covers the most important changes within forestry law in the past 30 years. The fourth part focuses on the key aspects of forest regulation flex-

ibility. The fifth part presents the research results. The sixth and seventh parts are the discussion and conclusions, respectively.

5.2 Methodology and contextualisation

5.2.1 Description of the study area

The northern Bolivian Amazon covers an area of about 91 000 km^2 of tropical rain forest, with a natural high abundance of Brazil nut trees (*Bertholletia excelsa*) and rubber (*Hevea braziliensis*). The region is almost fully covered with forest, with a commercial timber volume of about 28 m^3/ha (Poorter 1999). Brazil nut has been the most important forest product exported from Bolivia for the past three decades, and currently, its procurement and trade contribute 30% to the region's economy (Duchelle 2009, INE 2011). More than 50% of the combined cash and subsistence income of households is derived from gathering or processing Brazil nuts (MTPS 2008, Duchelle et al. 2011). Subsistence agriculture is important in all communities in the region, but only a small proportion of agricultural products is commercially traded (Zenteno et al. 2013).

In the region, approximately 30 000 rural inhabitants live in 262 communities located in the department of Pando and the Vaca Díez province of the department of Beni (MTPS 2008). During the beginning of the harvest of Brazil nuts in November–December, the population in rural settlements rises sharply as a large share of the urban population moves in to work as *zafreros*, or Brazil nut collectors.

Relevant social and political events in Bolivia have influenced people's livelihoods during the past two decades. Important changes in the country's forest regime and related regulations took place between 1996 and 2002 (de Jong 2004). As a result of changes in the Forestry Law, for the first time, communities could organise to become legal forestry entrepreneurs. In addition, important parts of forestry administration were decentralised and passed to departmental and municipal governments (Pacheco 2006). Since 1996, an extensive land tenure reform has been implemented, which resulted in 40% of forest lands being placed under the control of forest communities (Ruiz 2005, INRA 2007). From 2003 to 2008 regional programs provided support for community-based forest management, technical assistance to implement forest management plans, loans for small-scale Brazil nut extraction, and support to local cooperatives (Cronkleton et al. 2009), although in other parts of Bolivia (Santa Cruz department) that had started in 1998.

5.2.2 Methodology

Methods and data collection

The study relied on a combination of different approaches to answer the research questions presented in the introduction. A quantitative method to study the success of community forest management (CFM) in relation to livelihoods was performed to identify factors that promote communities to engage formally or informally in the management of forests (questions 1 and 2).

A qualitative method was performed to respond the last two questions, to understand the processes of developing new strategies and the consequences of normative flexibility. The study reports on quantitative surveys to identify and confirm trends in changes of forest use strategies.

To identify changes over time, data would be needed from different time periods for the same study areas. However, we used two surveys carried out by different researchers in 2009 (Cano et al. 2011, Zenteno et al. 2013) and 2011 (Cano et al. 2013) in the same region. These surveys compared some key variables related to timber extraction and sale, such as household variables (related to family members), household income and sources, household agricultural and forest variables, household expenditures, community social relations, and community institutional access (mostly related to the community's capacity to develop forest management plans). We validated this information with quantitative data provided by the Bolivian forest service about the number of clearing plans (authorisations to deforest small plots for agriculture and sell the valuable timber trees cleared) approved for community members and the number of authorisations to extract and sell small volumes of timber, no more than 11.3 m^3 (*Autorizaciones de aprovechamiento de volumenes menores*). Additionally community members were interviewed using a random sample.

The qualitative method consisted of interviews using semi-structured questions directed at different actors (chainsaw mills, carpentries, brick factories, small timber sawmills). We also conducted in-depth interviews with local leaders, community members, and other key informants. We collected the narrative of changes related to forest use and agricultural production occurring in 2009 and after 2011.

Zenteno et al. (2013) interviewed 239 households in 16 selected communities that reported to live at least 10 months per year in the community over a wide geographic area in the northern Amazon region (Table II 5.1). The quantitative data was collected by Cano et al. during 2012, involving interviews with 31 key informants in five communities in the same area. This selection aimed to track variation in annual and seasonal activities, and therefore this sample was

Table II 5.1 Resources available in 16 communities in the northern Bolivian Amazon.

Community	Community type	Timber[a]	Brazil nut[a]	Other NTFPs[a]	Surface per household[b]	Size[c]	Number of households interviewed (% of the total)
San Antonio (Riberalta)	Agro-extractive	L	L	L	S	L	19 (37)
Santa María	Agro-extractive	L	L	L	S	L	19 (25)
Desvelo	Agro-extractive	L	L	L	S	S	
Bella Flor	Agro-extractive	L	L	L	S	S	
Campo Central	Agro-extractive	L	L	L	M	M	
Antofagasta	Agro-extractive	L	L	L	S	M	9 (33)
Santa fé (Riberalta)	Agro-extractive	L	L	L	M	M	15 (45)
12 de Octubre	Agro-extractive	H	M	M	S	M	15 (31)
Santa Crucito	Agro-extractive	H	H	M	M	M	15 (31)
Loma Alta	Extractive	H	H	M	M	L	26 (27)
Contra Varicia	Extractive	L	H	M	L	M	13 (42)
Galilea	Extractive	H	M	M	L	L	19 (45)
Naranjal	Extractive	L	M	M	M	L	20 (33)
Motacusal	Extractive	L	H	H	L	S	9 (47)
Iraq	Extractive	NA	H	H	M	S	9 (41)
Las Mercedes	Extractive	L	H	M	L	M	16 (42)
Remanzo	Extractive	L	H	L	L	M	15 (42)
San Antonio (Filadelfia)	Agro-extractive	H	H	L	M	S	10 (42)
Petronila	Agro-extractive	H	H	M	L	S	10 (37)

Notes: L=Low, M=Medium or on average range, H=high
[a] L < 100 , M 100–500, H > 500 US/year, NA Not allowed by law
[b] S < 100, M 100–500 L > 500 ha
[c] S < 20, M 20–60, L > 60 households

restricted to those households that were interviewed three times in a year.

In Table II 5.1, extractive communities are those that depend mostly on timber and non-timber forest products (NTFPs, mainly Brazil nuts), agro-extractives communities depend more on agriculture, although once a year they achieve economic benefits working as Brazil nut collectors (Cano et al. 2011, 2014; Zenteno et al. 2013).

Quantitative data analyses

To understand the incentives to manage forests, we first formulated the question of whether differences in forest management exist due to the specific variables related to community type, through the sample. The existence of these site-specific variables can be an important source of divergence to a general model for understanding the probability of logging (Hobley and Shields 2000).

We used a binary chi-square test to characterise community types, aimed at overcoming the effects of higher level variables and confirming the significance of the logistic regressions (Dickinson and Basu 2005). To define the variables relevant to characterisation of the communities, we first used a productive criterion of the average Brazil nut extraction per household. This was also formulated by Stoian and Henkemans (2000). If production exceeds 100 boxes per household, the community is called an extractive community (because the higher annual production makes households more dependent on this product than on agriculture), while below this value, a community is characterised as agro-extractive. We then associated this with other variables that could relate to community characteristics cited below.

To understand which factors drive community members' decisions to undertake individual exploitation of trees, we considered a model that estimates the relation of the response variable of individual round-wood sales (a binary variable) to any explanatory variable that is associated with a household (Kahn 2005). The binary logistic regression method was used to estimate the significance of explanatory variables as factors (Barros and Hirakata 2003). The full model included one-way effects (independent) for explanatory variables:

$$\text{logit}(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 x_{1,i} + ... + \beta_k x_{k,i} \quad (1)$$

where p = probability of response variable, Logit p = ln (p/1 - p) or the logarithm of odds, Bs = coefficients of the explanatory variables, and e^B = odds ratio, a measure of likely change in the probability of response variable because of change in the explanatory variable from one value to the next (e.g. 0–1).

Explanatory variables consisted of variations in types of income sources and local institutional- and household-related variables (Delacote 2007, Tesfaye 2011) that are considered important factors for explaining timber extraction (Cronkleton and Albornoz 2009, Pokorny et al. 2010) and the households' agricultural and forest management practices (Fisher 2004). We also included the total income and type of income, the amount of expenditures per household in the year of the study. We used 41 selected variables that characterised households according to demographic, social, and institutional variables. These variables were included in the model for all cases, and compared to find out which variables were most consistent with the model (Menard 2001, Nakakaawa et al. 2011). All statistical analyses were performed in SPSS version 16.0.

5.3 Changes in the Bolivian forestry law

The first serious attempt to regulate the forestry sector in Bolivia took place in 1954. Two decades later, the Ministry of Peasantry and Agricultural Issues (currently called Ministry of Rural Development and Agriculture) created the Forest Development Centre (*Centro de Desarrollo Forestal*, CDF). However budget constraints, understaffing, and corruption were notorious, preventing the CDF from exerting efficient control over forest exploitation and conservation (Fredericksen 2000). In 1974, the first Forest Law was issued, with regulations following in 1977. This resulted in the allocation of logging areas in Bolivia's tropical region and the government started charging taxes on extracted timber volumes. However this type of logging contracts did not encourage enterprises to invest in forest management plans, which were considered to reduce economic benefits. Moreover, the CDF did not have the needed institutional capacity to enforce these contracts (Pacheco and Avila 2001). Also, between 1960 and 1980, indigenous groups from the highlands of Bolivia started colonising forested lowland areas and selling timber illegally. For them, the law provided no legal mechanisms to benefit from timber and thus illegal logging was widespread among both rural people and timber companies (Fredericksen 2000, Figure II 5.1).

During Bolivia's 1980–1985 economic crisis, the advantageous foreign exchange rate encouraged timber export. Increased logging activities did not, however, motivate the CDF to apply legal regulations; instead, its institutional weakness deepened (Pacheco 2007). As a result, since 1986 the CDF entered a serious institutional crisis and was unable to collect taxes and control Bolivia's forests. In 1990 a total logging ban was imposed in order to reorganise the forest sector.

In the mid-90s, as part of Bolivia's Sovereignty Plan (*Plan Soberanía*), a plan to ensure national territorial integrity, 17 timber companies were issued forest concessions in the northern part of the country (Pando department), along the border with Brazil and Peru. These concessions were renewed under the new forest regime of 1996, with 15 families holding concessions totalling 1 568 000 ha (Pacheco 2007).

In 1996, the new Forest Law (*Ley Forestal 1700*) was approved with three innovative elements: area taxes instead of taxes per logged volume, a new concession regime, and new forest management regulations (Fredericksen 2000). In addition, the Forest Law promoted a new institutional framework for forest use, which included the creation of the new forest division (*Superintendencia Forestal*, SF), the involvement of the prefectures in the definition of policies, and the creation of the Municipal Forestry

Figure II 5.1 Illegal chainsaw processed timber waiting for the right moment to be transported.
©Walter Cano

Units (*Unidades Forestales Municipales*, UFMs), in order to identify and supervise municipal forestry areas to which local communal groups (*Agrupaciones Sociales del Lugar*, ASLs) would be granted forest-use rights (Ferroukhi 2003). In 1998, the acceptance of the affidavit for the declaration of timber volumes to be logged led to a poor implementation of the new forest regime; several years later, this resulted in depredations of two timber species (*Amburana cearensis* and *Cedrelinga* spp) in addition to mahogany. Selective logging of only the most commercial species used to be the pattern of logging in Bolivia, currently the number of species harvested has increased to about 20.

The new forest regime gave rise to forest management plans (FMPs) in order to stimulate the introduction of sustainable forest management (SFM) regardless of the scale of operation. FMPs are not required for non-commercial forest uses but are essential for all types of commercial activities. Both forest concessionaires, including ASLs, as well as private landholders are compelled to elaborate such plans – including forest inventories – as an instrument to regulate commercial logging activities. FMPs have to comply with many technical requirements, mainly a minimum cycle of 20 years between logging operations on the same area, a minimum cut diameter, restrictions on cutting less abundant species (less than 0.25 trees/ha), and the mandate to leave 20% of the species harvested in the stand to guarantee a security margin for species preservation (Pacheco 2005).

In order to increase forest access for rural people (communities and indigenous people) the SF designs specific instruments, e.g. for instance the clear-cutting operations. This instrument requires formal authorisations based on annual cutting plans, which, in turn, must be formulated based on land-use plans at the parcel level. Clear-cutting fees are equivalent to 15 times the forest tax (USD 15/ha) plus of 15% of the logged timber's value. However, clear-cutting operations up to 5 ha, accumulated over time, are exempted from fee payment. This means that once any single landholder exceeds deforestation of 5 ha on that plot, the landholder is required to pay clear-cutting fees (Pacheco 2005).

According to some scholars, forest regime implementation has confronted various obstacles. To cope with those obstacles, the SF has approved additional measures called "exception regimes." Three main exception norms have been issued by the SF: 1) allowing forest logging on private properties equal or less than 200 ha (Resolución Ministerial N°132/97), by which landowners can log timber exempt from the

management plans; 2) allowing small-scale farmers holding less than 50 ha to log in areas less than 3 ha without presenting land-use plans at the parcel level; and 3) approving small-scale timber producers to initiate their forest operations with only an annual logging plan and within areas not formalised yet as municipal forest reserves due to the bureaucratic steps required to set them up (Pacheco 2004).

According to the second exception, permits for logging in areas less than 3 ha (ITE No. 087/2000, March 2000) were approved as a way to enable small landholders to extract timber from their plots based on an inventory of the commercial species to be exploited, without having to develop a forest management plan. The only constraint was that these permits would be issued for one time only for each rural landholding. The third exception measure that allowed ASLs to undertake their forest operations without an approved FMP, as well as within areas not formally constituted as municipal forest reserves (*ITE No. 09/98*, June 1998), was aimed at correcting problems arising from the slow and bureaucratic process of creation of such reserves (Pacheco 2005).

Since 2003, the administration of Bolivian forests has become a victim of limitations in staff appointments, reduction of the operating budget, and, accordingly, a reduced capacity to monitor and regulate forests. As a direct consequence, forest clearance has since increased to 100 000 ha per year. In 2008, after several years of intense struggles and debate among members of the new government, rural populations, and private timber companies, a national decree introduced community forest organisation (OFC in Spanish) to achieve social and political objectives related to the equity of access and benefits distribution from forests. This decree legalised all forest activities related to timber extraction undertaken by peasant and indigenous communities, promoted the reallocation of lands among rural people (Cano et al. 2011), and consolidated rural communities' rights over forests, providing alternative ways to achieve individual timber extraction authorisations for communities.

In 2009, the SF changed its institutional denomination to Regulatory Authority and Social Control of Forests and Lands (*Autoridad de Fiscalización y Control Social de Bosques y Tierras*, ABT). The ABT inherited the institutional and political tradition of the SF and also began to change regulations through directives, without having legal roots in the existing Forest Law 1700. In this way, rural communities started to be favoured by new government strategies that broaden forest governance to the detriment of timber and agro-industrial companies.

Finally, in 2012, under the slogan "Governance in the forests," a legal directive (*Directiva ABT N° 002/2012 – Norma de acceso a los recursos forestales y articulación con productores pequeños*) was created to rule the access to forest resources directed to small timber and processing facilities. The goal is to promote and secure a responsible and planned use of natural resources and to boost industrialisation through the development and strengthening of a productive base at different levels, as well as conserving the environment.

It is evident that changes in forest legislation in Bolivia have been a result of changing political ideas of different governments. This has led to constant institutional and normative improvisations in forestry since the administration of Evo Morales came to rule. Consequently, the latest stage facilitates the exercise of rights by small users (communities and indigenous people) according to their specific social and economic context, following a long period of social inequity and exclusion of the rural poor from the right to use forests.

5.4 Flexibility in forest regulations

When Bolivian Forest Law 1700 entered into force in 1996, the only way to extract and sell forest products for commercialisation was through specified forest management instruments, such as concessions. However, only private companies had the capital, knowledge, and institutional links to achieve a 20-year-cycle forest concession (see section 5.3 in this chapter).

Thus, the law continued to benefit private companies, because rural communities have no capital to invest in drawing up FMPs to comply with formal regulations for use of timber, although in other parts of Bolivia large management plans have been developed with the assistance of NGOs. To deal with this barrier communities started to negotiate selling of tree stands with private companies, but the prices were low since the company assumes the cost of the FMP, which is charged on the total cost of the tradable timber.

When land titling finished in Pando department and most of the field measurement and verification in the rest of the northern part of Bolivia was more or less clear and defined, a process of social change began under the Morales government, affecting the former set of rights related to natural-resource access and use rights in general – and the forest in particular. This change resulted in a new state constitution and the extension of rights related to forest in favour of rural people, who now have exclusive rights to use forest resources.

The initiatives were thought to benefit the rural poor under the principle of "forests are of strategic value for the development of rural people and the state has to ensure equitable access to all local

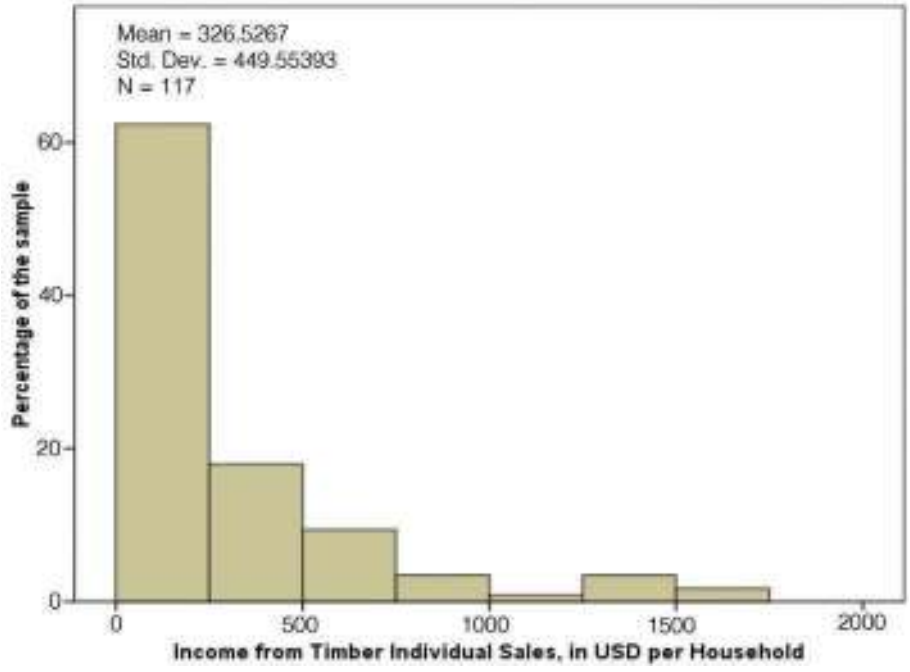

Figure II 5.2 Income from timber sales based on individual authorisation, in USD per household per year.

people and forest actors" (Bolivian Constitution, 2008). Thus, the ABT had to change the regulation policies and create new rules to favour communities and somehow recognise local arrangements for timber use.

The logging of a few trees a year per family within communities is an old arrangement within the study area (Cano et al. 2011, Zenteno et al. 2013) that can be traced back to the local informal market through middlemen, who have all the contacts to sell timber. This was the community strategy for timber use and for a long time it was considered by the forest authority as an illegal procedure subject to punishment. Today, a formal directive enacted by the forest authority (*Directiva ABT N° 002/2012*) recognises this communal arrangement, making room for an individual pattern of forest use within communities.

Currently, the arrangements between ABT and rural people in the northern Bolivian Amazon are based on authorisations to extract 4.71 m^3 of timber once a year (*Directiva ABT N° 002/2012*), an arrangement still rejected by chainsaw operators who want to raise the volume to 7.07 m^3 (ABT chief of Pando, personal communication), although in practice people develop informal ways to extract timber at least once a month during 7 months a year (from field interviews).

5.5 Results

5.5.1 Distribution and amount of Individual timber sales

From a sample of 239 interviews from Zenteno et al. (2013), we found that 49% of households (117) have sold timber based on individual authorisation during 2008–2009. An average of USD 326 per year resulted from the sales of three to five trees. It is worth noting that less than 5% of the sample obtained more than USD 1500 per year (Figure II 5.2).

To understand the incentives to manage forests through the sample, we first formulated the question of whether differences in forests management exist due to the specific variables related to community type. To analyse the data, the type-of-community variable has been used to determine its relation to the other site-specific variables for the sample. This variable is significantly associated with the other variables (Table II 5.2).

This association among site-specific variables separates the sample into two groups according to community type. From 239 households, 127 (54%) households are in extractive communities, while the rest are in agro-extractive communities.

We analysed differences in timber sales between extractive and non-extractive communities (Table II 5.3). No significant differences among total incomes from timber sales were found. However, we did find that prices per tree are higher for extractive communities. The number of households selling trees as well

Table II 5.2 Spearman correlation for the type-of-community variable and site-specific variables.

	Spearman correlation	Description
Ethnicity	–0.495	Community Type 0 = Extractive: communities more likely indigenous ethnic groups, with difficult access, and high amount of conserved forests 1 = Agro-extractive: communities more likely non-indigenous ethnic groups, with easy access to main towns, and less conserved forests
Access	–0.380	
Degree of degradation of forests	0.919	

Note: All Spearman correlations are significant at p>0.001.

Table II 5.3 Number of trees and prices for extractive and agro-extractive communities.

	Community Type	
	Extractive N = 112 Mean	**Agro-Extractive N =127 Mean**
Price in USD, per tree	133.83*	90.48
Income obtained in USD per year	321.59	329.72
Number of trees per year	1*	3*
Percentage of people selling trees	36**	63**

Significant differences for Mann-Whitney U, * P<0.05 and ** P<0.01.

Table II 5.4 Logistic regressions for two community types.

		B	S.E.	Wald	Sig.	Exp (B)
For extractive communities	Fallow period	–0.201	0.076	6.965	0.008	0.818
	200-ha forest plan	1.329	0.657	4.093	0.043	3.778
	Constant	–0.007	0.305	0.000	0.983	0.993
For agro-extractive communities	FMP	–1.192	0.498	5.716	0.017	0.304
	Knows 50% of community members	1.280	0.427	8.971	0.003	3.596
	Constant	0.068	0.332	0.042	0.837	1.071

Note: All variables regressed at 1 degree of freedom.

as the number of sold trees is significantly higher for agro-extractive communities. This could be due to lower quality of sold woods, the traded volumes – which triple in agro-extractives communities – and easier accessibility. Extractive communities are generally located far from urban centres and they do not have operable roads year-round.

The existence of such site-specific variables can be an important source of divergence for a general model for understanding the probability of tree logging (Hobley and Shields 2000). Therefore, we relied on communities represented in the two subsamples.

We performed a logistic regression considering the number of trees individually sold per year (Table II 5.4). Results from the logistic regression for each subsample suggest that site-specific variables are important for understanding individual wood sales. For instance, Table II 5.4 shows the variables that best explain the logistic regression models. In extrac-

Table II 5.5 Chi square test of proportions for explanatory variables in the sample.

Variable	Value	Community type					
		Extractive	Agro-extractive	Extractive		Agro-extractive	
		Relative proportions %		A	B	A	B
Fallow period in years	mean	3.49	5.8	4.2	2.84#	5.8	
< 200 ha forest management plan, or an accepted logging permit	A	90*	62	60*	30		
	B	10	34	4	6*		
> 200 ha FMP	A	68	79			25	54*
	B	32	21			13*	9
If community member knows more than 50 % of community members	A	60	38			21*	17
	B	40	62			16	46*

Significant differences for Mann-Whitney U, # $P < 0.05$ and X^2 test significant at * $P < 0.05$ A = no logging, B = logging.

tive communities, the likelihood of timber sales is explained by 200 FMPs and the fallow period. While in agro-extractive communities, the wood sales are explained by the existence of FMPs and knowledge among community members.

There are several explanations for the above results. Road access to communities may indicate greater importance of agricultural resources and more diversified livelihoods, creating different social, human, or economic circumstances (Zenteno et al. 2013).

To validate subsample-model selected variables, we performed a forward stepwise selection. For both models, the steps in defining the models resulted in a second iteration out of 41 variables considered. Different variables explained the existence of individual tree sales according to each community type.

Results also indicate that for both models, household- and institutional-related variables may explain, in quite opposite directions, the probability of individual timber sales. While in agro-extractive communities the existence of a group (or communal) FMP can reduce the probability of cutting trees individually, in extractive communities agricultural practices (maize, manioc, beans, bananas, rice cultivated through the slash-and-burn system) turn out to be relevant for reducing this probability (fallow periods refer to the number of years needed for the recuperation of soil fertility before using again for agriculture). Accordingly, social relations among community members are also important in agreements to approve logging.

We looked at the distribution and values of explanatory variables for the two subsamples of community types (Table II 5.5). Results indicate that extractive communities have shorter fallow periods than agro-extractive communities. Those who logged trees in extractive communities have significant shorter fallow period than those that did not log.

The proportion of community members holding 200 ha under a FMP is significantly higher in extractive than in agro-extractive communities. And it is positively correlated to logging. While in agro-extractive communities, the existence of the FMP is negatively correlated to the probability of community members to cut trees individually.

While both community types the existence of an FMP was not statistically significantly different in proportions, in agro-extractive communities, existence of these legal permits on logging, favoured less individual tree extraction. Additionally, even the proportion of community members who knew more than 50% of community peers was not significantly different among both community types; the probability of individual sells was positively correlated to well-known persons in the agro-extractive communities.

This result should be interpreted carefully. The qualitative information suggests that individual logging takes place when a community member is excluded from any communal form of authorised exploitation, while any individual authorisation promotes logging even in communities that are assumed to be out of commercial range.

5.5.2 Why institutional factors are important to reducing logging

Social community relations are relevant on members' behaviour towards using resources in an individualistic manner (Henkemans 2000, Assies 2002, Cano 2011). However, when community members have more local connections, it is expected that they may have more chances to make timber sales and also are more likely to be linked to local political spaces, such as being a community leader or a community board member, which permits networking to commercial bounds. This, in turn, gives people more opportunity to obtain social approval from the community members, when they selling timber becomes a rewarding outcomes to community or powerful groups (Poteete and Ostrom 2004). These results reinforce suggestions from Stoian (2000, 2005) on different land uses among community types in the suited context, from which it is expected that cultural practices such traditional agriculture based on longer fallow periods, as for bigger cultivated areas, is dependent to social structures as well as local livelihood strategies (Coomes et al. 2000, Perz and Almeyda 2010).

While commercialisation of timber together is a common strategy among communities, our results suggest that 49% of the population (both in agro-extractive and extractive scenarios) sell trees individually.

Local geographic conditions are important, and they may also interact strongly with social relations and with formal and informal institutional arrangements, which play a mediating role on individual actions (Cano 2013). Within this interplay, households have various strategies (Zenteno et al. 2013). While some groups will rely heavily on timber sales, others will not. From our panel data, we see that when formal regulations change, some local groups may respond quickly to the gaps in those formal mechanisms in order to impose local individual actions against collective action related to the sale of timber. Our results also indicate that extractive communities may pursue formal individual-use mechanisms to sell trees when small-scale FMPs are recognised.

However, in agro-extractive communities, the existence of FMPs seems to reduce individual tree logging. We found that local traditional agricultural practices can influence the probability of entering into commercial timber activities in remote communities. Therefore, the formal institutional arrangements clearly affect and are associated with local needs of forest management and agricultural activities.

In this case policies that promote more flexibility in formal procurement in forested lands will need to be analysed, taking into consideration critical variations in regional and local market pressure. One aspect to mention for extractive communities is that local livelihoods may be ensured by traditional agricultural practices, which are related to long fallow periods, while in agro-extractive communities, forest management rules depend on local social and commercial networks, which to differing extents, are the new sources of livelihoods.

5.5.3 Formal mechanisms that motivate intensification of logging

Before more flexibility in forest rules was introduced, the common way to sell trees individually was through informal or illegal channels. A few years ago, the only way to justify cutting trees within communities was for domestic use. However, there was always a trader with the right connections to buy trees from communities at a very low price and sell the timber in urban centres. The regulation allowing people to sell the trees that are being cut and burned to prepare agricultural field under the shifting cultivation opened up new opportunities for the commercialisation of timber. To sell trees from an agricultural field, people need clearing plans for a maximum of 5 ha.

An average family does not clear more than 1.5 to 2 ha for agricultural production (Cano et al. 2011, Zenteno et al. 2013), but clearing plans are generally larger (until 2012, the ABT approved up to 5 ha of forest plots for clearing plans within communities) to facilitate more benefit from timber sales under the clearing plans, especially in agro-extractive communities close to urban centres (Table II 5.6). Communities initiated a campaign of logging at different levels in order to benefit from timber sales. Now the ABT has expanded the rights of community members, allowing the transportation of timber for domestic use to urban centre when community members can show they also have houses in town where the timber can be used.

ABT data shows the number of individual authorisations for the transportation of timber from the community to urban centres (Figure II 5.3). All the communities with records in the ABT database experienced an increment in the volume of timber used between 2010 and 2011 due to this new regulation, in some cases more than seven times the volume registered the year before.

In other cases within the same community, there are individual authorisations and <200 ha FMPs, which raised the pressure to use timber through any of the different formal alternatives described above.

Table II 5.6 Number of clearing plans issued in Bolivia until 2012.

Department	Clearing plans for more than 5 ha	Clearing plans for less than 5 ha	Clearing plans for non-agricultural purposes	Total
Beni	2397	13391	44	15832
Cochabamba	13628	3126	681	17435
La Paz	2108	17073	307	19488
Pando	1479	2520	761	4760
Santa Cruz	352536	34711	6586	394833

Source: ABT webpage (http://abt.gob.bo/index.php?option=com_content&view=article&id=357:superficie-de-pdm-autorizados&catid=28&Itemid=204) consulted in November 2013.

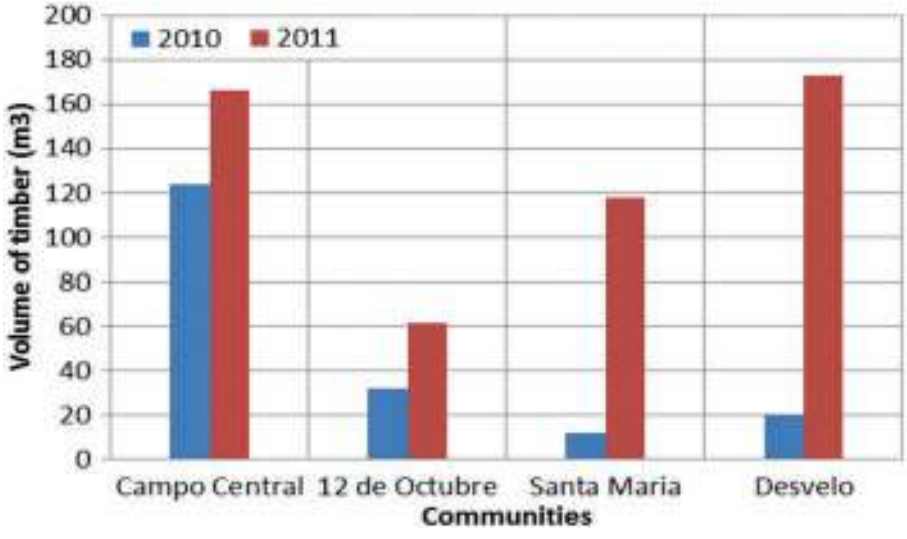

Figure II 5.3 Individual authorisations for the transportation of timber to urban areas issued to community members between 2010 and 2011.

5.6 Discussion

5.6.1 Role of communities in developing local strategies for use of timber resources and for forest management

Based on our data, a number of factors have influenced forest use within the study area. First, forest use depends on the type of community (extractive or agro-extractive). In communities where the use of timber has become an important activity, it is clear that several factors may alter the former local, traditional forest-management patterns, confirming the arguments supported by Ramcilovic-Suominen and Hansen (2012). However, the lack of compliance with the law is not necessarily linked to illegal activities, corruption, or unequal benefit- sharing (Contreras-Hermosilla 2002, World Bank 2004, Contreras-Hermosilla and Peter 2005, Ramcilovic-Suominen et al. 2010); rather, it is due to the complications in the law itself that make compliance with the law difficult for communities (Perry et al. 2007).

Proximity of communities to the market (urban centres) is likely to determine forest use by individuals and communities as collective entities. Most of the agro-extractive communities are located around urban centres and their forests are more degraded. Any increased flexibility in forest rules could have more impact in these communities. It is easy to take advantage of the nearby market, and any sort of legal individual authorisation for sale of timber can easily be applied.

Where strong connections to the market exist, local institutions and communal arrangements that are

expected to regulate forest use in the communities do not seem sufficiently robust to limit the sale of trees by individuals. Community members see the more-permanent opportunity to earn money selling trees either individually or collectively through a <200 ha FMP. Since benefits can be derived from timber sales relatively easily, community members seize the opportunity to improve their economic situations. This allows them to change their traditional rural lifestyle based on subsistence agriculture and Brazil nut collection to a more urban-based lifestyle, that is replacing agriculture and other NTFP collection with the sale of timber.

The forest areas of extractive communities, which are located farther away from urban centres, contain more valuable timber resources than the forests of agro-extractive communities. Apparently, these communities exert less pressure on these resources for economic purposes than agro-extractive communities. The dependence of members of agro-extractives communities on monetary benefits means that to keep income levels equal, they will have to sell more trees since the most valuables ones have already been extracted.

Thus, the use of individual timber sales may be determined by the level of commodification of the traditional rural lifestyle that used to be sustained by the sale of Brazil nuts only, a result not mentioned or discussed by any scholars. Where local economies depend to a higher degree on monetary income from the sale of forest products, the threat of forests degradation is greater.

In these circumstances, more flexible forest rules may create a space to develop new initiatives to widen the opportunities and ways to sell timber, thereby promoting forest degradation (forest clearing, agriculture as a justification for clearing and selling timber, or land-use change) instead of acting as a control mechanism and regulatory instrument to limit timber exploitation within communities.

5.6.2 Actors of forest degradation or of sustainable forest management?

Within the study area the process of making forest regulations more flexible seems to have contributed to the commodification of rural lifestyles and changed the traditional sources of livelihoods and incomes. In some cases (mostly among agro-extractive communities), the attribution of formal forest-user rights has contributed to the development of collective action and creation of efficient local institutions to regulate the use of timber. In other cases, the possibility to sell trees individually has motivated people to obtain private benefits rather than collective benefits.

However, efficient local institutions can regulate the use of timber through collective FMPs, and the sale of timber through individual authorisations, considering both collective and individual interests. Where livelihoods and incomes become more dependent on timber for monetary income year-round, management practices should adapt to more-intensive resource extraction.

In all communities, the motivation to engage in commercialisation of trees is to increase monetary income. Rural people's livelihoods used to depend on strenuous agricultural activities and the collection of NTFPs such as Brazil nuts and on wage labour in the bigger towns (agro-extractive communities mainly). Timber sales constitute a welcome and relatively easy source of income now that market demand is growing and logging is legally allowed. This process seems to have induced a real change in lifestyle, especially in agro-extractive communities located closer to urban areas. This change began with the importance of income from Brazil nut collection and has been given additional impulse by the sale of timber. Although some scholars argue that the above process has been going on for a very long time (Stoian 2005), the combined opportunity to sell timber and Brazil nuts has been gradually eliminating agriculture and collection of wild NTFPs as traditional livelihood alternatives.

In this case, it is important to continue to study the influence of the markets and the demand for forest resources on the evolution of rural community lifestyles, a weak link in the chain of factors studied worldwide.

5.7 Conclusions

Scholars from around the world almost unanimously call for the establishment of secure tenure and forest user rights in favour of those parties who have been traditionally excluded from formal access and user rights to forest resources (Agrawal 2007, Cronkleton et al. 2009, Alden Wily 2011).

Formalisation of tenure and access rights is thought to enable local people to develop strategies to create robust local institutions able to ensure the sustainable use of resources. When people are uncertain about future benefits, they are unlikely to invest in management systems that may initially reduce economic benefits. Customary rights are often found to be too weak to contest overlapping rights with more powerful actors, especially when market pressure increases.

Our study, however, shows that user rights granted to communities in Bolivia have not yet led to the development of robust local institutions that ensure sustainable use of the forests. One could suggest that

when the process of granting forest-use rights to previously excluded parties, such as the rural communities, stems from a process of making forest regulations more flexible to correct the law's deficiencies relative to forest actors, the result is too haphazard to promote development of robust sustainable forest management institutions.

In this kind of social context, the informal mechanisms developed to access and benefit from selling trees eventually become legitimised, as is occurring in Bolivia, obscuring the ability to distinguish what is legally prohibited and what is traditionally permitted.

Thus, communities can operate either as efficient actors and promoters of sustainable forest use or as true forest predators, innovating different strategies to use timber legally or illegally. In this sense, the devolution or granting of rights to peasant and indigenous communities to allow the use of timber resources must pass through a process of social, economic, and environmental impact assessment in order to prevent undesired outcomes. There is little evidence on the impact of proximity of markets on the evolution of social lifestyles related to use of forest resources, either timber or non-timber resources.

In addition, making forest regulations more flexible should be accompanied by clear incentives for sustainable management. Moreover, haphazard solutions may lead to what communities view as unstable institutions that can be changed anytime, prejudicing development of durable institutions. However, the time span of the present study is too short to ascertain whether secure institutions could develop, and become institutionalised in the law over long term. If the dependency on timber sales is durable and not opportunistic, people could start to engage in better management practices when it becomes difficult to keep incomes at a desired level and they may also search for alternatives which will not always be legal or sustainable, as is the case of most of the tropics.

An important lesson of the present study is the need for research and participatory planning to put new regulations in place that allow the use of forest resources to actors accustomed to use valuable forest resources, such as timber, through informal channels. Without the correct understanding of actors and markets linkages, institutional improvisations linked to the need to control the use of forest resources is not a good governmental strategy for devolving rights to forest use and recognising traditional ways to manage forests. If a national or regional forest policy is to be effective, it should have the commitment and support of the whole society as a result of joint deliberation, assessment, and coordination based on the local forest users' local realities.

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Challenges and opportunities of sustainable forest management through community forestry concessions in the Maya Biosphere Reserve, Petén, Guatemala

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Abstract: In Guatemala, the community and industrial forest concessions in the Maya Biosphere Reserve were created as an innovative way to manage natural resource goods and services in a sustainable way while promoting the stabilisation and well-being of local communities. This case study shares experiences from different periods, including the initiation of the process from 1992 to 1994, its expansion through 2001–2002, its evolution through the period 2011–2012, and reflections about future prospects. The concessionary model was created and institutionalised as a means of stopping the advance in the agricultural frontier while promoting economic and social development based on the sustainable management of natural resources. It provided an avenue for reconciling the preservationist and productive views of conservation in a region subject to social conflicts and migratory dynamics. Despite more than 20 years of the successful implementation of this model, achieving sustainability and guaranteeing the conservation of the forest resources remains a challenge. The different needs, objectives, and capacities of the various actors dependent on the forest in the Maya Biosphere Reserve are not always compatible; and the external factors such as corruption and pressure from illegal activities threaten the consolidation of concession governance structures. In addition, the focus on the use and management of forest resources alone (timber, non-timber) has minimised the importance of integrating the different agricultural subsystems (crops, livestock) and off-farm activities into the land-use planning strategies for sustainable development that complement conservation goals and guarantee food security in a poor region.

Keywords: Forest concessions, sustainable forest management, community forest enterprises, social participation, timber and non-timber forest products.

6.1 Introduction

The Selva Maya region is located in the northern part of the biogeographic and cultural bridge of Mesoamerica, linking two large continental masses. The region is of strategic political importance as well, providing opportunities for the integration and development of Mexico, Guatemala, and Belize. It is recognised as the point of origin for a variety of cultivated plants and is home to at least 7% of currently known species. The temperatures (24.4°C–26.1°C), mean annual precipitation (1214 mm–1568 mm) and elevations (97 masl–369 masl) are similar throughout the region. The forest cover is estimated to be 4.5 million ha.

This region is home to the Maya Biosphere Reserve (MBR), the largest protected area in Guatemala, which was created in 1990 by Congressional Legislative Decree 5-90 and is administered by the National Council of Protected Areas (CONAP, Spanish acronym). The objective of the MBR is to conserve biodiversity, maintain the ecological equilibri-

um of the area, conserve its cultural heritage, provide development alternatives that reconcile the need to use and conserve those resources, and promote the active participation of society (CONAP 2005).

The MBR covers more than 21 000 km^2 divided into the following areas: 1) a core zone (national parks and protected biotopes, or wildlife preserves, 36%), 2) a multiple-use zone (40%), and 3) a buffer zone (24%). The guidelines for each of these zones are detailed in the master plan for the MRB (CONAP 2005). The multiple-use zone (MUZ) was designed to allow different productive activities based on sustainable use according to the potential of available resources and it adheres to the reserve's conservation objectives. To meet these objectives, between 1994 and 2002, 14 forestry concessions were granted in the MUZ to 12 organised communities and two industrial enterprises. The formal agreements between the government and the concessionaires are effective for a minimum of 25 years, with an option for renewal. To date, three concessions have been cancelled due to contractual non-compliance and one was suspended but subsequently reinstated. Eleven concessions are active at this time.

Petén, the department with the largest territorial extension of the country (32.9%), is not exempt from the social conditions that affect the rest of Guatemala: poverty, illiteracy, malnutrition, and low life-expectancy. Nevertheless, in 2011, the Human Development Index (HDI) was higher in the municipalities where the community forestry concessions are located – Flores (0.695), San Andrés (0.636), and Melchor de Mencos (0.649) – than at the national level (0.574). The region benefits from important economic activities, including archaeological and nature tourism; the extraction, production, and exportation of timber and oil; and the continual growth of services and infrastructure (FUNDESA 2011).

This case study seeks to systematise the process of creation and development of the community forestry concessions in the MBR of the Petén and the advances made in consolidation of the model for the sustainable management of natural resources on behalf of rural communities (in the case of concessions with resident communities) and urban families (in the case of non-resident concessions). Additionally, the retrospective analysis focuses on the challenges and the complexity of the strategies used to strengthen the concessionary model and the internal and external factors that make conservation and development compatible and challenging. Using a timeline of the events and processes, beginning from the early 1990s, this chapter considers some elements from the ecological, institutional, and socio-economic dimensions and concludes with challenges to be faced in the short term upon contract renewal. This case study focuses on the community forestry concessions rather than the industrial concessions. It is based on the review of documents and direct experience with projects and programs in the region.

6.2 The community-forest-concession process

The Petén has historically been used for the uncontrolled extraction of timber and non-timber forest resources. The raw material from the natural resources was sold to local and export businesses. In the case of timber, most of it was extracted by individuals and external businesses, providing only minimal benefits to the local communities. In the case of xate (*Chamaedorea elegans*; *Chamaedorea oblongata*, and *Chamaedorea erupens*), an ornamental plant exploited for export since the 1960s, the extraction carried out with neither management nor selection has led to depletion of the resource. For example, it was estimated that about 60% of all leaves collected from the forest were thrown away by the businesses that purchased them due to non-compliance with market requirements (quality and size) (Ceballos 1994). As populations increased in the region, particularly after the 1980s, there was more pressure on the resource base. As a result, between 2003 and 2008 CONAP[(1)] generated several guidelines and studies on xate management; but it was not until 2010 that it established formal regulatory guidelines which has led to more ecologically sustainable harvesting practices, while increasing the time and effort required to harvest marketable leaves.

The conceptualisation, design, and implementation of forestry concessions in the MBR began in 1992. This initiative, which promoted participation of the rural population in the management of natural resources, was considered a necessary condition to ensure forest conservation in and around the MBR. The concessionary mechanism was a means of facilitating integrated development, improving livelihoods, and conserving important ecosystems in this vast region. In the case of the community concessions, some specific motivations included 1) the need

[(1)] Manzanero and Madrid (2010) refer to several manuals, guidelines and norms used for monitoring and evaluating xate, including "Policy framework for the Management of NTFPs"(2004), "Norms for the management, protection, transportation and marketing of commercial species of *Chamaedorea* in Guatemala" (2008), "Technical tools for the elaboration of xate inventories and management plans in natural forests for extensions greater than 1000 ha" (2003), "Methodology for the elaboration of management plans for xate" (2003); "Guidelines for the elaboration of annual operating plans" (2005), among others.

Table II 6.1 Community concessions in the multiple use zone of the Maya Biosphere Reserve.

No	Concession-aires	Year created	Responsible Organisation	Type of organisation	Area (ha)	Members (family bene-ficiaries)	Contract status
With population/communities living within concession area (according to Radachowsky 2013)							
1	San Miguel La Palotada	1994	Asociación de Productores de San Miguel La Palotada (APROSAM)	Non-profit	7039	35	Suspended in 2009
2	Carmelita	1997	Cooperativa Carmelita, R. L.	Non-profit	53797	144	Active
3	La Pasadita	1997	Asociación de Productores Agroforestales La Pasadita (APROLAPA)	Non-profit	18817	137	Suspended in 2009
4	Uaxactún	2000	Sociedad Civil Organización Manejo y Conser-vación (OMYC)	For-profit	83558	279	Active
5	Cruce a La Colorada	2001	Asociación Forestal Integral Cruce a La Colo-rada (AFICC)	Non-profit	20469	69	Active
6	La Colorada	2001	Asociación Inte-gral La Colorada (AFILC)	Non-profit	22067	42	Suspended and evicted in 2009
Without population/communities living within concession areas (according to Radachowsky 2013)							
7	San Andrés	2000	Asociación Forestal Integral San Andrés Petén (AFISAP)	Non-profit	51939	171	Active
8	Río Chanchich	1998	Sociedad Civil Impulsores Suchitecos	For-profit	12217	25	Active
9	Chosquitán	2000	Sociedad Civil Laborantes del Bosque (LABORANTES)	Non-profit	19390	78	Active
10	Las Ventanas	2001	Sociedad Civil Árbol Verde	Non-profit	64793	336	Active
11	La Unión	2002	Sociedad Civil Custodios de la Selva (CUSTOSEL)	For-profit	21176	86	Active
12	Yaloch	2002	Sociedad Civil El Esfuerzo	For-profit	25386	40	Active

to stabilise the agricultural frontier that had been strongly affected by the armed conflict, resulting in disorganised migratory influxes by refugees and displaced peasants from within Guatemala and from Mexico and 2) the need to stop speculation in land, cultural, forest, and natural resources located within the biosphere reserve (Imbach and Galvez 1999).

Since Guatemalan law already included a legal mechanism for concessions, the concept was adapted to apply to a community forestry concession in the

context of a biosphere reserve. This new form of governing natural resource management – linking government and society – is based, in general terms, on the Government Contracting Law (Decree 57-92), the Executive Branch Organic Law (Decree 114-97), and more specifically, Article 19 of the Protected Areas Law Decree 4-89, and its regulations and specific standards (CONAP 2005). When the peace agreements were signed between the government of Guatemala and the Guatemalan National Revolutionary Unit on December 29, 1996, the community concessions were already functioning. Nevertheless, the concept was incorporated into two of the 12 chapters of this historic agreement ("Situation of Agrarian and Rural Development" and "Use of Natural Resources") stipulating that legally organised small- and medium-size groups of peasants could receive concessions to manage natural resources within the multiple-use areas to meet sustainable forest management objectives (Naciones Unidas 1996).

The process of community forestry concessions in the MBR was strongly supported from the beginning by internationally funded initiatives (Swedish, Danish, and Norwegian Cooperation, the United States, and others). These organisations worked with national and local institutions to provide the necessary institutional support, technical tools, standards, economic resources, and awareness that contributed to the viability of the process. As a result, CONAP granted the first legal community forestry concession, covering an area of 7039 ha, in April 1994 to the community of San Miguel La Palotada, located in the municipality of San Andrés, Petén.[2] The initial success of this first experience, in which a population or community resided within the boundaries of its concession, created demand from other communities and industries in successive years, until 532 951 ha had been granted through concessions in the MBR. Of that total area, 75% (440 648 ha) were granted to communities; 64% of the community concessions are registered as non-profit while 36% are registered as for-profit concessions (Table II 6.1). The industrial concessions[3], established in 1999, represent 25% (132 303 ha) of the total land area under concession in the MBR and are registered with the government as for-profit organisations.

The timeline for the concessionary process is shown in Table II 6.2, with the following highlights:

- **The startup phase (1992–1997)**: Initially, the establishment of the MBR was considered by the local populations/users as a threat in that it would limit their access to land, which was important for goods and services (food security, and timber, non-timber, and other natural resources) and as a symbol of wealth and economic power. Also, at the outset, many government officials and international environmental non-governmental organisations (NGOs) opposed local populations' access to the MBR because their actions were perceived as a threat to the preservation of the forests/natural resources. These perspectives caused rivalries among the different social and political stakeholders in the region. Initially, the community concessions were designed to include strategies for sustainable development, such as improving infrastructure (water, electricity, schools, roads), agricultural techniques (increased production, income diversification), and forest management (timber and non-timber forest products). The forestry concession model, first implemented with the recently formed resident communities of San Miguel and La Pasadita, allowed the local population access to the natural resources and the means to sustainably manage them. It also provided necessary institutional arrangements and linkages and the formation of human capital in the technical management of timber and non-timber forest resources (Imbach and Gálvez 1999).
- **The second phase (1998–2010):** During this period, nine of the 14 concessions were approved, and ACOFOP (Association of Forestry Communities of Petén) and FORESCOM (community enterprise providing community forest services) were formed. Substantial advances were made in conservation and protection of forest cover, revitalisation of local and regional economies through the injection of financial resources, generation of employment, and creation of social awareness that has promoted changes in the management and conservation of forests (Radachowsky et al. 2013). It is highly probable that, given the institutional weakness of the government and its inability to stop the type of activities that encroach on national parks, had the concessions not been granted in the MUZ, the forested area in the MBR would have been invaded and deforested by different pressure groups (INAB et al. 2012). In this period, concessions were characterised by their focus on the technical aspects of forest management (timber and non-timber activities).

  During this second phase, three communities had their concessionary rights revoked (San Miguel, La Pasadita, and La Colorada), and one communi-

[2] The preparation phase, including the legal framework, and technical and development assistance was strongly accompanied by the Conservation for Sustainable Development in Central America project (known as the CATIE-Olafo project), financed by the Swedish, Danish, and Norwegian governments.

[3] Two industrial private concessions were established in 1999: Baren Comercial, Ltda manages La Gloria concession with 66 548 ha, and GIBOR, S.A. manages the Paxbán concession with 65 755 ha.

ty was suspended but then subsequently reinstated (El Cruce a La Colorada). These failed concessions all involved recent immigrant populations living within the concession area that did not have a strong forestry culture and they were subject to a high level of internal conflict. They violated their contracts with the government for various reasons: non-compliance with contractual obligations for allowable cuts, and certification regulations. They were also similar in poor financial management and a lack of transparency in their internal decisions, a high level of land invasions/deforestation, the presence of cattle ranching linked to drug trafficking, and a significant amount of registered environmental crimes (Radachowsky et al. 2013).

- **The third phase (2012–2025/27):** This period corresponds to the preparation phase for renegotiating the concessions nearing their contractual end. In addition to strengthening business management skills, attention should be focused on developing and refining the monitoring systems that would permit the concessions to demonstrate benefits that make the concessionary process viable in the long term for their members as well as for Guatemalan society as a whole. In particular, there is a need to design and implement tools that demonstrate the support and impact of forest management on the livelihoods of the beneficiary groups, its contribution to poverty alleviation in the region, and its effect on environmental sustainability. The tools and their results would provide the evidence of concession costs and benefits in the renegotiation process so that usufructuary rights, time periods, and legal structures for the concessions are adjusted and extended appropriately.

6.3 Results from implementing community forest concessions

This section summarises some of the main elements of the situation and challenges facing the implementation of community forest concessions based on the information available according to biophysical, institutional, and socio-economic dimensions.

6.3.1 Biophysical aspects

Using indicator species analysis developed by Dufrene and Legendre in 1997, Segura noted that for the MUZ there are actually three types of forests, which were grouped together based on an indicator-species focus and associated with specific community forest enterprises (Table II 6.3) (Segura 2012). This characterisation showed a diversity of species made up of 42 botanical families, 103 genera, and 147 species, which indicates a forest with great diversity and richness. Despite this diversity, only five of the timber species are harvested for commercial purposes given current market conditions: mahogany (*Swietenia macrophylla*), cedar (*Cedrela odorata*), santa maría (*Calophyllum brasiliense*), manchiche (*Lonchocarpus castilloi*), and pucté (*Bucida buceras*) (Segura 2012).

The predominant non-timber forest product gathered for exportation is xate, and its management has been improving due to two factors 1) CONAP defined institutional norms/management guidelines that include permits for harvest, transport, and export of xate and regular follow-up through field visits, and 2) buyers/exporters have started to pay for the leaves based on quality rather than quantity, causing a change in the extraction process (Radachowsky et al. 2013). While these factors have contributed to minimising the depletion and improving the resilience of the resource base in the forest, more stringent regulatory procedures and the different pricing structure have meant that those who harvest xate spend more time and effort gathering the leaves.

With respect to deforestation and degradation in the Petén region, a comparative study by the National Forest Institute (INAB, Spanish acronym) study on forest cover shows that during the period 2006–2010, the department of Petén lost 176 826 ha of forest, while 52 216 ha were recovered during that same period. This rate of change for this period reflects a slight decline in deforestation rates since 1991. The net loss of 124 611 ha of forest (an annual rate of 2.08% for the period) was concentrated in the western (in and around Laguna del Tigre National Park) and southern parts of Petén, particularly in Sayaxché, due to the expansion of agro-industrial crops and violence (INAB et al. 2012). In the MBR there is evidence that forest cover has consistently been the most stable in areas with formal land-use planning strategies including protected areas and concessions (Bray et al. 2008, INAB et al. 2012). While average annual net deforestation rates in the Petén between 2006 and 2010 were higher than 2% per year, they were 1.5% in protected areas (INAB et al. 2012); in the case of the 14 concessions, the average deforestation rate was only 0.45% annually between 2001 and 2009 (Radachowsky et al. 2013). The average deforestation rate in the weakest four concessions (San Miguel, La Pasadita, La Colorada, El Cruce a La Colorada) was 1.54% per year, versus only 0.0089% annually in the remaining 10 concessions (Radachowsky et al. 2013).

The area affected by fire is lower in the Petén than it is at the national level (INAB et al. 2012) and the rate of fire in the concession areas is significantly lower than in the Petén as a whole. According to the

Table II 6.2 Timeline of Maya Biosphere Reserve, multiple-use zone, and concession processes: Phases, milestones, dates, and processes/results.

Phases	Milestones	Dates	Processes/results
Phase I	CONAP created as part of Protected Areas Law (Decree 4-89)	1989	Significant migratory pressure from within and outside of the Petén
	Maya Biosphere Reserve in Petén created (Decree 5-90)	1990	Delimitation of the protected area nucleus and the multiple-use zone
	First master plan of MBR approved	1991	Social conflicts due to land invasions; conflicts between resident communities and CONAP
	International cooperation initiatives supporting land-use planning processes and the implementation of the master plan for the MBR	1992	Olafo project accompanying process of finding a long-term model to improve local production systems and guarantee protection of natural resources: 1) strengthening community organisation; 2) responding to communities' pressing basic needs − water, education, roads; 3) proposing sustainable management practices for natural resources; 4) improving production systems
	Forestry Advisory Council created	1993	Negotiation and consensus among different actors: government, communities, and international and national NGOs; conflicts between preservationist and sustainable development factions Design and approval of forest management policies, standards, and technical manuals Technical assistance and research
	San Miguel La Palotada concession approved		First community forest harvest with strong presence/orientation from international donors (Sweden, Norway, Denmark, United States)
		1994	CATIE/CONAP project begun with USAID/MAYAREMA funds
	Association for Community Forestry in Petén (ACOFOP) created (initially called CONCOFOP)	1995	Additional migratory pressure due to returning refugees (migration rate about 10%, or 55 people/day, according to FLACSO as cited in Imbach and Gálvez 1999)
	Peace Agreements signed	1996	The peace agreement signed on May 6, 1996, by the Peace Commission of the Guatemalan government and Guatemala National Revolutionary Unit, containing a subchapter on socio-economic aspects and the agrarian situation that recognises the importance of granting legally organised small- and medium- scale peasants natural resource management of 100 000 ha for sustainable forest management within multiple-use areas in Guatemala
	Carmelita and La Pasadita Concessions approved	1997	Forestry inventories, payment of fees, and compliance guarantees for new concessions

Table II 6.2 Continued.

Phases	Milestones	Dates	Processes/results
Phase II	First harvest and commercialization of timber (La Pasadita)	1998	Implementation of measures by La Pasadita community organization to control concession boundaries due to illegal timber extraction and cattle ranchers' staking claims within the boundaries CONAP made the decision to modify the regulations for granting concessions: streamlining processes for delineation, evaluation of available goods, tender and award processes for the concessions. This change in regulation paved the way for the approval of only a few concessions to the current scale.
	Industrial forest concessions approved	1999	Operations begun at La Gloria and Paxbán concessions
	Chosquitán and Uaxactún Concessions approved	2000	
	Master management plan of the MBR approved		Policy framework for integrated management of natural resources in Petén protected areas defined for the period 2000–2005
	Certification process initiated: compliance with international Forest Stewardship Council (FSC) standards through Smartwood		As part of the contract, all forestry concessions to work towards certification (three- year grace period)
	Las Ventanas, Cruce a la Colorada, La Colorada Concessions approved	2001	
	Land invasions/illegal sale of government land in concessions	2001–2010	Throughout this period, waves of illegal appropriation of land in protected area by large cattle ranchers
	Points of control established/strengthened by the government		CONAP, DIPRONA (Dirección de Protección de la Naturaleza), and the army with formal control points in San Miguel, Uaxactún, and La Colorada to prevent the entrance of cattle or illegal transit of timber/non-timber products from the reserve
	La Unión, and Yaloch Concessions approved	2002	
	FORESCOM (Empresa Forestal Comunitaria de Servicios del Bosque, S.A.) created to provide technical and business services	2003	Primary and secondary processing/commercialisation and exportation of products (collective/individual concession levels); Group FSC Certification provided through Smartwood
	San Miguel, La Pasadita contracts suspended; La Colorada contract suspended and community evicted	2009	More than 1000 ha of forest area illegally cleared in La Colorada
	Cruce a la Colorada put on notice	2010	In response to the threat of suspension, Cruce a La Colorada meeting conditions, continues to function
		2012	Beginning of discussions related to upcoming concession contract renewals
Phase III	First cycle of concessions finalised	2019–2027	Creation and strengthening of negotiation tools for concession agreements between communities and the Guatemalan government

Table II 6.3 Forest types that make up natural subsystem in the multiple-use zone of the Maya Biosphere Reserve.

Forest type	Characteristics	Community forestry foncessions*
Forest 1: *Aspidosperma megalocarpon*, *Pouteria*, *and Brosimum alicastrum*	43 indicator species, including *Callophyllum brasiliense* and dominance of Zapotaceae and Moraceae families	Yaloch Las Ventanas La Unión Chosquitán Río Chanchich Uaxactún
Forest 2: Forest made up of *Manilkara zapota*, *Metopium brownei*, and *Vitex gaumeri*	31 indicator species; mahogany one of the indicator species in this forest	La Gloria San Andrés (AFISAP) Paxbán
Forest 3: *Alseis yucatanensis*, *Ampelocera hottlei*, and *Spondias mombin*	70 indicator species: *Cedrela odorata* an indicator of this type of forest; *Brosimum alicastrum* (Importance Value Index =10.3%) dominant	La Colorada San Miguel Cruce a la Colorada.

* La Pasadita could not be categorised into one particular type of forest but rather showed evidence of being a transition between forest types 1 and 3 for the 54 plots analysed. In addition, La Carmelita was not categorised due to limitations in the type and quality of the information available (Segura 2012).

Petén Commission for Forest Fires in 2006, 95% of forest fires in Petén are caused by agricultural burns or are intentionally set. The other 5% represent fires provoked by hunting, campfires, and other causes (CATIE/BID 2010). In addition, challenges to the ecological integrity of the MBR include potential threats from other economic activities such as oil and mineral exploration and exploitation and the construction of roads and infrastructure developed in the Selva Maya region. Despite these threats, the evidence indicates that the diversified forest management by and for local communities will continue to be as effective as protected areas in preventing deforestation and degradation, or even more effective (Bray et al. 2008, Nelson and Chomitz 2011).

6.3.2 Institutional aspects

CONAP was established to play a crucial role in the management of natural resources and biodiversity in the country and, in particular, in the Guatemalan System of Protected Areas (SIGAP acronym in Spanish) through the definition and implementation of policies and standards that restrict and regulate the actions of different stakeholders linked with forestry concessions.

CONAP has many strengths that allow it to comply with its mandate, including providing opportunities for financing, cooperative agreements, alliances with civil society, technical committees, coordination/working groups, and training programs. The policy framework, standards, and guidelines[4] required to ensure sustainable forest management in the MBR have been in place and applied since the community concession process began in 1994.

For example, the terms of the agreements/contracts signed by the concessionaires and the government (CONAP) provide the guidelines and create a relatively stable environment for effective short- and medium-term planning. Each forestry concession is governed by the standards of sustainable forest management made up of a general management plan, five-year plans, annual operating plans, business plans, community development plans, and investments plans, and is sustained by a broad legal framework that covers different levels of management for

[4] National policy and strategies for the development of the Guatemalan System of Protected Areas System, Guatemalan Forest Policy, political framework for concessions for the integrated management of natural resources in protected areas of the Petén, political framework for non-timber forest products; Policy for Co-administration of Protected Areas; National Strategy for Biodiversity (ENB, Spanish acronym), the Forestry Administration Manual for Protected Areas, norms for granting concessions for harvesting and managing of renewable natural resources in the MBR, Strategic Institutional Plan for CONAP 1999–2010, master plans for protected areas.

the country's natural resources.[5] In addition, the regulatory framework requires that concessions establish and maintain permanent sample plots (PSPs), which permit the generation of information useful for management decisions about economic profitability and ecological sustainability and allow the government (CONAP in this case) to monitor the forest dynamics locally and at the regional level.[6]

Despite this strong policy and regulatory framework, CONAP remains administratively weak[7] and faces political, legal, economic, and social threats, as described by the current administration in its 2013 Operation Plan (CONAP 2012).[8] Its credibility with respect to management of the Guatemalan System of Protected Areas and for the mitigation of social pressure on natural forests is frequently questioned because of its lack of response to anthropogenic and natural threats. As a result, there are concession areas in the MBR that are vulnerable to drug trafficking, deforestation, and speculation to do with renewal and non-renewable natural resources.

One means of confronting these challenges is through the strengthening of what Carrera and Prins (2002) refer to as the "new rural institutionalism." This refers to horizontal relationships of cooperation created among the concessionary organisations, including the Community Development Councils (COCODES, Spanish acronym), the Municipal Councils for Development (COMUDES, Spanish acronym), and other stakeholders from the Guatemalan and regional forestry sector, such as CONAP, the National Forestry Institute (INAB), local and international NGOs, as well as buyers of forest products and providers of services. The primary organisation that brings together and represents the interests of the community concessions is the Association of Forestry Communities of Petén (ACOFOP), created in 1997. This organisation plays the role of liaison between the concessions and external cooperation agencies and the certification groups, for timber as well as non-timber forest products (NTFPs). In addition, ACOFOP works with government organisations for the definition of forest management strategies and integrated community development. It works as an agent to promote technical assistance and commercialisation of the community forestry concessions (Taylor 2012). These organisations make up a diverse network that allows concessionaires and other stakeholders to share information and opportunities and create awareness about the technical, administrative, and market standards/regulations, and mechanisms to troubleshoot threats due to internal and external factors.

The level of social empowerment is still very weak with respect to how the instrument of concessions contributes to long term conservation of Guatemala's collective national heritage. However, it is important to increase interest on behalf of the Peten citizens (and Guatemalans in general) on the quality of management practices of the natural resources, given that while the renewable resources are concessioned to a specific group over a period of time, the resource base belongs to the society as a whole.

Given the significant external threats to concessions, such as drug trafficking and corruption in the region, there should also be vertical integration linking to the central government, the Guatemala army, and the Department for the Protection of Nature

[5] Political constitution of the Republic of Guatemala, Protected Areas Law, and its reforms (Decrees 4-89, 18-89, and 110-96 of the Congress of the Republic); Regulations of the Protected Areas Laws, Government Agreement 759-90; Law for the Protection and Improvement of the Environment (Decree 68-86 of the Congress of the Republic); Law for the Creation of the Maya Biosphere Reserve (Decree 5-90 of the Congress of the Republic; General Hunting Law (Decree 36-2004); Government Purchasing and Contact Law (Decree 57-92 of the Congress of the Republic), its regulations and related laws; Forestry Law (Decree 101-96 of the Congress of the Republic) and its regulation; Law for the Harvesting and Commercialization of rubber and for the Protection of the Chicozapote Tree (Decree 99-96 of the Congress of the Republic); Law for the Protection of National Cultural Heritage (Decree 26-97).

[6] A more detailed review on the current state of the network of PSPs established in broadleaf natural forests indicated that there are a total of 227 PSPs in Guatemala, of which 88% were located within the MUZ/MBR. Nevertheless, most of the research experiments and their corresponding databases are controlled by the concessionaires, with only cursory supervision by the respective government institutions (INAB and CONAP). Review of the data reveals that the information from the PSPs is disorganised, that there are inaccuracies in the implementation of protocols, and errors in the identification of species; these factors limit the analysis of the experiments in the long term. As a result, the information needed for the effective orientation of sustainable forest management in the concessions is either unreliable or unavailable, both for the concessionaire and for CONAP (Marmillod 2012).

[7] Budgetary limitations have caused a reduction in multi-annual planning, high rotation of technical personnel, lack of equipment, communication services and transportation, poor infrastructure, a centralised administration, and a lack of decentralised processes, among others.

[8] Political vulnerability, gaps, and legal overlaps for effective management of natural resources, ungovernability of protected areas due to factors such as drug trafficking, illegal cattle ranching, risks in maintaining the sustainability of SIGAP in the face of accelerated population growth, pressures of extreme poverty around the protected areas, social conflict associated with agricultural invasions, political pressure to develop megaprojects, and change in land use, among others.

(DIPRONA/National Police), which would permit the administrators of justice to prosecute crimes against the environment. Strengthening linkages among the central governmental agencies would provide the institutional infrastructure necessary to more effectively implement the existing rule of law in and around the MUZ/MBR.

It is also important to note the role of agriculture within these forest concessions. For those community concessions with communities residing within their boundaries (San Miguel, La Pasadita, La Colorada, Cruce a La Colorada, Carmelita, and Uaxactún), there are areas dedicated mainly to agriculture for family consumption and cattle ranching activities. Nevertheless, historically, the attention the government has given to agriculture/livestock within concession areas has been marginal. Given its goal of improving food security, agricultural health, hydrobiology, and the sustainable use of renewable natural resources, the Ministry of Agriculture, Livestock and Food (Spanish acronym MAGA), should play a fundamental role in integrated attention to these management units. In particular, MAGA should be involved with communities through the agricultural component of the concessionary process, as outlined in the National Integrated Rural Development Policy (PNDRI 2009), by providing technical assistance and access to credit to ensure effective administrative, management, and diversified sustainable use of renewable resources.

6.3.3 Socio-economic aspects

While there is a lack of systematic, detailed, and trustworthy information on the impacts of the concessions on income and quality of life of the families associated with the concessions, as well as the indirect impacts of the concessions in the region, there are some case studies showing socio-economic impacts. Radachowsky noted that the resident community concessions with recent immigrants who depended on subsistence agriculture to survive (income sources dependent on cattle ranching, agriculture, and timber) had the lowest estimated mean economic level, while the resident community concessions with a history of using forest products (primary income sources included xate and timber) and the non-resident community concessions had medium estimated mean economic levels (primary income source was timber). In general, it has been shown that members have benefited from the creation of employment (including during seasons where there are few other economic opportunities available), increased their incomes as a result of the concessions (through dividends and wages), and have diversified their sources of income (from timber and NTFPs, services, agriculture) (Ammour and Reyes 2000, Stoian and Rojas 2006, Radachowsky et al. 2013).

The harvesting and sale of NTFPs continue to provide options for the generation of immediate monetary and non-monetary income for resident and non-resident families and complement the traditional production systems (agriculture, cattle ranching, extractive activities, off-farm activities mainly services). Other complementary activities include hunting wildlife for family consumption and for sport, the production of honey (*Aphis melifera*), the collection of palms for roof construction (guano, *Sabal* sp. Arecaceae), harvesting fibres for use in handicrafts, baskets, and furniture (in particular, *bayal*, *Desmoncus* sp., a climbing palm), gathering seeds or nuts (ramón, *Brosimum* sp., Moraceae), collection of at least three kinds of xate (*Chamaedorea* sp.), and the use of other materials for handicrafts. Other products are also sold, such as the loose pita fibre (*Aechmea magdalenae*), rubber (chicle, *Manilkara* sp.), and allspice (*Pimienta dioica*), but they are less important given the relative scarcity of the raw material and changes in the market conditions.

6.4 Community forest enterprises

It is stipulated by law that when the concessions are granted, the communities must create a legal entity responsible for management of the forestry concession. Community Forest Enterprises (CFEs) are made up of members who harvest timber and NTFPs through concessionary agreements; nevertheless, not all community members are part of the CFEs[9] (Larson et al. 2008). The CFEs are constituted under three organisational forms: cooperatives (governed by Decree 82-78 of the Congress of the Republic), civil associations, and civil societies. The civil societies are subject to the Civil Code (Decree 106 of the Congress of the Republic) and other tributary and labour laws; their objectives can be for profit or not for profit,[10] and the legal, administrative, accounting,

[9] Unable to determine the number of families/individuals participating in the respective CFEs versus the total population of the communities (data not available systematically over time).

[10] Non-profit entities are organisations that by law are exonerated from taxes but not free from complying with administrative or fiscal factors, which they must comply with in order to maintain their exemption in the corresponding registers; for example, associations, foundations, NGOs, churches, and cooperatives, among others. In general, they reinvest any profits from economic activities in meeting community needs or within the organisation. This is based on Article 15, number 3, of the Guatemalan Civil Code.

and financial standards are determined by the legal designation and the goals for which the enterprises were created.

The concessionary process was designed to emphasise and strengthen sustainable business and social administration over the medium term. As a result, the majority of concession associations have dedicated part of their budgets to community social investments, including roads, health centres, schools, community halls, and potable water (USAID/BIOFOR Project 2006). With respect to the business component, the CFE has the incentive to make long-term investments in the construction of infrastructure for primary processing, the purchase of field and basic industrial equipment, and training human resources. To meet the technical and marketing challenges the CFEs faced, they created a second-level organisation called the Community Enterprise for Forest Services, S.A. (FORESCOM); originally made up of 11 CFEs, FORESCOM was set up in 2003 to provide technical and business services to the concession community (Stoian and Rojas 2006).

Despite the significant advances made towards the sustainable management of the MBR forest resources over the past two decades, a recent report reviewing the administrative and accounting management practices of the community forest concessions in the MBR, Petén (Sterkel Mas et al. 2011), shows a series of weaknesses that affect administrative operations carried out by these businesses. For example, these include a poor ability to prioritise and plan for investments, inadequate organisational structure for business purposes, instability of trained personnel in key positions, and the absence or weakness of controls over the use of the available resources.

In part, such problems are due to the absence of basic administrative structures, the lack of long-term entrepreneurial vision among leaders and members, the low educational level of directors and support personnel, the lack of organisation, and procedural manuals that provide details about the functions of the participants in the directive bodies. Some examples of financial and accounting weaknesses include the limited use of accounting software programs and, up until 2011, the generally low compliance with the country's tributary laws (Table II 6.4), subjecting the concessionaires to fines on behalf of the superintendence of administration (SAT, Spanish acronym).

In addition, the rotation of the members of the boards of directors in management and administrative positions has affected leadership and organisational capacity. There are examples where changes in the participants in the board of directors were due to personal/group interests and they provided privileged access to resources. These factors have had negative impacts on the production, administration, and commercialisation processes and affect the transparency, confidence, and organisational development required to consolidate the business aspects of the concessions.

In addition to the internal weaknesses related to the administrative management of the CFEs mentioned in Table II 6.4, there are other factors that influence the success or failure of these nascent organisations. Ostrom (1990) and Taylor (2012) noted that communities are more likely to organise successfully when the members agree to some basic tenets: the benefits of cooperation are greater than the costs, adequate community participation is possible, there is systematic supervision, sanctions are implemented, efficient procedures for conflict resolution exist, and there is external recognition of the rights of the communities for the governance of their resources.

The three concessions that have failed to date were in the hands of resident communities living within the concession area (as defined by Radachowsky et al. 2013[11] – see Table II 6.2). They did not meet the above-mentioned criteria that Ostrom identified as necessary for success. The communities of San Miguel, La Pasadita, and La Colorada were made up of immigrants from different parts of the country (settled between 1985 and1990) who lived in extreme poverty, had very low educational levels, lacked organisational capacities at the community level, and had no previous experience living in/from the forest (Ammour and Reyes 1999). Their interest in participating in the concession process was to maintain access to the land for subsistence agriculture and cattle ranching rather than a specific interest in forest management. The low quality of the soils[12] and the lack of access to water made it difficult to promote technological crop improvements. In addition, the location of their forestry concessions was easily accessible to the routes between San Andrés and Carmelita, allowing outsiders to enter and illegally remove valuable timber. In addition, there were formidable external factors such as drug trafficking/cattle ranching, and weak backstopping from government organisations. As a result of the illegal sale of land, migration and drug trafficking, the social conflicts, deforestation for the establishment of cattle ranches, forest fires, wildlife trafficking, and administrative corruption, three of the concessions from

[11] Three types of actors have been involved in the concessionary process, as defined by Radachowsky et al. 2013): 1) Community forestry concessions with their population residing within the limits of the concessions, 2) Community forestry concessions without resident communities, and 3) private industrial concessions (Table II 6.2).

[12] Soils classified as laterites, from 20 cm to 40 cm maximum, equivalent, according to the USDA, FAO, and French classifications of soil types: Rendolls, Rendzinas, and Rendosols (Collinet 1997).

Table II 6.4 Administrative, financial, accounting and fiscal aspects of active community forest enterprises. Source: Sterkel Mas et al 2011.

Aspects evaluated	Community Forest Enterprises (CFEs)								
	AFISAP / San Andrés	AFICC / Cruce a La Colorada	Laborantes / Chosquitán	Árbol Verde / Las Ventanas	Cooperativa Carmelita	OMYC / Uaxactún	Suchitecos / Río Chanchich	Esfuerzo / Yaloch	Custosel / La Unión
Accounting									
Accounting records									
Organizational taxes									
Guatemalan Institute of Social Security									
Debt									
Employee taxes						N/A		N/A	
Transparency of administrative management									
Evaluation									

Criteria for evaluation:

- Excellent: complies with more than the standards stipulate
- Good: complies with the standards
- Average: the variation of compliance with the standards is minimal
- Deficient: non-compliance with the standards is problematic
- Unknown: unable to verify the information or information not provided
- N/A: Not applicable: the norm does not apply to the concessionary unit

Box II 6.1 Example of wood-product sales for the Integrated Forestry Association of San Andrés, Petén (AFISAP) in 2011

The Integrated Forestry Association of San Andrés, Petén (Spanish acronym AFISAP) is an example of a forest concession in the MUZ/MBR with a relatively stable wood-product value chain (Gómez 2012). The association benefits from a steady provision of primary material as laid out in its 25-year management plan, assuming that it has complied with its contractual requirements. In addition, it has installed its own machines for primary processing. As a result, the association controls the first link in the supply chain (primary production, transportation of forest products from the forest to the industry, and primary processing). AFISAP does not control the step of commercializing the wood to wholesalers.

Factors considered critical to success have been overcome: AFISAP counts on technically trained human resources, has access to financing, has developed and maintained road infrastructure, has purchased and maintained harvesting equipment, has maintained access to stable timber markets/prices, and has learned to control forest extraction costs. As a result, the quality of the timber and non-timber products delivered has been standardised according to market demand, extraction costs are near optimal, and registers for income and costs are maintained.

The forest products commercialised are a function principally of clients' requirements. The buyer defines the dimensions, quality, and delivery dates. In 2012, the sale prices of mahogany wood (*Swietenia macrophylla*) ranged from USD 4.90 for FAS special cuts to USD 3.90 FAS[2]; for wood from five species sold in the local and national markets, prices were from USD 0.76 to USD 2.00. The estimated gross income for the 2011 harvest was USD 830 309 (Tables A and B) at an approximate cost of USD 0.51/board foot, which yields a cost-benefit ratio of 4.44 for the harvest in the reference year.

Table A. Wood volume exported internationally and estimated income (USD),[2] 2011, Integrated Forestry Association of San Andrés, Petén (AFISAP).

Species	Volume (board feet)	Sale Price (USD)	Gross Income (USD)
Mahogany (*Swietenia macrophylla*)	96 495	4.36	420 718
Cedar (*Cedrela odorata*)	60 934	2.85	173 662
Santa maría (*Calophyllum brasiliense*)	33 000	1.27	42 038
Manchiche (*Lonchocarpus castilloi*)	10 000	1.41	14 071
TOTAL	200 429		650 489

Table B. Wood sales in national and local markets and estimated income (USD),[2] 2011, Integrated Forestry Association of San Andrés, Petén (AFISAP).

Species	Volume (board feet)	Sale Price (USD)	Gross Income (USD)
Mahogany (*Swietenia macrophylla*)	95 132	0.96	90 890
Cedar (*Cedrela odorata*)	24 965	2.00	49 930
Santa maría (*Calophyllum brasiliense*)	36 815	0.76	28 139
Manchiche (*Lonchocarpus castilloi*)	6529	1.02	6654
Pucté *(Bucida buceras)*	3004	1.40	4206
TOTAL	166 445	–	179 819

[1] FAS refers to the grading of timber quality "First and Seconds" by the National Hardwood Lumber Association.
[2] Exchange rate: GTQ 7.85 x USD 1.

this group have had their contracts revoked, and one was temporarily suspended. The exceptions to this characterisation are Carmelita and Uaxactún, which are more established settlements dating back to the 1930s. Their historic and current economic activity includes nature tourism, the harvesting of NTFPs such as xate, rubber, allspice, and now the primary processing and exportation of timber products.

Since the concessions without resident communities have not faced the same challenges that affected the first group of concessions, they have been able to consolidate their CFEs over the past decade: 1) eight of the community concessions have advanced in the supply chain from selling their unprocessed timber at the forest gate to primary processing of forest products, thereby earning a higher price and 2) they are seeking to incorporate species beyond the traditional ones[13] into their management and marketing strategies in order to expand the volume of wood available on a per-hectare basis. AFISAP is an example of this non-resident type of community concession that has been able to consolidate its timber and non-timber forest management. The text box II 6.1 outlines how they were able to generate more than USD 830 000 in income in 2011 from timber sales internationally as well in the national and local markets.

Nevertheless, this group has also had to overcome challenges. Although the forest cover is the principal capital that Petén and the concessions have, the majority of tree species available do not correspond to market demand. The high diversity of forest species in natural forests such as those in the Petén means that while many different tree species are available for harvest, a relatively small volume of timber for each of them is available per hectare. As a result, historically and currently, the majority of timber sales from the concessions come from mahogany (75%), followed by cedar (10%–15%), and finally, by small volumes of manchiche, santa maría, and other species (personal communication with Forster, administrative manager from AFISAP in 2013). Broadening the range of marketable species and adding value to the available forest products through primary and secondary processing continue to challenge these concessions.

The concession organisations have a formal/legal harvesting and commercialisation structure that lends certainty to the buying/selling agreements for timber forest products. This means that they are granted harvesting licenses, transport guides, can count on the presence of a forest manager, can provide proof of payment of taxes based on the stumpage value or the extracted volume, and have certificates for those species subject to the complementary controls of the Convention on International Trade of Endangered Species (CITES), as well as formal FSC certification for forest management and chain of custody. As far as marketing their timber products, the concessions need to strengthen their internal organisation and administration with respect to improving alliances that optimise primary processing and commercialisation, including market intelligence, so that they can increase sales to appropriate national and international markets, including niche and fair trade markets in the United States and Europe. In the case of non-timber forest products such as xate (*Chamaedorea* spp), the concessions of Uaxactún, AFISAP, and Carmelita have established strategic alliances among themselves that allow them to commercialise directly to importers in the United States, Canada, and Holland.

The concessions still face challenges in consolidating administration of their financial resources. In particular, there is a need to incorporate more analytical means of prioritising investments and to separate the social-community management from the business management of productive activities. Some argue that the cancellation of the concessions of San Miguel La Palotada, La Pasadita, and La Colorada concessions can be attributed to the mixing of these processes. Other elements that affect the long-term sustainability of the concessions are debt levels and the low capacity for business administration; these factors have led concessions such as El Cruce a la Colorada and Uaxactún to face critical situations.

For both types of community concessions (those with and those without resident populations), it will continue to be important to strengthen their capacities with the goal of obtaining beneficial results in the social, economic, environmental, and institutional realms. Since the technical aspects of forest management are progressing well, efforts should be focused on community organisation and entrepreneurial capacity along the lines of management (leadership, direction, and coordination), business administration (including accounting and administration), primary and secondary processing links along the productive chain, and the commercialisation of products. In addition, it is imperative that the government assume its role in controlling illegal activities, such as land occupations and the illegal harvesting of timber and non-timber products.

[13] Traditional timber species are mahogany (*Swietenia macrophylla*), cedar (*Cedrela odorata*), santa maría (*Calophyllum brasiliense*), manchiche (*Lonchocarpus castilloi*), and pucté (*Bucida buceras*).

6.5 Conclusions

The analysis of the design and implementation process of the community concessions in the Petén, Guatemala 1) provides evidence of progress toward the integrated management of the MBR and its contribution towards effective management of protected areas and the integrated development of the local population and their surroundings, and 2) generates some lessons learned, factors for success, and challenges for the consolidation of the community concessions. The following conclusions summarise some of these elements:

- The adaptation and approval of the legislation for community concessions to a biosphere reserve necessarily involved reconciling the protectionist perspective (at the national level as well as at the level of international environmental NGOs) with the productive vision by linking economic and social development with the sustainable management of natural resources.
- The factors that facilitated the institutionalisation and implementation of the community forest concessions were the government's need – and its political will – to stabilise the conflictive social dynamic of migrations (from Mexico and, in particular, from southern Guatemala) in order to stop the expansion of the agricultural frontier.
- The establishment of community concessions with resident populations was initially based on a land-use-planning concept that took into consideration the diversification of production of agricultural activities, animal husbandry, and forestry. Unfortunately, not all community concessions with resident populations were implemented based on the above-mentioned criteria. The diverse institutions working with the concessions focused primarily on the productive use and conservation of forest resources, completely ignoring the importance of agricultural areas for food security and other off-farm activities. The lack of an integrated vision for the different subsystems (crops, timber, and NTFPs) limited the possibilities of creating complementarity among the different components, including production for family consumption as well as for generating income. Therefore, when designing communities' concessions with residents living within the concession areas, it is imperative to incorporate land-use-planning strategies for agricultural areas according to soil potential as part of the integrated development strategy for agriculture as well as forestry, with particular focus on technical, marketing, and credit assistance.
- Given the differences in perspective on the role of the forest for concession models with populations residing inside the concession area and those without resident populations, it would be worthwhile to determine if more than one type of concession contract should be developed to reflect the different realities and needs for technical and administrative assistance – rather than just one format. The continued administrative deficiencies, the lack of transparency in the use of financial resources generated, and the lack of debt-level controls, which are the responsibility of the community leaders and political decision-makers, should be addressed when renewing concession contracts.
- The concessions represent an acceptable governing structure for the management of natural resources in the MBR, given that at least nine of the original 12 community organizations continue to manage their concessions and have begun to generate tangible benefits, including:
  - Social: community infrastructure, business management, formation of human capital, establishment of dialogue, and conflict resolution mechanisms
  - Economic: generation of employment, income that stimulates the local economy and purchase of capital goods and other assets for primary processing
  - Environmental: control of forest fires, control of illegal harvesting, control of predation on archaeological sites, and applications of other measures for recuperating forest cover

  The environmental sustainability of the concessions remains a concern given that most timber sales continue to be generated by mahogany (75%) and cedar (10%–15%), followed by santa maría and manchiche, given that they do not represent the species with the greatest available volume. It continues to be difficult to commercialise non-traditional species.
- Sustainable forest management in the tropics requires that there be improvements in managing information through a closer dialogue between scientists and those who possess local knowledge (Lawrence 2007). It is important to resume long-term forestry research through the use of permanent sample plots (PSPs) as an integral part of the monitoring and evaluation system of community forest concessions. The monitoring systems would provide analytical information to guide management decisions, allow for adjustments, permit the recuperation of areas disturbed by forestry operations and other incidents, and allow for comparisons between concessions and other areas in Guatemala (when research protocols are reviewed, standardised, and institutionalised). Scientific studies of dendrology based on the PSPs could be used to promote awareness of species under forest management, particularly those having economic importance, examining

them from the phytogeography perspective as well as anatomical, physiological, and ecological points of view.

- Given that the first concession contracts are coming to an end by 2019, the third phase (2012–2019/27) should focus on the information and tools needed for the negotiation process between the different actors and the government of Guatemala. Specific attention should be paid to the systematic quantification and qualification of amounts and types of socio-economic benefits generated by the concessions to their members and the region. The current complexity of the institutional context should be considered, given the strategic importance of the natural, economic, and cultural resources in the MBR.
- The current performance of the concessions is due to the interaction of several factors, including: the existence of explicit public policies, instruments for incentives and controls, and the existence of the technical framework for concession administration. The social empowerment of those communities directly involved as well as civil society needs to be strengthened. Our knowledge of the process has allowed us to identify important weaknesses in each of the previously mentioned dimensions, the most critical being government leadership and social empowerment.

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Community-based forest management in Quintana Roo, Mexico

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Abstract: The Mexican model of community forestry is often touted as an example whereby greater community control enhances both conservation and local livelihoods. We examine the conditions that have enabled and challenged sustainable forest management within community forests in Quintana Roo, a tropical state strongly influenced by the Maya culture that currently boasts 91% forest cover. Over time, community forestry has been shaped by land reforms and forest policies that institutionalised common property and local governance systems, granted timber rights to communities, instigated Permanent Forest Areas for commercial management, and laid a foundation to respond to changing market opportunities (i.e. payments for environmental services, railroad ties, polewood, and future carbon credits). Significantly, 16 years of state and international support via the Forestry Pilot Plan further empowered residents and increased local capture of forest benefits. In contrast, recent neoliberal economic and policy changes have promoted parcellisation and privatisation of communal lands, driving some deforestation and weakening governance in vulnerable communities. Corruption, lack of transparency, and contradictory agricultural, forestry, and conservation policies have impeded proper forest-sector investment. This case study explores the dynamic human-forest relationship that has evolved and persisted for more than 3000 years, revealing the resilience of both people and forests.

Keywords: Community forestry, *ejido*, forest cover, Maya Forest, Yucatan

7.1 Introduction

Despite the multitude of pressures at distinct levels to convert forested land to other uses, the Mexican model of community forestry seems to be a case where greater community control over forest management and related benefits have enhanced both forest conservation and local livelihoods (Klooster and Ambinakudige 2005). We examine the conditions under which community-based forest management operates in the tropical state of Quintana Roo, which occupies 50 212 km^2 of the eastern half of Mexico's Yucatan Peninsula (Figure II 7.1). Although centered between the mid-1980s and 2012, our analysis necessarily begins several millennia before to better understand the historical conditions that shaped modern-day community forestry in Quintana Roo. We present an overview and analysis of the intertwined socio-cultural, political, economic, and ecological dynamics that have enabled and challenged sustainable forest management (SFM) in the region.

Diverse sources were used for the study, including a myriad of bibliographic resources and the experience of the authors working in the region over different periods of time. This case study is highly relevant due to the dynamic human-forest relationship that has evolved and persisted for more than 3000 years, demonstrating the resilience of both people and forests. There are very few cases globally with such substantiated data over such a long period of time. Lessons learned should inform readers how community forest management can contribute to the overall goal of forest-based sustainable development and conservation in the tropics.

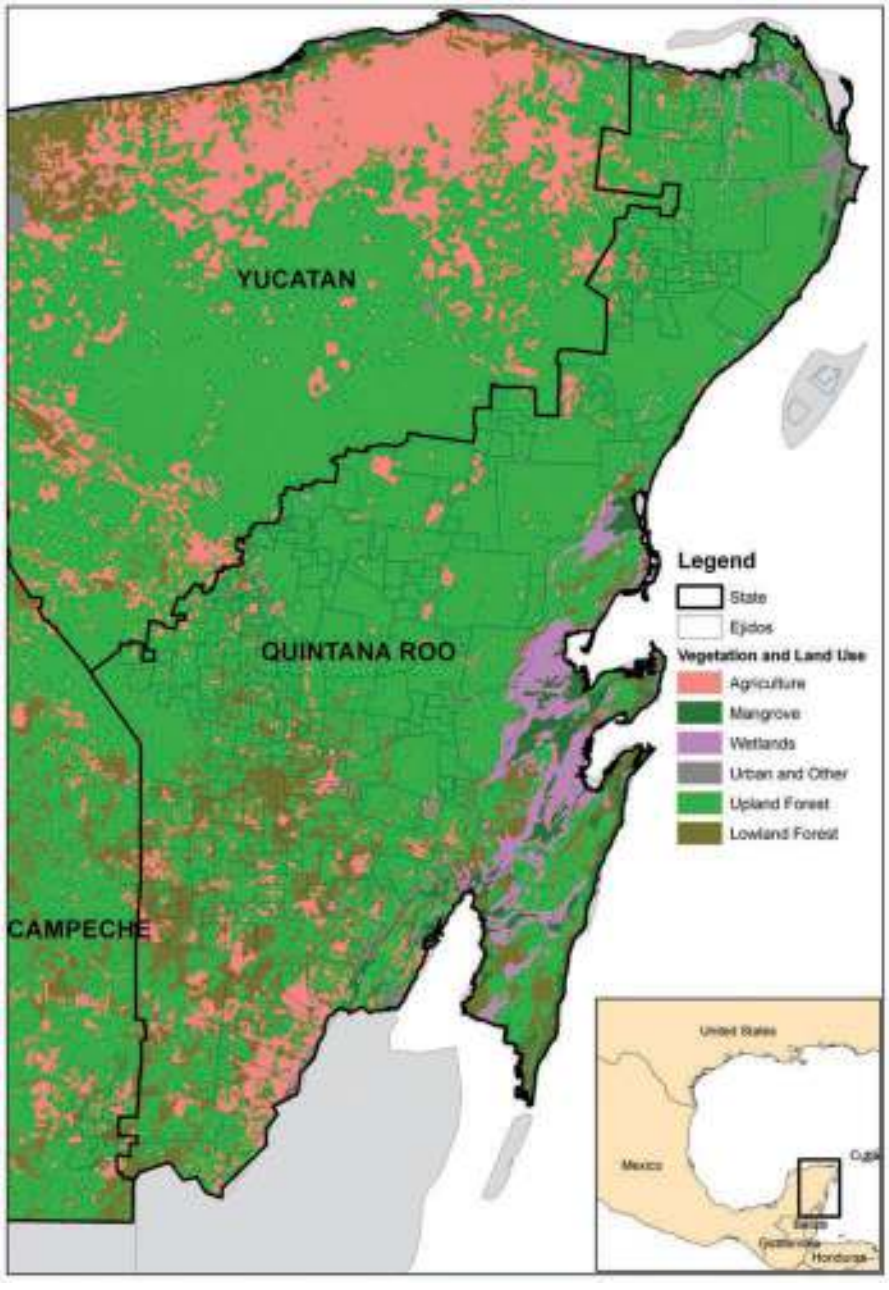

Figure II 7.1 Land use/land cover map of the state of Quintana Roo, Mexico. Three shades of green highlight that the state retains 91% forest cover. © E. Ellis

7.2 People and forests of Quintana Roo

The tropical forests of Quintana Roo are intimately linked with ancient cultures as well as modern-day forest-based communities. Archeological, paleolimnological, and written historical evidence coupled with present-day observations provide insights into a human-nature relationship that has alternately flourished, collapsed, adapted, and been reshuffled many times over (Figure II 7.2). Today's forest reflects approximately 3000 years of Maya agroforestry, resource extraction, fire, drought, and hurricanes (Gómez-Pompa and Klaus 1992, Gómez-Pompa and Bainbridge 1995).

Ancient Mayas became established on the Yucatan Peninsula between 2000 BC and AD 250, reaching their greatest cultural heights between AD 600 and 800 (Coe 2005). Forests were cleared to construct architecturally magnificent and densely populated cities and to cultivate food crops and trees to support them. Shifting slash-and-burn agriculture was

Figure II 7.2 The pinnacle of an architectural ruin in the Mayan archeological site of Cobá in Quintana Roo peeks out from a blanket of forest. © K. Kainer

the norm and maize the primary crop in a very diverse production system (Hernández 1985) known as *milpa*. The Mayas planted seeds with dibble sticks in ash-laden holes upon the great limestone shelf that forms the bedrock on which extremely shallow soils accumulate (Coe 2005). After abandonment of the milpa fields, natural succession ensued and the Mayas enriched these areas, selecting and tending desirable species while simultaneously eliminating unwanted competition–the present floristic diversity of the region reflects their ancient agroforestry systems (Edwards 1986, Gómez-Pompa et al. 1987).

In the Maya northern area, which encompasses all of modern-day Quintana Roo, the Mayas excavated and built thousands of underground cisterns (Coe 2005) to compensate for the extreme scarcity of surface water, complementing the numerous sinkholes formed by natural collapse of underground limestone caves. Between AD 800 and 1000, however, the driest interval of the middle- to late-Holocene epoch fell upon the region (Hodell et al. 1995), overlapping with the collapse of the Maya civilisation. This sustained drought coupled with coincident annual crop failure and years of environmental degradation (Coe 2005) created conditions that could no longer support extremely high population densities. Cities were abandoned, but in this northern area, the Mayas continued, albeit in much lower population densities, such that 500 years later, when the first Spaniard, Hernández de Córdoba stepped foot on the peninsula in 1517, he was swiftly killed by Maya warriors (Coe 2005), descendants of this brilliant civilisation.

Compared to other conquered regions in Latin America, early colonial impacts on forest and peoples of the Yucatan Peninsula were distinctly shaped by a dearth of natural resources of value to the Spaniards (DiGiano 2011). The lack of precious metals, scarce surface water, and shallow karstic soils occasioned limited commercial interest. Coincidentally, the traditional Maya agricultural and land-tenure systems did not suffer wholesale disruption. In the late 1700s, however, a fundamental shift towards a more intensive hacienda mode of production, particularly for henequen (*Agave fourcroydes*), ensued in the northwest part of the peninsula; the Maya of the southeast continued to practice subsistence agriculture (DiGiano 2011). Here, nonetheless, forests were being exploited for export products from dyewood (*Haematoxylon campechianum*), mahogany (*Swietenia macrophylla*), and later *chicle*, a resin extracted from *Manilkara zapota* used to produce chewing gum. These externally valued forest assets became increasingly important to the Mayas as they struggled to gain access to land and resources during the ex-

tended and bloody Caste War (1847–1901) fought against the creole elite of the peninsular northwest (Reed 2001). These forest resources were exchanged with the British for cash and weapons, and the entire forested region of Quintana Roo was converted to a center of jungle warfare and a Maya refuge (Reed 2001). By the time the rebel headquarters were captured by Mexican forces in 1901, the war had reduced the regional population from 85 000 to 10 000 (Konrad 1991). Quintana Roo became a Mexican territory that same year and soon thereafter foreign-owned forest concessions were granted (Kiernan and Freese 1997) to promote territorial control, regulate forest extraction, and sever relations between the Mayas and British Honduras (DiGiano 2011).

A land-tenure framework favourable to common property management arose from the 1910–1917 Mexican revolution (Bray et al. 2005), enabling the first communal land grants or *ejidos* to be established in the territory of Quintana Roo in the 1930s and 1940s; these were also recognised when statehood was attained in 1974. It was not until passage of the 1986 Forest Law, however, that communities across Mexico garnered legal rights to the trees on their lands. This precipitated a shift from timber harvests via industrial concessions to community-based forest management. In Quintana Roo, in particular, this shift was accompanied by an innovative joint Mexican-international program (Plan Piloto Forestal, or Forestry Pilot Plan) "to empower ejido residents and increase the economic returns they receive from the forest" (Kiernan and Freese 1997, p. 98).

Vis-a-vis these reforms, Mexico stands out in Latin America and the world in that the state effectively gave collective land entitlements to thousands of rural communities, resulting in more than 60% of Mexico´s forested land presently being under communal ownership (Bray et al. 2003a, FAO 2010). In Quintana Roo, this figure is slightly higher – at 67%, based on current figures of forest cover (INEGI 2010a) and land-tenure distribution (INEGI 2006). In these rural regions, the 2010 census reveals that population densities are rather low (~5 inhabitants/km^2) (INEGI 2010b), yet in an adjacent forest region in the state of Campeche, with half that population density, deforestation is much greater (Ellis and Porter-Bolland 2008).

With approximately 75% of the total state population of 1.32 million concentrated in coastal and tourist-related urban areas such as Cancun (628 306), Playa del Carmen (149 923), the island of Cozumel (77 236), and the state capital Chetumal (151 243) (INEGI 2010b), population pressures in rural Quintana Roo are limited. Yet when compared to the estimated 8 to 10 million Mayas who occupied the lowlands (Mexico's Yucatan Peninsula, parts of Tabasco and Chiapas states; the Peten of Guatemala; and Belize) in about AD 750 (Coe 2005), it becomes clear that more than population pressures explain the brand of community-based forest management and relatively successful forest conservation that now characterizes Quintana Roo.

7.3 Natural resource base

Quintana Roo's natural ecosystems include coral reefs, coastal dunes and marshes, mangroves, freshwater wetlands, and seasonal tropical forests (Flores and Espejel 1994). Topographical variation across the state is minimal. For most areas, changes in elevations rarely exceed 15 m, although the far southwestern corner of the state rises to 310 m AMSL (Vester and Navarro-Martínez 2005).The climate is hot and subhumid, with a mean annual temperature of 25°C and mean annual precipitation of 1200 mm (Gutierrez-Granados et al. 2011). Forest types vary according to soil and topography: medium-stature forest (15 to 25 m) dominates upland, well-drained rendzinas, while lower-stature forests occur on seasonally inundated depressions with poorly drained gleysols and vertisols (Lawrence et al. 2004, Toledo-Aceves et al. 2009). A pronounced dry season (< 60 mm of rain per month) from November to April, followed by 100 to 200 mm of monthly rainfall in the subsequent months, shapes these seasonal forests (Gutierrez-Granados et al. 2011), also referred to as dry, semi-deciduous or semi-evergreen forests. In effect, the forest landscape of Quintana Roo can be described as a mosaic of lowland and upland forest types of different successional stages (Flores and Espejel 1994, Ellis and Porter-Bolland 2008).

Forest structure of the *Selva Maya*, a Spanish term that purposefully links the tropical forest with Maya heritage, consists of three to four tree and shrub layers, 3 to 25 m in height (Snook et al. 2005, Hernández-Stefanoni et al. 2006). Common tree species include *Brosimum alicastrum*, *Manilkara zapota*, *Talisia olivaeformis*, *Bursera simaruba*, *Lonchocarpus longistylus*, *Nectandra salicifolia*, *Psidium sartorium*, *Guetarda combsii*, *Vitex gaumeri*, and *Caesalpinia gaumeri* (Hernández-Stefanoni et al. 2006, Gutierrez- Granados et al. 2011). *Hemotoxylon campechianum*, *Metopium brownei*, and *Pachira acuatica* are frequent in lowland flooded forest, although both upland and lowland forests share many of the same species (Flores and Espejel 1994, Pérez-Salicrup 2004). There are more than 100 tree species per hectare in these forests, of which about 75% are evergreen and the rest deciduous (Snook et al. 2005, Hernández-Stefanoni et al. 2006).

7.4 Policies, institutions, and governance

7.4.1 Agrarian reform and community-based forest management

Three important policy and institutional factors have shaped community forestry over the years in Quintana Roo: 1) agrarian reform, 2) forest policy and related institutions, and more recently, 3) conservation and sustainable development initiatives. Agrarian reform and land distribution to communities arrived in Quintana Roo when ejidos were first established in concert with the promotion of cooperatives for chicle production (Forero and Redclift 2006). Calculating that 420 ha of forest per chicle producer was needed to maintain production, 10 ejidos, averaging 35 000 ha each, were granted to mostly Maya populations between 1935 and 1942 (Barsimantov et al. 2011). Much of the land transferred was remote and often heavily forested, which in turn gave communities access to and use of large forested territories. From the 1960s to early 1970s, much smaller ejidos, averaging only 20 ha per farmer, were distributed, mainly to stimulate agricultural production and also, given that Quintana Roo received statehood in 1974, as a colonisation mechanism (Bray et al. 2004, Ellis and Beck 2004).

Complementing communal ownership, another major influence of agrarian reform was installation of an ejido governance system that still operates today, with some modifications. Decisions on commonly owned land and natural resource assets, as well as other community issues, are voted upon by a General Assembly composed of *ejidatarios*, who are usually male heads of household (Antinori and Bray 2005). Further, each community is represented by an elected *comisariado ejidal* (ejido commission), responsible for administrative management of the ejido, including its resources, and carrying out decisions of the General Assembly. The commission consists of a president, a secretary and a treasurer, who each hold three-year terms. In addition, it includes a *consejo de vigilancia* (oversight council), which polices and enforces community regulations and serves as a check-and-balance and auditing system (Bray et al. 2006). This ejido governance system was modeled after colonial and indigenous systems in rural Mexico (Antinori and Bray 2005) and is credited with facilitating the community forest management movement and creation of community forest enterprises in Mexico (Bray et al. 2006).

7.4.2 Social movements and policy reforms related to timber rights

Still, well up to the mid-1980s, communities did not have complete control of their forest resources. The government had the right to superimpose logging concessions on ejidos, with communities receiving little or no benefit from concessions on their lands. In 1958, the parastatal company Maderas Industriales de Quintana Roo (MIQRO) gained control of about 550 000 ha of forest concessions for a 25-year period and began unsustainable logging, profiting from about 400 000 m^3 of valuable timber (mostly mahogany and Spanish cedar, *Cedrela odorata*) (Taylor and Zabin 2000, Taylor 2001). In the mid-1960s, however, grassroots mobilisations sprung up across Mexico demanding communal rights to manage and profit from commercial timber on ejido land. In Quintana Roo, the ejidos of Tres Garantias and Noh-Bec organised against MIQRO (Taylor and Zabin, 2000, Taylor 2001, Bray et al. 2003a). Academic activists and even government reformists supported these grassroots movements – all instrumental in the transition from concession logging to community-based forest management (Bray et al. 2003a, Merino-Pérez 2004). The federal government responded with the 1986 Forest Law, which ended all private concessions, required more environmentally sound forest management and harvesting, and allowed communities or community organisations direct control of management and marketing of forest timber resources on ejido land (Taylor 2001, Bray et al. 2006).

Termination of the MIQRO concession and the beginning of the Forestry Pilot Plan in 1982 marked a new era of community-based management with timber rights (Figure II 7.3). The pilot plan was a joint venture of the Mexican government and GTZ, the German cooperation agency, and was also widely supported by state government and the governor of Quintana Roo (Merino-Pérez 2004) to empower and benefit local communities. It provided forestry technical teams and services that worked completely autonomously with communities, supporting over 40 forest ejidos and delimiting about 500 000 ha as Permanent Forest Areas specifically for forestry activities (Taylor and Zabin 2000, Taylor 2001). These areas are considered a unique example in Latin America of communities controlling land-use change and effectively slowing deforestation in the region (Bray et al. 2003a, Bray et al. 2004). By 1991, five ejidos in Quintana Roo became the first tropical forests to be certified by the Forest Stewardship Council (FSC) (Markopoulos 1999), with some also obtaining chain-of-custody certification (Macqueen et al. 2008).

Although the creation of intermediate-level forestry organisations was not part of the original Forestry Pilot Plan, the need to effectively harvest, process,

Figure II 7.3 Mayan and mestizo communities in Quintana Roo, Mexico, own timber rights on their lands and are highly engaged in forest management and timber harvests. © E. Ellis

and market timber and compete against MIQRO, still present as a buyer, spawned the creation of forest civil societies, such as the Society of Forest Ejido Producers of Quintana Roo (SPFEQR) in the south and the Organization of Forest Ejido Producers of the Maya Zone (OEPFZM) in the central part of the state (Taylor and Zabin 2000, Taylor 2001). These forest civil societies helped empower ejidos and helped them gain political credibility, blocking a state government attempt in 1987 to obligate ejidos to sell timber to MIQRO, and more importantly, laying an institutional foundation to allow continuity of community-based forest management and their corresponding community enterprises beyond the pilot plan (Taylor and Zabin, 2000, Taylor 2001). Though the Forestry Pilot Plan ended in 1998, its legacy remains in the approximately 729 592 ha of Permanent Forest Areas and the continued technical support available in Quintana Roo (Snook 2005). Here, as elsewhere in Mexico, the original civil societies allied ejidos and provided technical support personnel who fundamentally facilitated community access to government forestry programs and compliance with the many and complicated forest-management legal requirements. Civil societies have slowly transformed from a focus mainly on timber extraction to also assist communities in developing strategies for multiple-forest use (product diversification). Increasingly, the technical forestry aspects of ejido support have been filled by the some 37 private individuals and eight firms now registered in Quintana Roo (Registro Forestal Nacional 2012), who may or may not be affiliated with civil societies. These technical consultants support themselves largely through government programs that are channelled through ejidos for this purpose as well as by volume-based commissions per ejido and through obtaining external funding to carry out community projects – akin to fundraising strategies adopted by NGOs. These institutional arrangements that emerged from those years of policy reforms and forest-based development initiatives helped shape a socio-economic landscape apt for the community forest management observed today in Quintana Roo.

7.5 Livelihoods, commodity chains, and continued adaptations

Forests, almost exclusively community-owned, remain the cornerstone of rural Quintana Roo despite the increasing importance of wage labour and migration to coastal tourism developments (Murray 2007). Cultural, economic, and environmental reliance on forests is substantial although highly variable among communities (DiGiano and Racelis 2012). Also variable is the degree to which any particular community is engaged with timber and/or non-timber forest products (NTFPs), including environmental service payments (PES) and ecotourism.

7.5.1 Local variability of forest-based revenues, benefit distribution, and employment

Wide varieties of timber and NTFPs are managed and harvested for commercial and subsistence purposes from the Selva Maya. Direct timber revenues in the state were USD 6.7 million in 2007, but total forest-related revenue would be considerably higher if other forest products and services were considered in this number (González Canto 2007). Mahogany and Spanish cedar continue to be the most prised timber species, and *Manilkara zapota* the most important non-timber species for its chicle (Snook 1998, Negreros-Castillo et al. 2003). Other commercial timber species include softwoods such as pa´sak (*Simarouba glauca*), jobo (*Spondias mombin*), chakaj (*Bursera simaruba*), amapola (*Pseudobombax ellipticum*), sak chakaj (*Dendropanax arboreus*), and hardwoods such as tzalam (*Lysiloma latisiliqum*), chechem (*Metopium brownei*), ciricote (*Cordia dodecandra*), machiche (*Lonchocarpus castilloi*), and granadillo (*Platymiscium yucatanum*) (Gobierno del Estado de Quintana Roo 2005).

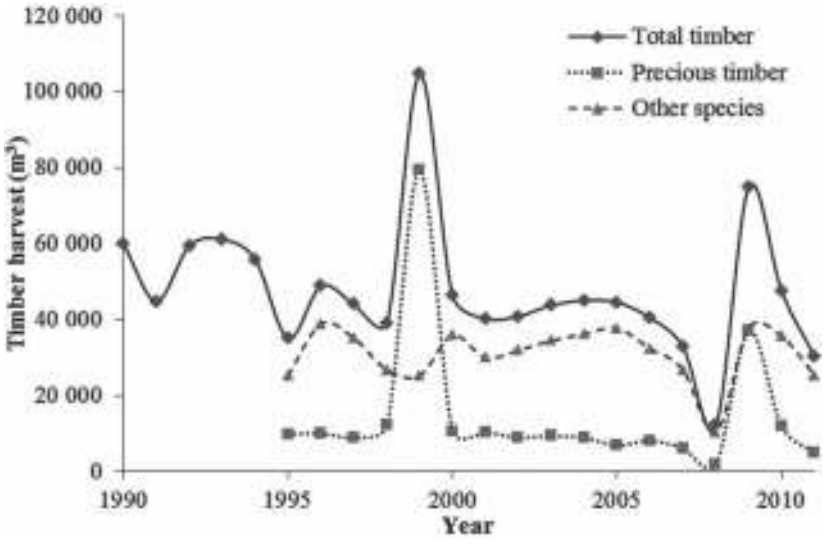

Figure II 7.4 Timber harvests in Quintana Roo from 1990 to 2011. Data from 1990 to1994 was obtained from Instituto Tecnológico de México 2004; data from 1995 to 2011, from Sistema Nacional de Información Forestal 2013.

The number of ejidos involved in legal harvest of forest products has fluctuated over the years, varying from 61 in 1995 to 80 in 2006 (SEMARNAT 2006) and 46 in 2010 (SEMARNAT 2010). Annual timber production also has varied, with annual minimum and maximum harvests associated with particular events such as hurricanes (e.g. Hurricane Dean in 2007 caused a spike in 2008) (Figure II 7.4). Overall precious timber production follows a decreasing trend (Figure II 7.4), perhaps associated with silvicultural aspects of mahogany management (Box II 7.1). While harvested volumes of non-precious timber species have varied less, over time, targeted species and products derived from them have changed according to market demand. Pole-sized trees exemplify these changes as product demand from this size class has shifted from railroad ties to construction materials. Known simply as polewood, this most recent commercial product is derived from more than 30 hardwood species and is used mainly for construction material demanded by the tourism industry (Racelis and Barsimantov 2008) (see Box II 7.2, Figure II 7.5). Charcoal production is particularly important in secondary forests close to the urban markets in northern Quintana Roo (V. Santos, OEPFZM, pers. comm). Thatch from *Sabal yapa* and *Thrinax radiata* palms are also harvested for commercial and subsistence purposes (Pulido and Caballero 2006, Calvo-Irabién et al. 2009). Moreover, ornamental plants (palms and orchids) and game are commonly extracted NTFPs. Fallow fields as well as Maya home gardens are also valuable sources of tree-based products used for fuel, food, medicine, and construction materials (De Clerck and Negreros-Castillo 2000), providing a diverse set of products harvested from heterogeneous forest landscapes (Rico-Gray et al. 1991, Toledo et al. 2008). Beekeeping, the second largest economic activity in the state, heavily depends on flowering plants in this forested landscape (Guemes and Villanueva 2002, Villanueva 2002). Finally, local economic benefits derived from commercial forestry vary widely among ejidos, partially driven by native abundance of valuable hardwoods. Bray et al. (2007) also have found that timber versus non-timber producing communities generally tended to have greater incomes per person and were above the poverty line; however, among these timber-producing ejidos, incomes were still low when associated with Maya communities and those without sawmills. A diverse suite of factors may cause variation in timber production and, very importantly, ejido engagement and disengagement in forest management and associated derived benefits. A detailed study exploring these factors would help inform effective conservation and development policies.

The forest regrowth phase of traditional slash-and-burn agriculture, which continues to be central to the living Maya culture, maintains and/or renews soil fertility and reduces agricultural pests and weeds (De Frece and Poole 2008, Bruun et al. 2009, Padoch and Pinedo-Vasquez 2010). This provision of ecosystem services at the local level (soil enrichment, watershed protection) is now interacting with external valuation of ecosystem services via PES (Elizondo and Lopez Merlin 2009). Increasingly, since 2005, both timber-focused and non-timber ejidos have been setting aside additional forest land under PES programs sponsored by the National Forest Commission (CONAFOR, Spanish acronym), both for hydrological and biodiversity purposes (CONAFOR 2009,

Box II 7.1 Sustaining the forests where mahogany grows: Silvicultural and other technical challenges

In 1953, after decades of unregulated precious-timber extraction, the large parastatal forest company MIQRO implemented the first harvesting system in Quintana Roo (Flachsenberg and Galletti 1998). Intended to allow repeated harvests over time, MIQRO constructed a system of logging roads and established a selective polycyclic system based on forest inventories, minimum cutting diameters, and a distinct focus on mahogany (Flachsenberg and Galletti 1998). Mahogany was managed on a 75-year rotation and 25-year cutting cycle to produce veneer, with minimum cutting diameters of 60 cm dbh originally, which then fell to 55 cm dbh (Snook 1993). Regeneration was not considered.

Sustained harvest pressures over decades have widely depleted mahogany stocks across Quintana Roo and elsewhere in the neotropics. Although few ejidos still count on this species as a major income source, its extremely high commercial value continues to drive most forest management plans and silvicultural research. Still, information gaps, harvest pressure, and even public policies and opinion continue to impede application of regionally appropriate, scientifically sound silvicultural systems for this species, as detailed below.

Regeneration. Mahogany is a shade-intolerant species that regenerates almost solely in very large (≥ 5,000 m^2) gaps (Dickinson and Whigham 1999, Negreros-Castillo and Mize 1993, Snook and Negreros-Castillo 2004, Toledo-Aceves et al. 2009). Current harvest intensities considering all species are low (1–3 trees ≥ 35 dbh ha-1), and the full light conditions that mahogany requires for regeneration are rarely attained (Toledo-Aceves et al. 2009). Artificial gaps, either created by machine or fire, have been shown to provide the necessary conditions to successfully regenerate mahogany (Snook and Negreros-Castillo 2004). Interestingly, traditional slash-and-burn agriculture historically creates these ideal conditions: small clear-cuts with full sunlight and minimal woody competition (Negreros-Castillo et al. 2003). Notwithstanding, the segregation of community lands into production forest and agricultural areas that accompanied the 1986 Forest Law eliminated this highly effective method for mahogany regeneration.

Minimum cutting diameter. Aggravating inadequate site conditions, the current 55 cm dbh minimum cutting diameter for mahogany contrasts with the ≥ 75 cm diameter at which mahogany reaches its maximum seed-producing potential (Camara-Cabrales 2005, Camara-Cabrales and Kelty 2009). Although rarely successful, some ejido communities conduct enrichment plantings to compensate for persistent regeneration failure.

Rotation length and cutting cycles. The continued 75-year rotation (in 25-year cutting cycles) assumes an average diameter growth of 0.73 cm/yr opposed to the comparatively low growth rates of 0.22–0.40 cm/yr observed for Quintana Roo (e.g. Mize and Negreros-Castillo 2007, Snook 2005, Vester and Navarro-Martínez 2007). In response, scientists propose either to extend cutting cycles, apply silvicultural practices to enhance individual tree growth, or a mix of both (Grogan et al. 2011). The estimate of up to a 250-year rotation needed to sustain mahogany under typically low-growth conditions and current harvest regimes is considered to be economically unfeasible.

Tree mortality. This vital rate and important production variable has received minimal attention. While some ejidos have been trained in reduced-impact logging techniques to minimise residual tree mortality, management plans do not make explicit assumptions of tree mortality rates, let alone mortality related to extreme events such as hurricanes and wildfires. After such events, salvage harvests have been the norm. Hurricane Dean in 2007 clearly highlighted the need to develop strategies for coping with extreme events *before* a hurricane hits.

Current thoughts on mahogany silviculture include the opening of 0.25 to 1 ha clear-cuts as one feasible regeneration method. Some researchers and technicians advocate re-establishing slash-and-burn agriculture in production forest areas as a win-win strategy to generate agricultural products while also promoting regeneration of key commercial tree species. A second approach that is being implemented in one community consists of machine-made clear-cuts around individual focal seed trees. While evidence indicates that small clear-cuts coupled with enrichment plantings do improve mahogany's productive potential, several factors limit widespread acceptance of this low intensity, even-aged silvicultural system (Kelty et al. 2011): biodiversity conservation concerns, stakeholder perceptions of clear-cuts as synonymous with deforestation, and the increased interest in reducing carbon emissions (e.g. burns) from forest operations. Additionally, even-aged silviculture poses market, financial, and logistic challenges. Currently, timber is harvested on demand. In contrast clear-cutting implies a harvest of all aboveground woody material regardless of its immediate and future marketability.

The emergence of new markets for species traditionally regarded as lesser known has reduced the economic centrality of mahogany. For example, diverse species were communally harvested for railroad ties over a 20-year period until the national train system was privatised in the mid- to late-1990s. Currently, the different resource conditions and the weight that each community gives to different species groups are resulting in an incipient differentiation of silvicultural systems in Quintana Roo. The clearest example of this ongoing differentiation is represented by the charcoal-producing ejidos in northern Quintana Roo, where secondary forests are intensively managed via a coppicing system. While further research on silvicultural systems is needed, in the end, forest management practices will be shaped by markets and societal choices.

Box II 7.2 Tourism fuels polewood management in the Maya forest

As in many other tropical regions, thatched huts and other rustic buildings are an essential part of the natural paradise image promoted by the tourist industry that flourishes on the Caribbean coast of Mexico (Haldeman Davis 2007, Quiroz-Rothe 2010). Polewood, the stems of small diameter (5 to 35 cm dbh) hardwood trees, is one of the indispensable materials needed to build these structures (Figure 7.5). Since the early 2000s, many local communities have responded to this new demand by including polewood in their official forest management plans (V. Santos and R. Ledesma, OEPFZM, pers. comm.). By 2007, polewood was considered one of the most important forest products in the state: 11 886 m^3 were harvested (23% of total wood volume), representing at least USD 1.08 million in direct revenue to approximately 40 communities of the central southern region of Quintana Roo (González Canto 2007). This product has become particularly important for small forest communities with limited volumes of merchantable sawtimber (Racelis 2009).

The structural use of polewood for housing is a long-standing tradition in lowland Mayan communities (Wauchope 1938, Villers et al. 1981, Rico-Gray 1991). More than 40 tree species have been used and 14 structural categories described (Wauchope 1938, Villers et al. 1981, Rico-Gray 1991, Racelis 2009). Expanding this repertoire, tourism-related buildings are far more variable in terms of function, size, species used, budget, and architectural influences. Indeed, polewood is used in a growing list of structures with little precedent in the Maya tradition, ranging from trash bins to large theaters, and these commercial ventures represent an exponential increase in harvested polewood volumes. Several small-statured tree species are harvested solely as polewood, while some larger species are harvested for both polewood and sawtimber.

Polewood can be legally extracted only in the designated Permanent Forest Areas where sawtimber is also harvested. In reality, some communities harvest smaller polewood classes (< 15 cm dbh) from secondary forest fallows in zoned agricultural areas, representing just one example of the various polewood management strategies adopted by communities. Differences in land area, forest resources, harvest technology, internal land-tenure arrangements (see Box 7.1), benefit-sharing, and market chain structures also vary greatly among communities. While early evidence suggests differential harvest impacts on species populations at the local level (Racelis 2009), formal assessment is still needed. Complicating matters, from the mid-1950s to the late 1990s, some polewood species were intensively harvested for railroad ties (Shoch 1999), resulting in cumulative historical impacts that are difficult to assess.

In periods of economic crisis and limited new construction, a considerable proportion of polewood demand is for building maintenance, given that naturally decaying polewood elements need replacement every 10 to 20 years. Additionally, although most polewood production is marketed in-state, some ejidos have important commercial relations with buyers on the Pacific coast, more than 2000 km away. All in all, polewood is likely to remain one of the most important forest products in Quintana Roo, serving as an evolving experiment to test the management and marketing of lesser-known species, the oft-pursued forest product diversification hypothesized to contribute to sustainable forest management.

McAfee and Shapiro 2010, Shapiro 2010) (Figure II 7.6). Some ejidos, such as Yoactun, currently receive more income from PES than from timber sales (V. Santos, OEPFZM, pers. comm.). Communities such as Naranjal Poniente have zoned out forest areas as voluntary conservation areas (Bray et al. 2006), an increasing trend observed in ejidos (Elizondo and López Merlin 2009). As harvest volumes of mahogany decline, some ejidos are moving towards exploiting other valuable hardwoods, including polewood (see Box II 7.2). Still others, such as Betania and Noh-Bec, are involved in multiple-use forest management with areas set aside for ecotourism and biodiversity conservation, in addition to forest for timber production. These strategies of multiple forest use, land-use zoning, and diversification of forest income sources show promise in the region as local community adaptations respond to national and global forest conservation initiatives.

There is no industrial forestry in the region in the sense of large for-profit timber corporations (Herbonh 2006). Local communities have significant land rights and the final say in forest management; however, private participation is present. In many cases, local companies and individuals conduct logging operations, operate sawmills, and commercialise forest products; in others, ejidos possess an integrated vertical structure, participating in all the aspects of forest management from planning and harvesting to commercialisation of processed products (Arguelles and Garcia 2008). For these community forest enterprises, continued challenges include increased enterprise transparency, greater reinvestment of forest revenues in the enterprise, and dispelling the notion that community forest enterprises are safety nets (Wilshusen 2009).

Figure II 7.5 Polewood (of various species and dimensions) is readied for sale, harvested from the ejido of Dzula in the state of Quintana Roo, Mexico. © K. Kainer

Figure II 7.6 The ejido of Betania in Quintana Roo signals its participation in Mexico's ProArbol Program, accepting payment for environmental services by dedicating 1632 ha to hydrological protection. The sign also declares that no hunting, faunal and floral extraction (including logging), or trash dumping is permitted. © E. Ellis

The type and structure of ejido governance and entrepreneurial organisation partially determine how revenues from forest products are shared. Agrarian reforms in the first half of the 20th century set the stage so that an elected ejidal commission administers communal forest enterprises. Noh-Bec, an ejido with a large centralised community forest enterprise, divides revenues from mahogany, *Manilkara zapota* timber, and polewood between ejiditarios, while revenues from other timber species are designated for communal works that benefit not only ejido members but also the larger population residing in the ejido (G. Martínez-Ferral per. comm.). In some communities, however, permitted by a 1992 reform of Constitutional Article 27 (see Box II 7.3), internal ejidatario producer subgroups have emerged that operate as independent commercial entities separate from the elected ejidal commission (Taylor and Zabin 2000). In the economically important forestry ejidos of Petcacab and X-Hazil, this division of the ejido community forest enterprise has led to multiple (10 or more) work groups (Taylor and Zabin 2000, Taylor 2001, Antinori and Bray 2005, Bray et al. 2006). Work-group formation may be an attempt to eliminate problems with corruption and inefficiency within the ejido governance system. Wilshusen (2009), however, demonstrates how the formation of work groups in Quintana Roo represents a downside to social capital, a term often used positively to describe social networks based in trust and reciprocity. He describes a scenario in which elite ejido member work groups flourish and obtain greater rewards from forest management due to better networking, capital, and influence in the community. Thus, while individual ejidatarios benefit from these work groups, forest profits are no longer invested in community assets such as schools or even sawmills or the forest itself. Additionally, unit production costs increase with these numerous small groups (Taylor and Zabin 2000, Taylor 2001). Across Quintana Roo ejidos, distribution of polewood revenues is highly dynamic and variable but does not seem to be used for communal works. In Reforma Agraria, a de facto privatised and non-Maya ejido, each ejidatario harvests, processes, and markets products, mostly polewood, from his/her own plot of land with significant investments in agroforestry systems and plantations for future wood harvests.

Employment creation also is a significant local benefit from forest activities in Quintana Roo, providing unique opportunities for jobs in home villages, particularly valued by landless young men. The quantity and types of forestry-related employment at the local level varies with the degree of vertical integration. In Noh-Bec, forestry is the central livelihood and forest management and enterprise activities are credited with creation of 90 permanent and 100 temporary jobs (Arguelles and Garcia 2008). Because this particular ejido had also invested heavily in local capacity-building and collective forest governance, system shocks such as Hurricane Dean were met with quick internal assessments of forest damage and multidirectional lines of communication with important external actors (DiGiano and Racelis 2012). These authors have concluded that strong internal institutions coupled with a well-developed network of partners at higher scales impart increased robustness and enhanced adaptive capacity. In other communities, permanent forestry positions are nonexistent and temporary labour opportunities are often limited to timber cruising and NTFP and polewood harvesting. Nonetheless, under some arrangements, a skilled polewood harvester can make up to five times the local daily wage for agricultural activities. Participation of local labour in specialised activities such as tree felling and hauling, wood processing, and management depends on development of local enterprises. While women are not commonly involved in commercial forestry, they do participate in paid activities like polewood debarking in some ejidos. Moreover, wood-based handicraft production is an activity frequently led by women.

7.5.2 Commodity chains and markets: opportunities and challenges

Commodity chains vary greatly among forest products. Chicle production in Quintana Roo has a single commercialisation channel with fixed prices. The Consorcio Chiclero, an association of 56 cooperatives, consolidates chicle production from communities in Quintana Roo and Campeche and coordinates the logistics, trade, and finances for gum manufacture and export (Forero and Redclift 2007, CHICZA 2012). In contrast, polewood value chains are more variable (Racelis 2009). In some cases, the same ejido member who harvests polewood also builds and sells huts as a finished product. In most cases, however, polewood passes through various hands, possibly including a harvester, foreman, local middleman, wholesalers, and contractors (see Box II 7.2) – a complex value chain mimicked by palm leaves for thatching (e.g. Caballero et al. 2004). Commercial charcoal production has existed for decades in northern Quintana Roo, although management has only recently been legalised (Mex 2011). Timber market chains are more complex and vary by species, quality, processing, certification status, and the particular contacts that the ejido or seller may have. For example, mahogany from Noh-Bec may reach regional, national, and international markets (mainly in United States) requiring high-quality standards, while lower-quality pieces are used for local

Box II 7.3 The push to privatise: Mexico's 1992 reforms and impacts on forest ejidos

Control and access to land and forest resources have been central to the history of the Selva Maya and have played a critical role in shaping land use. While the original agrarian law of 1917 established firm limits to privatisation of communal property, the 1992 reform of Article 27 explicitly allowed ejidos to divide and parcelise communal agricultural land, which could then be sold, purchased, or rented (Taylor and Zabin 2000, Bray et el. 2006). Land under forest cover was theoretically exempt from parcelisation and sale, but no measures were in place to prevent deforestation of that land and then subsequent privatisation (Taylor and Zabin 2000, Taylor 2001, Bray et al. 2006).

While many speculated that the 1992 reforms would lead to widespread privatisation, less than 10% of ejidos nationwide have opted for formal privatisation (RAN 2007). In Quintana Roo, the vast majority of ejidos (98%) chose only to certify common-use lands (whereby individual ejiditarios receive certificates to their share of these lands) and only three ejidos opted for formal privatisation of common-use lands (RAN 2007). Despite the tepid response of the formal push to privatise, research has demonstrated how ejidos have selectively adopted some aspects of privatisation, without undergoing the formal process of certifying and titling ejido lands (Nuitjen 2003, Haenn 2006, Perramond 2008, Barsimantov et al. 2010, DiGiano 2011). To circumvent an important clause that prohibited the division and alienation of commonly held forest lands (Agrarian Reform, Article 59), some ejidos opted to informally privatise these lands. As a result, ejidos legally recognised as commonly held may, in fact, have diverse configurations of individual and commonly held rights and are neither wholly individual nor communal but somewhere on a continuum from private to communal (Barsimantov et al. 2010).

DiGiano et al. (in press) studied eight ejidos in the Selva Maya to understand how different land-tenure configurations impacted land use and forest conservation, using institutional and land cover change analyses. Ejidos that maintained collective land rights experienced less forest cover change than ejidos that underwent informal parcelisation. Lower rates of deforestation were linked to the predominance of smaller landholdings (a lower average of hectares per ejidatario) and land-use activities oriented towards traditional *milpa* agriculture or forest management. Conversely, in informally privatised ejidos, members tended to have larger landholdings, more land under cultivation, and livelihood activities that were capital intensive and characterised by long-term payoffs.

Privatisation, formal and informal, was linked to increased conversion of forests to other land uses, while at the same time providing opportunities for greater individual investments in land and new livelihood activities. Commonly held ejidos were more effective at conserving forested areas when forests provided economic benefits to ejido members via community forest management and/or payments for environmental services. In sum, Mexico's reforms did not have a homogenous impact on forest ejidos but rather facilitated a complex continuum of individual and communal rights with distinct land-use and land-cover change outcomes.

carpentry and beehive construction (Arguelles and Garcia 2008). Katalox (*Swartzia cubensis*) is sold in a small European niche market (Arguelles and Garcia 2008), and particular softwood species (e.g. *Dendropanax arboreus*) are sold for production of matches, tongue depressors, and toothpicks (Forster et al. 2003). Tzalam is increasingly sought after and for many ejidos currently provides their main source of forest revenue. Other highly valuable species have local and international niche markets, such as holywood (*Guaiacum sanctum*), granadillo, ciricote, and machiche, which feed a growing flooring market. On the other hand, some species considered internationally as lesser-known species have local markets, such as kaniste (*Pouteria campechiana*).

Diverse efforts have been made to upgrade the market position of local producers. One example is a timber-marketing fund established with federal monies to secure higher prices and to find national and international outlets for lesser-known timber species (Wilshusen 2009). Unfortunately, poor administration, including informal loans and petty corruption, resulted in termination of the fund (Wilshusen 2009). The aforementioned Consorcio Chiclero is a more successful initiative that resulted from the merging of the chicle-tapper cooperative movement with the Plan Piloto Chiclero, a derivate of the Forestry Pilot Plan (Forero and Redclift 2007). FSC certification was another huge marketing initiative of the early 1990s in which 11 communities began the certification process and six actually obtained it (Arguelles and Garcia 2008). Adding value to forest products has been an important strategy promoted by forest civil societies and NGOs and has included on-site milling with micro sawmills and wood-based handicrafts (V.J. Santos Jimenez pers. comm., UNDP 2012) (Figure II 7.7). Impacts of the myriad marketing initiatives are diverse, and in many cases, it may be premature to accurately assess them.

Figure II 7.7 A log is processed to add value and facilitate transportation by members of a community forest enterprise in Quintana Roo, Mexico. © E. Ellis

7.5.3 Continued policy reforms, credit and soft loans

Public policy and private opportunities continue to influence community forest management. Policy reforms of 1992 marked a notable challenge. In an era of free trade agreements such as GATT and NAFTA, government support for community forestry was declining, the private sector was lobbying to push forest management and production back to industry and private markets (Taylor and Zabin 2000, Taylor 2001, Bray et al. 2006), and the administration of President Carlos Salinas de Gortari adopted a neoliberal legal framework. The 1992 Forest Law focused on plantation forestry, eliminated government-supported technical assistance (relegating these services to private markets), and, notably, did not distinguish or support community forestry in any way (Taylor and Zabin 2000, Bray et al. 2006). Second, the 1992 reform of the original 1917 agrarian law also known as Constitutional Article 27 introduced privatisation on ejido lands (see Box II 7.3). Although strong social and bureaucratic barriers may have impeded a widespread and notable parcellisation and privatisation effect of the 1992 reform in Quintana Roo, its influence has been significant on two counts: to weaken internal ejido governance, and seemingly to precipitate formation of the aforementioned ejido work groups (Taylor and Zabin 2000). Moreover, another government intervention, the 1993 PROCAMPO program, provided incentives and subsidies to farmers with land specifically under agricultural production, which effectively promoted deforestation (Keys and Roy Chowdhury 2006, Schmook and Vance 2008).

In the late 1990s and into the 21st century, there has been a reverse trend in policy, once again supporting community forestry and promoting more sustainable and multipurpose forestry. The 1997 Forest Law provided measures to regulate management of natural forest, bring avenues to support community forestry, and promote new incentives for plantations, creating three new programs for these purposes, PRODEFOR (Forestry Development Program), PROCYMAF (Community Forestry Development Program), and PRODEPLAN (Forestry Plantation Development Program), respectively (Bray et al. 2006). The 2003 Forest Law created the National Forest Commission (CONAFOR), and included a 10-fold budget increase in the PROCYMAF program directed particularly to community forestry in several states, including Quintana Roo, the major recipient of these funds (Bray et al. 2006). In sum, various government programs provide subsidies to individuals, communities, or organisations (Bray et al. 2006) that may cover a range of activities: agricultural and animal husbandry improvements, agroforestry, fire prevention practices, payment to technical consul-

tants for local capacity-building and management planning, or infrastructural investments. While some grants and subsidies – to establish mills, for example – have been instrumental investments in community forest enterprises, deficient administration and petty corruption have undermined other development opportunities (Wilshusen 2009).

In addition to these federal policies and programs, conservation and community forestry are also present and very evident in the most recent development plans of the state of Quintana Roo, with language concentrating on increasing sustainability, improving production, enhancing information, and especially in linking development and conservation with international agendas such as REDD+ (Gobierno del Estado de Quintana Roo 2005, 2011). However, concerns and confusion are prevalent among communities and forest civil societies on how to meet REDD requirements to measure and monitor carbon stocks and reduce emissions. Moreover, at both national and state levels, agricultural, forestry, and conservation policies tend to be conflictive and contradictory, impeding a holistic landscape perspective and proper integrated management of ejido lands. Regulation and policy designed to protect forests and biodiversity have in many cases been highly regulatory and costly in pursuit of SFM. This is evident after hurricanes when conflict and chaos ensue as ejidos attempt to legally harvest fallen wood and deal with forest restoration and emergency actions. While some ejidos lost FSC certification because they were unable to comply with cumbersome process requirements, the ecological and socio-economic disturbance from Hurricane Dean further interrupted renewal of FSC certification of other Quintana Roo ejidos, resulting in fewer currently certified.

In rural Mexico, access to formal credit through banks and credit unions is limited. Credit is particularly restricted for the forestry sector, which accounts for only 0.88% of the primary-sector credit and is mainly represented by loans for commercial forest plantations (Torres-Rojo 2004). In this context, individuals rely mostly on informal credit through moneylending, *tandas* (rotational credit associations), and pawning (Carreon and Svarch 2007). Whether the entrepreneurial organisation is structured as a communal enterprise or through working groups or individuals also influences access to particular subsidies, credits, or grants. In communities where timber and polewood volume rights are distributed among ejidatarios, if an emergency need arises, volume rights can be sold beforehand at reduced prices to local elites (Wilshusen 2005a). Even after the neoliberal reforms of the 1990s, subsidies and soft loans continue to be an important part of livelihood strategies in rural Mexico (Poole et al. 2007).

Despite these legal changes and economic trends, many communities in Quintana Roo persist in forest management. Land-tenure conflict on forest lands is low (Zepeda 2000) and illicit activities are minimal, consisting mainly of small-scale timber theft and non-compliance with forest management plans (e.g. PROFEPA, 2012). Communities have weathered periods of economic hardship and unfavourable timber prices, and ejidos such as Noh-Bec and Laguna Kaná, willingly reduced logging volumes by more than 30% to sustain production over the long term (Bray et al. 2006). Others have paid higher prices for technical services – all with a genuine desire to promote SFM (Taylor and Zabin 2000). Ejidos also tried to respond as rapidly as possible to salvage downed logs in the approximately 22 000 km^2 of forests damaged by Hurricane Dean in 2007 (Rogan et al. 2011). Clearly, continuity and survival of community forest management in Quintana Roo, in the past and present, has been related to adaptive management and diversification strategies by local communities, forest civil society organisations, and NGOs, all working in the region.

7.6 Forest cover conserved

Despite millennia of disturbances, forest cover of the Selva Maya has remained relatively resilient and persistent; suggesting that the brand of community forestry practiced in Quintana Roo has positive conservation outcomes. Quintana Roo boasts the largest percentage (91%) of forest cover of all Mexican states and is among the top three states with the most conserved natural vegetation (SEMARNAT 2009) (Figure II 7.1). Two studies on land-use/land-cover change demonstrated very low recent deforestation rates (Bray et al. 2004, Ellis and Porter-Bolland 2008). A subset of forestry-focused ejidos in the central portion of Quintana Roo had significantly lower and even null (0.002) deforestation rates between 2000 and 2005 (Ellis and Porter-Bolland 2008) compared with an adjacent region in Campeche (-0.7) (Ellis and Porter-Bolland 2008) and also lower than the national average (-0.24) between 2005 and 2010 (FAO 2010). Statistical models have shown significant positive relationships between forest cover conservation and both community-zoned Permanent Forest Areas and timber volumes harvested from ejidos (Bray et al. 2004, Ellis and Porter-Bolland 2008). In addition, these particular conditions are associated with bigger and older ejidos with typically large areas of communal forest property and a historical tradition of chicle extraction (1920s and 1930s) and, since the 1980s, community-based timber management (Bray et al. 2004, Ellis and Porter-Bolland 2008). Low rates also were associated with poor agricultural soils and external labour markets in the coastal tourist regions. Still, higher defores-

tation rates are present among some communities in the region, mostly associated with smaller, more recent (1960s to 1980s) agriculturally based ejidos (Bray et al. 2004, Ellis and Porter-Bolland 2008). In fact, at the ejido level, a wide variety of deforestation rates can be observed in the region. DiGiano (2011) reports that some smaller non-forestry-based ejidos that have parcelled and privatised communal land, have been trending toward deforestation. Typical deforestation drivers in the region are proximity to roads and settlements, population of settlements or number of registered community members, urban expansion, cultivation, agricultural policy, and soil characteristics (Bray et al. 2004, Porter-Bolland et al. 2007, Ellis and Porter-Bolland 2008, Schmook and Vance 2008). In contrast, forest conservation at the landscape level can be associated with cultural values and local community governance and institutional promotion of land-use zoning and regulations for natural resource management (Dalle et al. 2006, Ellis and Porter-Bolland 2008, DiGiano 2011).

7.7 Research and monitoring

The study of Maya ethnoecology, a central research topic across the Yucatan Peninsula (Gómez-Pompa 1987), laid a research foundation for integrating this time-tested wealth of information into regional SFM strategies. The devolution of forest rights to communities in the mid-1980s, coupled with significant institutional support to form community forest enterprises, ignited unprecedented international research interest in Quintana Roo and Mexico in general (e.g. Cabarle 1991, Richards 1991, Bray et al. 2006). Two main research agendas have emerged: the ecological basis for sustainable management and the social dimensions of this pioneer experience of community forestry in the tropics. Ecological research has homed in on forest dynamics (e.g. Whigham et al. 1991, Macario et al. 1995, Dickinson et al. 2000, Toledo-Aceves et al. 2009), silviculture (e.g. Negreros-Castillo and Hall 2000, Snook and Negreros-Castillo 2004, Negreros-Castillo and Mize 2013), demography and management of NTFPs (e.g. Martínez-Ballesté et al. 2008, Calvo-Irabien et al. 2009), autoecology of mahogany (e.g. Camara-Cabrales and Kelty 2009), and effects of logging on plant-animal interactions (e.g. Gutierrez-Granados and Dirzo 2010).

Forest governance has been the central theme in the social science research agenda. Social capital, business management, markets, certification, cultural values, and public policies, particularly as related to land tenure, have been key topics (e.g. Bray et al. 1993, Galletti 1998, Antinori and Bray 2003, Forster et al. 2003, Klooster 2006). Community adaptation and resilience to environmental, institutional and market changes have stimulated further studies in the region (e.g. Wilshusen 2005b, Bray et al. 2006, Wilshusen 2009, Barsimantov et al. 2010, DiGiano et al. 2011, DiGiano and Racelis 2012). Throughout, forest cover change has been used to gauge conservation outcomes of myriad interacting factors that collide in a community (Bray et al. 2004, Ellis and Porter-Bolland 2008, Dalle et al. 2011, DiGiano 2011).

Since inception of community forestry, both knowledge and institutional research support have consistently increased. Local institutions and regional efforts have played a very important role in producing relevant information for forest management, although only a fraction has been published and rarely in international venues. A forestry research station has existed near the state capital of Chetumal since 1974, and it became a National Institute for Forestry, Agricultural, and Livestock Research (INIFAP, Spanish acronym) Center in 1985. This station was established to focus on forestry research, and technology; sustainable management of natural forests, and agroforestry were included in the research agenda, but plantation research predominated, and the Center contains Mexico´s few mahogany plantations (INIFAP 2010). Nonetheless, in 1986, INIFAP supported the first off-station silvicultural study established on communal forest land in X-Hazil (Negreros-Castillo and Mize 1993).

International and national scholars have published a wealth of scientific papers; however, interaction with local actors has tended to be limited except for some notable exceptions (e.g. Snook and Jorgenson 1994, Primack et al. 1998, Bray et al. 2003b). Second-tier organisations, including forest civil societies and NGOs, have played a fundamentally critical role in linking researchers with local communities and in many cases actively participating in the research itself (Galletti 1998, Santos Jimenez et al. 2005, Arguelles and Garcia 2008). More recently, a network of researchers, academic institutions, and NGOs has emerged to develop best management practices for forest management, made possible through a National Council of Science and Technology (CONACYT, Spanish acronym) initiative to link scientists in joint development and environmental goals. Also, the recent creation of regional public universities and colleges with an intercultural perspective (Llanes Ortiz 2009) constitutes a unique opportunity for future initiatives and partnerships.

The state government has been a major proponent of regional and community land-use zoning plans in the state and has sought formal collaborations with national environmental organisations such as Pronatura and the National Institute of Ecology to pursue environmental sustainability goals (Gobierno del Estado de Quintana Roo 2011). Important international collaboration has emerged, particularly in pursuit of

climate change adaptation. With Mexico as a major REDD+ partner (CONAFOR 2010), planning within Quintana Roo has explicitly included the reduction of emissions through deforestation and forest degradation, collaborating in REDD+-related projects with international organisations such as The Nature Conservancy, GIZ, US Agency for International Development, Japan International Cooperation Agency, and others (Gobierno del Estado de Quintana Roo 2011). Measuring carbon emissions, capture, and storage, have been a major research concern with REDD+-related initiatives (Gobierno del Estado de Quintana Roo 2011), and climate change adaptation programs are already being developed for forest ecosystems in the region (CONANP 2011a, 2011b).

Monitoring and long-term ecological research in general has been acknowledged as a necessity for informing forest management. One of the first large-scale monitoring initiatives was conducted under the Forestry Pilot Plan, which established a sizeable system of permanent forest plots (Alder 1997). More recently, the Mesoamerican Biological Corridor Project developed an extensive monitoring strategy, expanding the original permanent plot system (Vester et al. 2007) and extending to assess wildlife conservation (CBMM 2012). Integrating local priorities and technicians, Peters monitored diameter growth of commercial tree species (Peters 2006), and for 15 years Mize and Negreros-Castillo (2007) accompanied growth of 30 tree species. Individual initiatives, without the security of sustained funding, have also permitted long-term forest dynamics research (e.g. Macario Mendoza 2003, Mize and Negreros-Castillo 2007). Still, a lack of permanent funding and institutional infrastructure has compromised systematic data collection over extended periods, and the need remains to expand, consolidate, and institutionalise a network of permanent forest plots for research and monitoring of silvicultural treatments, regeneration, growth, and carbon capture and storage. Moreover, a regional system for monitoring deforestation, forest degradation, and land-use change is sorely needed.

Although ecological knowledge for this region is fragmented, it is significant compared to other larger tropical forests. Dialogue concerning research findings exists among researchers, NGOs, and local communities; however, implementation of research findings in actual forest management is still limited. Constraints that hinder adoption of innovative, potentially more sustainable, silvicultural practices lie beyond technical limitations and still have to be fully acknowledged and tackled (Walters et al. 2005). Although far from perfect, the ejido communities of Quintana Roo are living examples of tropical residents who have commercially harvested from their forests for decades while maintaining regional forest cover (Ellis and Porter-Bolland 2008). In a time when the definition of sustainable tropical forestry is still debated (Putz et al. 2012, Zimmerman and Kormos 2012), a region like this will continue to attract researchers from different origins and disciplines.

7.8 Conclusions: Drivers of and deterrents to SFM in Quintana Roo

Quintana Roo is often cited as an example of successful community forestry in the tropics, where sustainable landscapes go hand in hand with low deforestation rates (Bray et al. 2004, Dalle et al. 2006, Ellis and Porter-Bolland 2008). Our findings suggest that the collective resource rights and community forest enterprises that have emerged in this Mexican state are integral to this success. A combination of several drivers has enabled many of the SFM successes observed in this region. The Maya heritage, embedded in the land and its people, is an underlying factor; the knowledge accumulated over millennia and the Maya way of approaching the forest pervades the region. Moreover, agrarian reforms of the early- to mid-1900s, fomented by grassroots efforts, academics, and government reformers, institutionalised common-property forest ejidos and local governance systems. Changes in the forestry laws in the 1980s were also crucial in returning rights to harvest and profit from forests to their owners – the communities. In Quintana Roo, in particular, it is evident that the Forestry Pilot Plan was instrumental in transforming industrial timber management via concessions to community-based management. This 16-year program brought about technical assistance, fostered the creation of forest civil societies, and supported timber-processing and marketing initiatives. The concurrent decision to dedicate more than 500 000 ha of tropical forest (owned by several communities) to commercial management via Permanent Forest Areas is regarded as the main reason for conserving forest lands and slowing deforestation in the region. Notwithstanding, shifting cultivation practices that create various successional stages have also contributed to the creation and maintenance of forest diversity over the centuries, although this positive forest-agriculture interaction has been jeopardised. Paradoxically, forest maintenance and corresponding management investments can also be attributed to the underlying poor soils that dominate the Yucatan, limiting expansion of industrial agriculture, animal husbandry, and other activities that clearly compete with forestry in other regions of Mexico. Witness the limited alluvial soils in southern Quintana Roo that are increasingly dedicated to monocultural production of sugar cane.

In contrast, neoliberal economic and policy changes since the 1990s have challenged and per-

haps set back SFM. Parcellisation and privatisation of ejido lands has not only driven deforestation in some areas but it has more importantly weakened governance in vulnerable ejidos. Corruption and lack of transparency have impeded proper investment in the forest sector, and conflicting and contradictory agricultural, forestry, and conservation policies have also put a damper on sustainable forestry development. Furthermore, recent hurricanes have underscored the conflicting and/or lack of effective policies for post-disaster adaptation and recovery. Unfavourable forest product prices, inadequate investment in processing and marketing, and a lack of appropriate silviculture have decreased the values and volumes of products that could be harvested from Quintana Roo forests.

Throughout, however, many forest communities in Quintana Roo have proven exceptionally resilient in adapting to all these challenges and setbacks. Indeed it has been their capacity in adaptive management and diversification of activities that have enabled sustainable community forestry to survive by continually shifting products marketed and by capitalising on other forest values and opportunities, such as PES (biodiversity and hydrological) and ecotourism activities. Similarly, while the growing tourism industry has caused migrations that drain labour from rural areas, it has also created a positive demand for forest products, even further bolstered after hurricanes. While adaptation has been the norm, each community and individual has dealt with change and complexity in different ways. As a result, an increasingly diverse array of local governance schemes, livelihood strategies, and management practices coexist throughout the state. To date, local communities have been key in ensuring the survival of the Selva Maya and its diverse inhabitants – from Maya descendants to traditional chicle producers to more recent small-scale farmers and entrepreneurs.

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Achieving excellence in managing community forests: What conditions for success arise from cases in Latin America

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Abstract: Latin America is the region showing the highest increase in tropical forests sustainably managed by communities. A wide range of community forestry initiatives presents a mixed picture of experiences that promote local forestry. This raises questions in relation to the reasons or factors that explain the disappointing outcomes where they occur or conversely, the successful examples of community and smallholder development initiatives. This case study aims at partially answering these questions by analysing the enabling conditions or successful factors behind a set of exemplary cases of forest management by communities and smallholders in Latin America, drawn from an effort led by the United Nations Food and Agriculture Organization (FAO) to find out what works and why in sustainable forest management in the three tropical regions. From the five cases selected from Latin America, three correspond to initiatives where indigenous or traditional communities manage native forests: San Andrés in Petén, Guatemala; San Diego de Tezains in Durango, Mexico; and Cururú in Santa Cruz de la Sierra, Bolivia. The other two cases are local initiatives run by smallholder associations to protect, manage, and restore mixed primary or secondary forests, plantations, and agroforestry systems: El Choloque in Lambayeque, Peru, and Chinchiná in Caldas, Colombia. A set of enabling conditions facilitating the successful development of community-forestry processes are highlighted. The study finalises with some concluding remarks and recommendations.

Keywords: Sustainable forest management, community forest management, tropical forests

8.1 Introduction

8.1.1 Forests managed by communities and smallholders

The area of the world's tropical forests that are under some form of sustainable management has increased 50% since 2005, from 69 million ha to 183 million ha (ITTO 2011). The forests managed by communities (indigenous peoples and other local communities) likely represent a significant amount of this increase, as the area of forest under community forest ownership or management has more than doubled over the past decade or so, much of it in tropical countries, with indications that it is likely to double again in a similar time period (White and Martin 2002). Latin America is the region showing the highest increase in tropical forests sustainably managed by communities. According to the ITTO report cited above, forest-dependent communities have land tenure or access rights to roughly 25% of the forested area in the region.[1]

[1] It includes 13 member countries: Bolivia, Brazil, Colombia, Ecuador, Guatemala, Guyana, Honduras, México, Panama, Peru, Suriname, Trinidad and Tobago, and Venezuela.

As in other tropical regions, indigenous populations and other forest communities have been practising community forestry in Latin America for centuries. One of the key drivers for the emergence of community forestry (in different places between the 1970s and 1990s) has been deforestation and forest degradation occurring as a result of decades of overexploitation from industrial logging (Charnley and Poe 2007).

Community forestry has evolved as one of the most promising options to meet rural development challenges, as it is supposed to combine both economic development and the conservation of tropical forests. The approach aims to provide an urgently needed source of income to local forest users and thereby motivate them to value and conserve forests (Palm et al. 2005). Community forestry may also contribute to carbon sequestration, biodiversity conservation, avoidance of erosion, and water quality (Pokorny et al. 2010). Recent research (Porter-Bolland et al. 2012) suggests that it may be more effective in achieving some of these goals than other strategies, such as the declaration of protected areas.

But community forest management (CFM) initiatives often suffer from weak organisational, management, and technical capacities, as well as from external problems due, for example, to a legal framework that does not consider local realities and world views (Sabogal et al. 2008, FAO 2010). A review of the literature that deals with the wide range of community forestry initiatives[2] presents a mixed picture of experiences that promote local forestry (de Jong et al. 2010). In view of the quite contrasting experiences with community forestry, de Jong and the other authors of the review address several relevant questions: What explains the disappointing outcomes where they occur? Or, conversely, what explains the successful examples of community and smallholder development initiatives?

This case study aims at partially answering these questions by analysing the enabling conditions or successful factors from a set of exemplary cases of forest management by communities and smallholders in Latin America.

[2] Also called smallholder forestry, participatory forest management, community-based forest management, community-based forestry, adaptive collaborative management, or joint forest management (de Jong et al. 2010).

8.1.2 The "In Search of Excellence in Forest Management" initiative and the analytical framework used in this chapter

The preponderance of negative news, especially in the 1990s, about the destruction of tropical forests led to efforts headed by the United Nations Food and Agriculture Organization (FAO) to balance the negative reports on tropical forests with an idea to identify cases of exemplary forest management and examine the core components of high-quality forest management. This was the beginning of a FAO initiative to promote the development of sustainable forest management (SFM) practices to strengthen policies and the application of SFM and to show the main challenges and alternatives in different conditions and contexts (i.e. across a variety of different forest types and ecosystems, exemplifying management in large and small forest areas for diverse objectives and under different ownership arrangements). The broad concept of SFM as defined by the United Nations General Assembly[3] was used, which includes natural and planted forests and agroforests, all geographic regions and climatic zones, and all forest functions, be they conservation, production, or multiple purposes to provide a range of forest goods and ecosystem services at the local, national, and global levels.

The initiative compiled and documented more than 80 cases of successful SFM that demonstrate the economic, social, and environmental benefits that can be achieved under SFM in three major (mostly tropical) regions.[4] Through their varied approaches and strategies in multiple contexts, these examples show that good forest management is a powerful conservation practice, which can reduce deforesta-

[3] The United Nations General Assembly defines sustainable forest management as a "dynamic and evolving concept, which aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations" (United Nations General Assembly 2008). The SFM concept encompasses both natural and planted forests in all geographic regions and climatic zones, and all forest functions, be they conservation, production, or multiple purposes to provide a range of forest goods and ecosystem services at the local, national, and global levels.

[4] Central Africa, where 24 exemplary cases in nine countries were identified and described (FAO 2003); Asia and the Pacific, involving 16 countries with 28 cases (FAO 2005); and Latin America and the Caribbean, with 22 exemplary cases and 13 cases with exemplary aspects in 14 countries (FAO 2010).

Table II 8.1 Set of minimum criteria of exemplariness for assessing and validating cases of sustainable forest management in Latin America. Source: FAO 2010.

Social component
1. Contribution to local development and poverty reduction
2. Quality of employment and workplace safety
3. Mechanisms to resolve or manage conflicts arising from forest management
4. Respect for rights, cultural diversity, and local knowledge
Economic component
5. Diversification of uses
6. Adding value to products and services of the forest
Environmental component
7. Innovative conservation and protection mechanisms
8. Initiatives to enhance environmental benefits and valuation of environmental services
Institutional and technical component
9. Diversity in management and organisation processes
10. Innovative partnerships
11. Innovative technical aspects of forest management

tion and maintain environmental services, as well as a powerful development option that can help reduce rural poverty and improve living conditions.

For the study in Latin America, a panel of experts agreed on a selection of 11 "minimum criteria of exemplariness" (MCE) that included key social, economic, environmental, institutional, and technical aspects of what was considered successful forest management (see Table II 8.1). The MCE standards were completed with the development of indicators (73 in total), verifiers, and means of verification, later on used for field assessment of the pre-selected exemplary cases.[5]

The majority of the 35 exemplary cases were forest management programs run by indigenous communities and local mestizo (of mixed indigenous and Spanish parentage) or smallholder associations for a broad range of objectives. On the basis of the availability of information to address the framework conditions defined in the analytical framework of this book (see Part I chapter 3) five of these cases were selected for further analysis. The analytical framework was, however, slightly modified to better reflect the facilitating factors for the successful development of community-based and smallholder forest management initiatives.

The following factors are considered in the analysis of the cases:

I. Policies, institutions and governance
- 1) Well-defined land tenure and rights to forests and trees
- 2) Effective participation and stakeholder cooperation
- 3) Long-term vision
- 4) Social cohesion and respect to cultural identity
- 5) Strong organisation and leadership
- 6) Capacity for enforcement and conflict resolution
- 7) Effective and balanced strategic partnerships

II. Forest resources, capacities, cultural and socio-economic aspects
- 8) Forest resource base and potential
- 9) Contribution of forest resources to livelihoods and local development
- 10) Technical and managerial capacities
- 11) Access to commercial opportunities, linkages to markets and value chains
- 12) Access to financial resources

III. Technological development, research and monitoring
- 13) Technological innovation and research to add value to forest products and services
- 14) Flexible and effective system of surveillance and monitoring

The five case studies are shortly described in section two. Section 3 presents the results of the analysis of the enabling conditions/facilitating factors for sustainable community forest management, and section 4 concludes the chapter with conclusion from the analyses and recommendations.

8.2 Case descriptions

Three of the cases selected for analysis in this chapter are initiatives where indigenous or mestizo communities manage native tropical or subtropical forests on either communal or public land. Two cases are local initiatives ran by smallholder associations to protect,

[5] The panel of experts used this evaluation process to choose exemplary cases, defined as cases in which forest management has been implemented according to the sustainability criteria (some cases achieved this goal to a higher degree or level than others) and the MCE standards. These cases were checked and documented by professionals in the field to complete the process of analysis and selection.

Table II 8.2 Exemplary cases selected involving communities or smallholder associations.

Cases	**San Andrés**	**El Choloque**	**S. Diego Tezains**	**Cururú**	**Chinchiná**
Location	Petén, Guatemala	Lambayeque, Peru	Durango, Mexico	Santa Cruz de la Sierra, Bolivia	Caldas, Colombia
Area	51 940 ha	1027 ha	26 038 ha	26 421 ha	12 697 ha
Type of forest (Biome)	Native (subtropical humid forest)	Native (tropical dry forest)	Native (tropical and subtropical coniferous forest)	Native (subtropical humid forest)	Mixed secondary + planted forest + agroforestry system (tropical humid forest)
Organisation	Community association	Community association	Community cooperative	Community association	Smallholder associations
Land tenure	Public (in concession)	Communal	Communal (ejido)	Communal	Public and private
Management objectives					
Industrial wood production	X		X	X	
Harvesting of non-timber forest products	X			X	
Multiple uses (including food security)		X			
Generation of environmental services			X		X
Reforestation					
Forest landscape restoration		X	X		X
Biodiversity conservation	X				X
Protection (water resources, soil)			X		X
Research and demonstration					X

manage, and restore mixed primary or secondary forests, plantations, and agroforestry systems. The forest management areas in these cases range from 1027 ha to roughly 52 000 ha. Background information for each case is presented in Table II 8.2.

In this section the five cases are briefly described in terms of the context; the main conditions shaping SFM and the resulting outcomes on forests, local livelihoods, and development; and the evolving relationship between forests and people and the diverse ecological, social, and economic outcomes.

8.2.1 Community of San Andrés in Petén, Guatemala[6]

Context

This community in the department of Petén is located in one of the most important native forests in Mesoamerica, rich in natural resources and archaeological finds with monuments dating from the ancient Maya civilisation. In 1990, the Maya Biosphere Reserve (MBR) was created, becoming the largest area in Central America still covered by tropical rainforest. The creation of the MBR generated a series of clashes between local communities and government institutions. The frequency of poaching and forest fires rose sharply (Gómez and Méndez 2007). To mitigate opposition, the government, through Guatemala's National Council of Protected Areas (CONAP), made the decision in 1994 to award management concessions to local communities for forest areas in the reserve. In that year the community of San Andrés created the Integrated Forest Association of San Andrés, Petén, (Spanish acronym AFISAP), a non-profit, non-political civil society association. In 1999 AFISAP was awarded a 25-year renewable concession for the San Andrés forest management unit in the Multiple-Use Zone of the Maya Biosphere Reserve, with an area of 51 940 ha.

AFISAP harvests wood and non-wood products in its concession area following an approved long-term (40 years) forest management plan. Wood products mainly come from a few species: mahogany (*Swietenia macrophylla*), Spanish cedar (*Cedrela mexicana*), manchiche (*Lonchocarpus castilloi*), santa maria (*Calophyllum brasiliense*), and pucté (*Bucida buceras*), with a logging density of 1.5 trees/ha. The association also harvests about 25% of the concession's potential in non-wood resources, mainly from the *xate* palm (*Chamaedorea oblongata*), sapodilla or chicle tree (*Manilkara zapota*), and allspice (*Pimienta dioica*) species (Figure II 8.1). But most of the concession's economic income, about 90%, comes from selling wood products.

Main conditions shaping SFM and resulting outcomes

AFISAP has been able to efficiently combine external opportunities with the association's strengths by managing the organisation with social responsibility not only for its associates but also for the community in general and other stakeholder groups (clients, suppliers) and by facilitating social cohesion among its associates. Organisational strengthening has supported forest protection and provided benefits for AFISAP and the municipality. Adherence to strictly following management plans has contributed to sustainable harvesting and the control of forest fires and expansion of human settlements. An enterprise vision has facilitated the growth of investments in infrastructure, equipments, and training of personnel.

Among the main conditions that have contributed to SFM implementation, the following can be highlighted:

- *Historical context*. Prior to the concessions, many of the Petén communities were informal loggers, which gave them a basic capacity for managing logging operations.
- *Participation*. One of the keys to AFISAP's success is the active participation of its members in the day-to-day running of the organisation, from planning the harvest to selling its products and services.
- *Capacity development*. AFISAP's members have improved their operational, technical and administrative skills, allowing the association to reach its current level of development.
- *Employment quality and work security*. Job quality (working time, incentives, social security) and compliance with labour laws and training in work safety have influenced employment stability and the dedication, creativity, and efficiency of AFISAP's workers and leaders.
- *Mechanisms for conflict resolution*. Appropriate mechanisms are applied to resolve conflicts that arise in management, mainly to deter land squatters from invading the concession area.
- *Respect and valorisation of the cultural diversity and local knowledge*. Most families from AFISAP and the community in general have lived from the forest for several generations, applying good practices and traditional knowledge in their forest activities. This can be observed, for instance,

[6] Adapted from: "San Andres: A community organization manages a unique natural resource responsibly" by Juan Herrero. In: FAO 2010, p. 50–56.

Figure II 8.1 Women from AFISAP community association in San Andrés, Petén, Guatemala, selecting leaves of xate (*Chamaedorea* spp.), an economically important non-timber forest product. ©Juan Herrero

in the harvesting of xate *palm* leaves[7] and latex from chicle tree.[8]

- *Diversification of uses*. New forest products and services have been incorporated over the past years to traditional timber production and the collection of xate and chicle. Recent additions include ecotourism and beekeeping for honey and other products. An inventory of non-timber forest products that include guano (*Sabal morisiana*), copal (*Protium copal*), pepper, chicle and breadnut (*Brosimum alicastrum*) is underway. As part of the diversification strategy, AFISAP acquired the farm El Triunfo, which operates under an agroforestry system, in 2007 to develop projects that create jobs for the local community. Today the farm produces a wide variety of organic fruits and vegetables. Fish farming, poultry, and beekeeping projects have also been developed on the farm, producing honey, bee wax, and propolis[9].
- *Value added to forest products and services*. In the beginning AFISAP sold wood by the square foot, but in 2002 it created a company to manage its exports and the following year bought a mobile sawmill. This investment allowed the association to transform logs into lumber and sell it directly to clients, eliminating intermediaries. In recent years the association acquired a carpentry shop to add more value to its products, which are mainly exported though a small quantity is sold in Guatemala. The community uses the services of FORESCOM, a community services provider of which AFISAP is also a member, for shaping, drying, and planning timber from lesser-used timber species.
- *Innovative mechanisms for conservation and protection*. The association has been recognised by international organisations for its application of measures to protect flora and fauna species that are rare, threatened, and in danger of extinction, as well as their habitats, and the establishment of protection and conservation zones. An example is the award received for its work protecting the scarlet macaw.
- *Diversity of administrative and organisational processes for management*. Since its creation, AFISAP has had a series of executive and advisory bodies that are essential for its good performance, such as the general assembly, the board of directors, the consultative council, a supervisory body, the general management, and working

[7] The leaves of the xate palm have a wide range of uses, including in flower arrangements due to their beauty and resistance to discoloration. These are mainly exported to the United States.

[8] The *chicle tree* latex is used as a raw material to make chewing gum. It also has numerous other uses and is often in high demand

[9] Propolis is a resinous mixture that honey bees collect from tree buds, sap flows, or other botanical sources. It is used for medicinal purposes.

committees. In recognition of its forest protection and conservation standards, AFISAP received a prize from National Council of Protected Areas (Spanish acronym CONAP) for being an exemplary CFM organisation in the Maya Biosphere Reserve.

- *Innovative alliances*. From the beginning, AFISAP established partnerships with and received technical and financial support from different institutions and organisations that have been important to its development and growth, including the ProPetén International Conservation Project, the Training and Productivity Technical Institute, Rainforest Alliance, and the Wildlife Conservation Society. The association also has a close relationship with education centres that help with research and provide interns to work in the concession. AFISAP is an active member of the Petén Forest Communities Association (Spanish acronym ACOFOP), which helped it obtain the forest management concession and offers research and technical support.

Evolving relationship between forests and people and resulting outcomes

In the 11 years since AFISAP was formed, the area under its management has brought important socio-economic benefits to its members[10] and the population of San Andrés through employment generation and support to municipal social programmes.

The creation in 2009 of the National Alliance of Forest Community Organisations of Guatemala[11] represents for AFISAP and other community organisations an important platform dealing with the technical and political aspects related to the CFM process.

Another important forum for interaction and cooperation is the Mesoamerican Peoples and Forests Alliance (Alianza Mesoamericana de Pueblos y Bosques), which provides visibility to community and indigenous organisations in the region and promotes forest conservation through SFM, searching for incentives for local groups that have conserved and are managing these forests.

Women, young people, and elders are represented in the meetings and participate in decision-making. Women have the same opportunities as men to be employed in the different productive activities.

Currently ACOFOP and its partner organisations are working in the preparation of a proposal to extend the rights and contractual terms for the community concessionaires since most of them have passed the halfway mark in the contract. This is critical in the negotiation with the government for a project on carbon certificates under REDD+ (Reducing Emissions from Deforestation and Forest Degradation) and could be an important opportunity to strengthen the CFM process.

8.2.2 Community of El Choloque in Lambayeque, Peru[12]

Context

The forest of the community of El Choloque is within one of the world's biodiversity hotspots. The village, in the Motupe district in the department of Lambayeque, consists of 60 families of mestizo origin. The community has created the Association for the Protection of the Dry Forests of El Choloque (Spanish acronym ASPROBOS) to organise the participation of community volunteers in forest management and productive activities. The community's forest management plan was established in 2003, covering an area of 1027 ha. This 20-year plan outlines the community actions aimed at conserving the dry forests ecosystem and developing sustainable production processes for non-timber forest products that improve the standard of living.

Main conditions shaping SFM and resulting outcomes

ASPROBOS is an efficient, independent organisation that has grown by executing projects successfully and transparently; it has built a good reputation in the community. The association has obtained financing from banks and won the support of regional and local governments, allowing it to establish synergies with them.

[10] In 2010 there were 173 associates, of which 15 were women.

[11] The Alianza Nacional de Organizaciones Forestales Comunitarias de Guatemala – created in 2009 – provides a forum for small-scale forest users, communities, and indigenous groups in Guatemala to find a common voice and influence national and international forest policy. Made up of more than 400 community groups, with about 77 000 members, the alliance represents an unprecedented level of coordination among indigenous people and community forest organizations in Guatemala (Growing Forest Partnerships. Briefing 2011).

[12] Adapted from "El Choloque: A poor community saves a tropical dry forest from destruction and improves its quality of life" by Miguel Segur Pelayo, José A. Orellano Rodríguez, and Patricia Medina Llerena. In FAO 2010, p. 70–74.

El Choloque community has a long-term vision for natural resources management. The members understand that the forest must be protected, which is why they guard their forest areas, sow seeds to diversify species, and increase tree cover while protecting natural regeneration. In addition to silvicultural activities and agroforestry designed to promote regeneration and forest restoration, community members have developed a prosperous business producing organic honey, honey from alpargate bees, and jams. In these efforts the community has received support from various sources since 1994, in the form of technical and humanitarian assistance (food donations).

The support of local and regional authorities, who for example used this experience for shaping the regional community-forestry policy, has helped the village of El Choloque to keep going even during difficult times when other communities might have decided to split the profits and walk away. As a result, the community has managed to conserve its tropical dry forest that was threatened with destruction while improving the quality of life for its members.

Evolving relationship between forests and people and resulting outcomes

At a local level, the association has helped initiatives that protect forests and promote sustainable management. The biggest producers in ASPROBOS act as coaches, applying teaching methods such as "learn by doing" and "from farmer to farmer" to spread the community forestry idea in their local surroundings.

The creation of a local management committee for the Moyán-Palacio Regional Conservation Area provided a space for participation and coordination for the local population where forest conservation actions are planned. ASPROBOS was first to lead this committee but now some organised local actors have taken over the work, for example, as voluntary park guards. This is an interesting effort to empower local organisations to protect access to natural resources. ASPROBOS plays a supervisory role, denouncing illegal acts against the forest resources.

At a regional level, the association supports the development of a regional system of protected areas in the department of Lambayeque to promote tourism activities (birdwatching, organic food sales, adventure tourism, etc.). ASPROBOS also participates in regional organisations promoting biodiversity conservation. Thanks to the intervention of ASPROBOS and its business modality within its own territory and a watershed approach to secure water resources, the Peruvian government declared the upper part of El Choloque as a Natural Protected Area and is promoting its conservation.

8.2.3 Ejido San Diego de Tezains in Durango, México[13]

Context

San Diego de Tezains is an *ejido* (state-supported communally farmed land) of 374 members and a population of 1600 located in the mountainous region of the Sierra Madre Occidental in the state of Durango, Mexico. It covers about 60 000 ha of land, of which 26 038 ha are commercial forests. The ejido has become an important social and business organisation, especially in terms of silviculture, industrialisation, and marketing of timber products and has become one of the main forestry producers in Durango. Since 2000, its operations have been certified by the Forest Stewardship Council (FSC).

The use and harvesting of forest resources is the ejido's main economic activity. The forests are mainly temperate, with diverse combinations of pine and oak (*Pinus-Quercus*), deciduous forest (with species like *Arbutus* sp. and *Junniperus* sp.), and riverbank vegetation. The forest management plan covers 26 038 ha of commercial forests (43% of the total area) and is oriented towards the extraction of roundwood and its transformation into diverse products (such as boards, boxes, and pallets) as well as ecotourism. Local families practise subsistence farming in a relatively small area. A few families practise extensive cattle farming, raising cattle, horses, pigs, and poultry.

Main conditions shaping SFM and resulting outcomes

San Diego de Tezains developed from supplying raw materials to a decentralised public organisation (PROFORMEX) to independently producing and selling wood products (thanks to a loan from the National Communal Lands Development Fund, or FONAFE, that allowed the community to purchase a sawmill). In this evolution, the ejido developed a solid and well-defined organisational structure under a collective management scheme for forest harvesting, overseen by a general assembly and a technical council formed by professionals from the region who had contributed with their own financing. Today, the community-owned company employs an average of 200 workers in different processing activities, from extraction to marketing (Figure II 8.2).

[13] Adapted from "Tezains: A community cooperative protects the forest and produces innovative products and services" by César Alvarado. In FAO 2010, p. 93–98.

Figure II 8.2 Wood processing is the main industry in the community-owned company of the San Diego de Tezains ejido in Durango, Mexico. ©César Alvarado

The cooperative's forest management practices are established in a 15-year operating plan and annual operating plans. These are approved by the state's forestry service, CONAFOR, and are also supervised by the company's certification agency. The co-op uses various innovative forest management techniques that are worth highlighting. Mobile harvesting equipment, for example, is not used in the forest. Instead, the workers use five tow bikes that are rented from members under a semi-private system. Workers are paid by the cubic metre for collecting forest waste, including branches and trunk sections. The trucks that transport the wood from the forest are administered directly by the company, but a member can also obtain a truck and pay for its maintenance. The transport of timber and other products to the market is done using company vehicles or rented trucks, and in some cases, customers take care of their own transport.

The co-op is constantly seeking new markets for its products to make its activities economically sustainable. All activities are also subject to financial analysis and accounting.

One of the company's key strategies has been reinvesting its profits to ensure efficiency in production processes and the competitiveness of its products in the market. The co-op members have a clear long-term vision of natural resource conservation, which is based on the community's forestry tradition.

The co-op has developed processes that add value to forest products, with most investment going into industrial production equipment:

- The company has three sawmills used to process different types of wood. The waste, mainly bark and sawdust, is stored and sold separately. The system of wood selection follows the country's classification criteria.
- All wood is treated to prevent discoloration, then air-dried, and packed. The company also has a drying room for wood used in furniture manufacture.
- The company sells roundwood (mainly from the genus *Quercus*), lumber, toothpicks, sawdust, woodchips, and bark (to produce fertilizer), among other products.

The company is careful to fulfil all obligations to its clients in terms of delivery times and the quantity and quality agreed upon. The woodchips and sawdust are sold to two large panel products companies in Durango and Michoacán. Soon, the company plans to produce plywood, mouldings, and furniture.

The co-op has recently developed a new ecotourism project – San Diego Paradise. This ecotourism complex, located in an area of great natural beauty, offers a variety of services including cabins, fishing, interpretative trails, lookouts, camping areas, equipment rental for outdoor sports, and diverse wildlife, providing an excellent recreation and adventure alternative in the region. The complex uses the logo of Mexico's Tourism Department and is included on its list of tourist attractions, which is key to attracting visitors and generating income.

The ejido has developed successful alliances

with private, state, and semi-state organisations at various levels. One of the ejido's strongest partnerships is with the Community Forest Development Programme (PROCYMAF) of the National Forestry Commission. This programme, led by co-op members, communities, and indigenous peoples' associations aims to strengthen CFM schemes and help the owners of these resources generate alternative sources of income. In addition, it maintains strong links with high schools and universities.

The co-op has also established partnerships with various universities in different research areas, not only to obtain an immediate benefit for the company but also to contribute to the development of science and education in the region. The central government has a series of programmes supporting silviculture, forest protection, and industrial development. For example, the ProÁrbol programme, aimed at promoting silviculture, has supported reforestation and soil conservation using forest waste products.

Evolving relationship between forests and people and resulting outcomes

Forestry has made an important contribution to reducing poverty and improving the quality of life of ejido families. Unemployment does not exist in San Diego de Tezains. The minimum salary paid by the co-op's company is three times higher than the regional average. The company gives preference to local workers and is an important source of jobs for the community. It also invests in social projects such as water treatment systems, drainage, schools, health centres, etc. The profits are distributed equally among the 374 members. The workers receive dividends every three months, without exception.

All company employees have health insurance and access to medical services. The co-op also supports primary and secondary schools and gives scholarships to outstanding students, whether co-op members or their family members. It's not a requirement that these students, once they have graduated, return to their community, but it is worth noting that a large majority do return and become involved with the forest co-op company.

Women have an important role in the production process, especially in activities related to the plant nursery, production of toothpicks and broom handles, packaging, and administration, among others. Moreover, there is a Women's Industrial Agricultural Service, which receives some of the co-op's profits to develop its own projects. There are 146 female co-op members with property rights, representing 39% of all members.

In the past two years, the co-op has implemented various activities aimed at sustainable development: acquiring road clearing equipment, modernising factories, buying machinery to improve productivity, carrying out reforestation – including soil conservation, maintaining reforested areas and ensuring plant health, doing market studies to increase exports and identify demand for products with value added, developing technical studies of conservation areas with diverse ecosystems, and strengthening the Paraíso de San Diego ecotourism centre.

The level of organisational maturity achieved by the co-op is one of its main strengths and is a key element for its long-term sustainability in terms of community entrepreneurship. For the exemplary management of forest resources, the co-op members of San Diego de Tezains obtained the 2009 Forest Merit Prize in the category of community silviculture presented by the president of Mexico.

8.2.4 Guaraya Community of Cururú in Santa Cruz de la Sierra, Bolivia[14]

Context

The Cururú community, in the province of Guarayos, 310 km from the city of Santa Cruz de la Sierra, forms part of the Guarayos Indigenous Peoples' communal property (TCO or *Tierras Comunitarias de Origen*), which allows indigenous communities to develop their own economic, social, and cultural systems. The Guarayos are part of the Tupi-Guarani family of South American indigenous peoples, traditionally governed by a head council or *cabildo* made up of councilors who elect the *cacique*, the authority responsible for ensuring the preservation of the Guaraya culture and religion. The Guarayos indigenous community land covers 1.15 million ha, titled on behalf of the parent entity, the Guarayos Center for Indigenous Peoples' Organizations (COPNAG).

The conditions in the Cururú community, formed by 212 people in 32 families, are precarious: road access is very difficult, there are no health services, and the community lacks running water, electricity, and sewage treatment. Its school has two teachers and 56 students in different levels. The boys and girls also work from a young age with their parents and learn skills for farming, ironwork, carpentry, leatherwork, weaving, shipbuilding, masonry, and arts such as music.

[14] Adapted from" Cururú: An indigenous community organization harvests wood and non-wood products to defeat poverty" by Henry Moreno. In FAO 2010, p. 75–80.

The Guaraya families traditionally practise subsistence agriculture, complementing small-scale cattle farming with forestry activity, hunting, fishing, and handicrafts. The forests are mainly used to provide raw materials for their housing needs, food security, energy, handicrafts, and medicines. The Guarayos have a rich artisanal tradition of using forest resources for making musical instruments, handicrafts, furniture, canoes, and some tools. Non-wood products include cusi palm oil (*Attalea speciosa*), honey, wild fruits, resins, and latex. They also use a wide variety of plants for medicinal purposes and palms in multiple ways: trunks as beams for their houses, leaves for roofs and weaving baskets, and seeds for extracting oil. From the urucuri palm (*Attalea phalerata*), known as *motacú*, they obtain palm hearts and fruit.

Since the introduction of the Forest Law, many Guaraya communities have organised themselves in forestry associations to harvest their forests and obtain economic returns. Some have been more successful than others, mainly those with management plans for larger areas that are located in the northern part of the TCO (San Juan, Cururú, AISU, Curuvare).

The most common tree species of commercial interest are *tajibo* (*Tabebuia impetiginosa*), *cuchi* (*Astronium urundeuva*), mahogany (*Swietenia macrophylla*), *ochoo* (*Hura crepitans*), *curupaú* (*Anadenanthera colubrina*), *serebó* (*Schizolobium* spp.), *paquió* (*Hymenaea courbaril*), and *sirari* (*Ormosia coarctata*).

Main conditions shaping SFM and resulting outcomes

In 2001, the Cururú community received technical support from the Bolivia Sustainable Forest Management Project (BOLFOR) and other organisations to conduct forest inventories and to prepare, obtain approval of, and implement a general forest management plan (FMP) covering 26 421 ha with a logging cycle of 30 years.

To administer the management area, the community created an association called the Cururú Indigenous Lumber Association (Spanish acronym AIMCU), a community-owned forest company comprises 32 members. In 2007, the Cururú community certified its forest under the FSC. This followed the signing of a technical and economic cooperation agreement with the company INPA Parquet in Concepción.

AIMCU is in charge of executing the community FMP, in compliance with the rules established by COPNAG for the use of natural resources. The association is also responsible for maintaining an efficient business structure, approving the annual forest operating plans, and organising and supervising committees for the different forestry activities, including security measures to stop third parties from invading the land. AIMCU's Forestry Committee is made up of five members, including a forestry professional who is responsible for reporting back to the country's forestry regulator. To control the association's income, payments are deposited in a bank account in the name of the Cururú community in order to avoid potential problems that can occur when individuals manage large sums of money.

To ensure the Cururú FMP is implemented correctly, AIMCU has developed a training programme for technical and managerial aspects of SFM. AIMCU's forestry operations team has received training over several years, which has allowed them to gradually take on the technical and administrative responsibilities under the management plan.

Evolving relationship between forests and people and resulting outcomes

Most of the income generated is used to cover operating costs of forestry and other activities and the remainder is divided among the members. The community decided that 15% of the profits should be paid to workers as a production bonus, 3.5% to COPNAG, and 5% for the community. Payments to the community and COPNAG are designed to support their forest-related activities in Cururú.

The creation of jobs for both men and women is one of the key benefits of the wood producers' association. In addition, AIMCU is developing a project to improve community housing using a design that respects the traditional Guaraya architecture.

More recently, with the support of the Center for Sustainable Forest Enterprise (CADEFOR), the community made the decision to create a microenterprise (SERFORCU) to provide services for 100% commercial inventories, directional felling, and other reduced-impact logging techniques, capitalising on the knowledge acquired through the technical assistance received from external agencies such as the BOLFOR I and II projects, the PAI Project, WWF, and others. This has improved income from the sale of services and generated new jobs and training opportunities for more young people.

Thanks to AIMCU, the community has the confidence to continue with its forestry activities on more than 26 000 ha of land certified by the FSC, which should also allow AIMCU to obtain better terms in negotiations with potential customers.

8.2.5 Smallholder association of Chinchiná in Caldas, Colombia[15]

Context

The Chinchiná watershed, covering 113 000 ha, is in the south-central area of Colombia's Caldas Department. It is home to some 530 000 people in the towns of Manizales and Villamaría as well as part of the Neira, Palestine, and Chinchiná municipalities. Its altitude varies, rising from 780 meters above sea level (masl) to 5400 masl in the Nevado del Ruiz. For nearly 200 years, the region has survived by producing two traditional products, coffee and beef, that generated economic growth though at the expense of serious environmental problems.

Forests cover more than 68% of the basin, but much of the native forest has been cleared to grow coffee and create pastures for livestock. This has led to soil deterioration, erosion, and, as a result, sediment build-up in the river. There has also been a significant loss of biodiversity caused by the destruction of forest and riverbank habitats. Making the situation worse, the crisis in the coffee and livestock markets in recent decades has brought economic and social hardships to the region.

The Chinchiná Watershed Forestry Project (PROCUENCA) was created in these circumstances with the mission to build a sustainable wood production process, promote forest restoration, enhance environmental services, and improve the quality of life of the population. The improvement of the production chain based on a system of shared public-private responsibility was proposed. The project aimed to bring about a cultural change while maintaining the essence of the community and its cultural traditions.[16]

Main conditions shaping SFM and resulting outcomes

Changing social attitudes was particularly important since deforestation was the result of clearing land for traditional farming and crops. The strategy included the development of new economic opportunities (forestry, agroforestry, and tourism), without taking away traditional sources of income, mainly coffee growing and cattle grazing. The PROCUENCA project's strategy was based on four main pillars:

1. *State participation*: The state's involvement has been important in promoting the project and implementing support mechanisms and incentives. The five municipalities involved have included the project in their long-term development plans to ensure its continuity. The project is financed by an independent municipal institute (Institute of Finance, Promotion and Development of the Municipality of Manizales, or INFI Manizales), which runs the project with funds obtained from the water service concession owned by the private company Aguas de Manizales.
2. *A project coordinator*: PROCUENCA was created within the framework of the agreement with INFI Manizales and support from FAO. It has a strong management structure and technological-innovation capacity, which has enabled decentralised and flexible project management.
3. *Allocation of funds*: The project implemented a fund allocation mechanism in the form of payments for environmental services (PES). This mechanism works by assigning a value to the environmental processes and regulatory functions performed by different actors and distributing funds in relation to this value. Part of the funding for the project is derived (indirectly through concession fees) from payments by landowners for the community's potable water service. The landowners are then repaid for services provided in the form of incentives aimed at forest restoration, diversification, and sustainable development. This method is used to recover environments for biodiversity conservation and protect water resources.
4. *Community participation*: PROCUENCA initially identified community members and landowners with leadership potential, and these people further encouraged their neighbours to become involved in the project's initiatives as well as setting future goals and objectives. Neighbourhood committees were established to help recover conservation areas and promote training in technical aspects of production. Communication was also improved between residents and landowners, which facilitated decision-making.

The project used different methods to incorporate communities and encourage sustainable activities over the long term, such as:

- Facilitating access to financing (soft loans and technical assistance)
- On-Farm Sustainable Forestry Management, a mechanism that helps landowners implement an

[15] Adapted from "Chinchiná: A public-private forestry project protects the environment and generates socio-economic development" by Luis Chauchard. In FAO 2010, p. 156–164.
[16] The PROCUENCA project is based on the Environmental Management Plan for the Chinchiná watershed. From 2001 to 2008 the project received technical assistance from FAO. Since then, the municipality has been solely responsible for project management and execution.

environmentally sustainable forest production plan and provides around-the-clock technical support throughout the duration of the contract
- Sustainable production systems, such as agroforestry and silvopastoral activities, to generate additional income for producers, coupled with the promotion and assistance in creating and strengthening these systems through the Association of Agroforestry Producers (AGROFORESTAL)
- Community management of water resources
- Community participation in decision-making through representation on the Technical Committee of three producers involved in the project
- Capacity development and outreach
- Adding value in the forest production chain

One of the strengths of the project is its public-private organisational structure that allows technical and financial independence while facilitating public participation in the management process. The project also established links with external agencies to provide financing and technical support for research and innovation and involved local landowners and neighbourhood associations.

Part of the success of the project is due to its financing mechanism. INFI-Manizales invests 10% of its royalties obtained from the potable water company into the project, and this money is used to provide incentives for producers to improve their production processes and forest restoration. These funds are also used to benefit the community, for example, in cleaning up waterways, expansion of potable water infrastructure, and implementing reforestation plans on land with high conservation value. Various other financing mechanisms were also used in the project.[17]

Increased productivity and environmental protection

The project included the management and sustainable use of different types of forest: native secondary, forest plantations, and agroforestry systems. Reforestation and restoration activities are carried out on public or state-owned land to ensure the conservation and growth of natural forests in vulnerable areas. No harvesting is permitted in native forests, which are mainly second-growth due to intense human activity in the past, including settlement and expansion of the agricultural frontier.

The reproduction of native species is promoted for restoration activities. Many of these species (e.g. *Hyeronima antioquensis*, *Oreopanax* sp., *Palicourea* sp., etc.) are difficult to reproduce through artificial propagation, but transplanting native plants that sprout from earthwork sites resulting from road construction and maintenance has been tested with good results.

Forest plantations and agroforestry projects are developed on private land that was used in the past for growing coffee and for livestock production but now trees are combined with coffee plants, crops, and silvopastoralism (wood and grasses).

Forestry systems overlap with, rather than replace, traditional agricultural land uses. This has enabled producers to continue cultivating crops and raising cattle while diversifying their activities to include forest management, which will generate income in the long term (from 11 to 18 years).

The project created a Management Programme for Micro-Basin Water Resources (MIMA), which aims to ensure the sustainability of water resources in the watershed. The process of forest restoration and environmental protection was started in 29 out of the 52 micro-basins identified in the area as environmentally vulnerable due to pressure on natural forests.

[17] a) *Soft loans*: Proceeds from the water services concession given to landowners as soft loans to create forest plantations and perform other activities such as pruning and selective logging. These loans, which increase annually in line with the Consumer Price Index (CPI), come with technical assistance and are paid back at harvest time.

b) *Forestry Incentive Certificate* (*CIF*): Based on a 1994 law to promote the establishment of commercial forest plantations that offers a financial incentive equivalent to a percentage of the costs of establishing and managing the plantation. Landowners can manage these incentives independently, but for small producers, the costs of performing the required studies can be high.

c) *Forestry Capital Fund*: This is a long-term financing instrument for the sustainable management of new plantations and for development of new processes to add value to the raw material produced.

d) *Clean Development Mechanism* (CDM): Since 2003, the UN's CDM mechanism has been used to generate carbon credits from forestry plantations that sequester carbon emissions. These projects must first be registered under the United Nations Framework Convention on Climate Change (UNFCCC) in order to sell Certified Emissions Reductions (CERs) from forests. Once the CERs are certified, they can be sold to foreign countries to help them meet their emissions reduction goals and each landowner involved receives a financial bonus. In April 2010, the project received approval from the UNFCCC, making it the first Colombian CDM forestry project and the second large-scale project of its kind in Latin America.

The territory is zoned for the development of biological corridors and waterway protection. Existing native forests are protected and restored in areas that connect with forests in neighbouring areas, which involved coordination between public agencies and private landowners to allow the protection and connectivity of these forests. Such agreements use a legal mechanism called "ecological easement," which reserves privately owned land for conservation and restoration of wetlands and waterways. This mechanism enables public investment on private land.

Evolving relationship between forests and people and resulting outcomes

Community participation has been established in each area of the region, involving local communities to create a cultural change in land use and conservation and to promote self-management. The project promoted activities through community meetings in villages, field visits, individual contacts, training programmes, and the association of forestry producers.

The School of Forestry Leadership trains producers, workers, and rural youth in partnership with public agencies and private institutes and promotes environmental education programmes in schools and rural colleges. These programmes raise awareness and create a forest culture in communities with full-time courses for young people and part-time courses for managers and farmers.

The implementation of the project has increased the value of private estates, which has encouraged many families to return to live on them. Moreover, the strategy of public participation has allowed neighbours get to know each other better through regular community meetings.

The project has succeeded in uniting the government and landowners to work towards common goals. In addition, it has created a cultural change in the attitudes of other landowners in the basin with regard to the implications of past land-use practices and the need to organise and actively participate in the activities promoted by the local association.

After completing the first phase of the project, AGROFORESTAL has emerged as a key actor in regional development, and the main challenge in the next phase is to improve the economic sustainability of the association.

8.3 Analysis of enabling conditions/facilitating factors for sustainable SFM

Table II 8.3 presents an overview of the analysed framework conditions in each case. These conditions are further discussed below.

8.3.1 Policies, institutions, and governance

Well-defined land tenure and rights to forests and trees

The most important changes in land tenure and forest-use rights in the presented cases have resulted from reforms in the policy and legal/regulatory frameworks. These changes created the conditions for the clarification and recognition of land-tenure rights on what had been traditional community territories (e.g. Larson et al. 2008). External support providing technical and financial assistance played an important, if not a key, role, especially in the process of preparing the communities to have access to forest resources through the approval of the FMPs and, often, of the subsequent annual operating plans.

- In the case of San Andrés, the long-term concession contracts offered by the government (CONAP) prompted the community to get organised and apply for a concession to utilise the forest following rules laid out in an FMP. Giving the community legal responsibility for the forest was decisive in significantly reducing illegal logging, land invasion, and wildfires.
- The promulgation of Bolivia's Forest Law in 1996 allowed many indigenous communities to legally use forests through FMPs, as was the case for the community of Cururú. AIMCU received support from the BOLFOR project and other organisations to conduct forest inventories and prepare the FMP.

Effective participation and stakeholder cooperation

Participation is the engine of development activities and a driver of change. The cases illustrate the importance of an effective and inclusive community participation where women, young people, and elders are part of the decision-making process and are given opportunities to play active roles in forestry activities.

Table II 8.3 Analysed cases and the framework conditions (❖ when the condition is strongly present)**.**

Cases	San Andrés	El Choloque	Tezains	Cururu	Chinchiná
I. Policies, institutions and governance					
1) Well-defined land tenure and rights to forests and trees	❖		❖	❖	
2) Effective participation and stakeholder cooperation	❖	❖	❖	x	❖
3) Long term vision	x	❖	❖		x
4) Social cohesion and respect to cultural identity	❖	❖		❖	x
5) Strong organisation and leadership	❖	❖	❖		x
6) Capacity for enforcement and conflict resolution	❖	❖		x	
7) Effective and balanced strategic partnerships	x	x	❖	❖	x
II. Forest resources, capacities, cultural and socio-economic aspects					
8) Forest resource base and potential ❂ For agroforestry and trees outside forests)	❖	❂	❖	❖	❂
9) Contribution of forest resources to livelihoods and local development	❖	x	❖	❖	x
10) Technical and managerial capacities	❖		x	x	❖
11) Access to commercial opportunities, linkages to markets and value chains	❖	x	❖	x	x
12) Access to financial resources	x	x	x		❖
III. Technological development, research and monitoring					
13) Technological innovation and research to add value to forest products and services	❖	x	❖	x	x
14) Flexible and effective system of surveillance and monitoring	x		x	x	

- In San Andrés, one of the keys to AFISAP's success is the active participation of its members in the day-to-day running of the organisation, from planning the harvest to selling its products and services. Its members have improved their operational, technical, and administrative skills, allowing the association to reach its current level of development. Particular attention is paid to women and young people.
- In San Diego de Tezains, community members maintain historic forest traditions and a collective management scheme for forest production and community work. Women's participation is important in the production process of the cooperative.
- The case of Chinchiná shows a high level of community participation and organisation, for instance, through members and landowners with leadership potential who encourage their neighbours to become involved in project initiatives.
- In El Choloque, the creation of a space for participation and coordination for the local population was favoured by the community's strong cohesion and involvement in all decision-making processes. The town council and ASPROBOS, the executing structure, exist harmoniously, with the former organising the participation of community volunteers.

Examples of stakeholder cooperation can be drawn from the cases of El Choloque and Chinchiná, with coordination and active involvement of the local/regional government and landowners to work towards common goals.

Long-term vision

Having a common, long-term vision with regard to the use, management, or restoration of their natural resources is fundamental for the sustainability of community-based forest management initiatives. This was shown particularly in the cases of San Diego de Tezains and El Choloque.

Social cohesion and respect to cultural identity

These are also contributing factors to success in CFM initiatives. The cases of San Andrés, El Choloque, and Cururú illustrate this. In Chinchinaá the challenge faced by PROCUENCAS was to create a cultural change in the attitudes of the local residents.

Strong organisation and leadership

Effective participation precludes the development of an effective community organisation for which strong leadership is also a key asset.

- AFISAP in San Andrés shows a well-run organisational structure that adequately administers its management unit with social responsibility and an enterprise vision.
- ASPROBOS in *El Choloque* is a leader organisation that has empowered grass-root organisations and is able to mobilise different stakeholders and financial resources towards common objectives.
- The ejido of *San Diego Tezains* has developed a well-defined, mature organisational structure with a clear long-term vision of natural resource conservation.

Capacity for enforcement and conflict resolution

As part of communal governance approaches and practices, the communities have taken seriously their responsibilities and commitments when formalising the use and management of their forest resources and in respecting laws and regulations. Local decisions regarding the protection of forest areas and the drawing of rules and control measures for forestry activities have also been important in empowering communities and strengthening their capacities in negotiation and conflict resolution.

- In San Andrés, AFISAP's activities to prevent and fight forest fires as well as to crack down on illegal squatting and trespassing clearly show that capacity.
- In El Choloque, the organisation and functioning of the Civil Self-Defense Committee is key to prevent poaching and illegal logging in the protected forest areas.

Effective and balanced strategic partnerships

The forging of alliances and partnerships with governmental and non-governmental organisations has been instrumental in advancing community efforts towards achieving their forest management objectives. The five cases exemplify this quite well, but in particular:

- San Diego de Tezains shows a successful strategy of alliances with private, state, and semi-state organisations at various levels.
- The community of Cururú established a technical and economic cooperation agreement with a forest company.

8.3.2 Forest resources, capacities, and cultural and socio-economic aspects

Forest resources base and potential

Forest areas in the cases dealing with natural humid forests range between about 26 000 ha (Cururú and Tezains) and 52 000 ha (San Andrés) and are mainly primary forests that have partially been selectively logged. The production forests in San Andrés and Cururú contain not only high-value timber species – in particular mahogany, though the main commercial volume comes from hardwoods – but also non-timber forest species of high local value (construction, food, medicinal use, etc.) and in the case of the Maya forests, also resources that already have an established market (xate palms, latex from sapodilla, allspice). The forests in the Mexican case, on the other hand, are mainly temperate with diverse combinations of pine and oak, deciduous forest, and riverbank vegetation. The trend in these three cases is to diversify and intensify (product value added) forest management to include lesser-known timber species, non-timber forest products, and even environmental services (as in the case of Tezains).

In the cases of El Choloque and Chinchiná, the original forests in their respective territories have been severely degraded and the efforts are directed to protection, management, and restoration. The dry lowland forests in northern Peru represent a valuable resource in terms of biodiversity and also valued non-timber forest products, generating income for local residents. The watershed of Chinchiná is characterised by fragments of primary degraded and secondary forests along an altitudinal gradient, with important ecological functions (water in particular) that need to be re-established.

Contribution of forest resources to livelihoods and local development

Forests are important to very important to livelihoods in all selected cases. Communities involved in managing their forests are receiving important economic, environmental, and social benefits from conserving and sustainably using their forest resources. Job creation, better salaries, and (re) investments in community infrastructure and services are the main benefits from forest management.

- In San Andrés, AFISAP reinvests its earnings with the aim of creating jobs and benefitting its members and the population of San Andrés municipality. These investments also contribute to meeting the municipality's health, education, and infrastructure needs.
- In San Diego de Tezains, forest activities have made an important contribution to reducing poverty and improving the quality of life of families in the ejido. The minimum salary paid by the cooperative's company is three times higher than the average for the region. The company gives preference to local workers and is an important source of jobs for the community. All of the company's employees have health insurance and access to medical services. The profits are distributed equally among the members (whether they work in the company or live on or outside the community lands). The company also invests in social projects, such as water treatment systems, drainage, schools and health centres, and supports primary and secondary schools, giving scholarships to outstanding students.
- In Cururú, the creation of jobs for both men and women is one of the key benefits of the wood producers' association (AIMCU), which is also developing a project to improve community housing. The creation of the microenterprise SERFORCU allows the generation of new jobs as well as expanding sources of income and the selling of services to other Guaraya communities and even to forest concessionaires.

Technical and managerial capacities

In all five cases there is evidence of important efforts to develop local capacities for forest management and in some cases enterprise development as well. External support (from NGOs, governmental programmes, the private sector, or research and educational institutions) has been key in providing the (technical, financial) means.

- Community members in San Andrés, with external support that developed operational, technical, and administrative skills over the years allowed them to obtain FSC certification for their concession.
- In Cururú, to ensure correct implementation of the FMP, AIMCU's forestry operations team received training support over several years, which allowed them to gradually take on the technical and administrative responsibilities under the management plan. The association now provides technical services to other communities and even to forest concessionaries.
- In Chinchiná, the School of Forestry Leadership trains producers, workers, and rural youth in partnership with public agencies and private institutes and promotes environmental education programmes in schools and rural colleges that raise awareness and create a forest culture in communities.

Access to commercial opportunities, linkages to markets and value chains

All cases show innovative ways to develop and diversify commercial forest-based opportunities.

- In San Andres, AFISAP went from selling wood by the square foot into processing and selling transformed logs directly to clients, without intermediaries. A carpentry shop allowed the association to add more value to its products. Later on, the association began to diversify its activities by processing and selling non-timber forest products, and even acquired a farm under an agroforestry system to develop projects that create jobs for the local community.
- In El Choloque, in addition to agroforestry work and silvicultural activities designed to promote regeneration and forest restoration, community members developed a prosperous business producing organic honey, alpargate honey, and jams. The members receive payment from the association, which administers activities and controls incomes, making it a more powerful economic actor in the market than the villagers would be on their own.
- San Diego de Tezains is a notable example of entrepreneurship, constantly developing processes that add value to forest products and seeking new markets for its products to help make the co-op's activities economically sustainable. One of the co-op's key strategies has been reinvesting its profits to ensure efficiency in the production processes and the competitiveness of its products in the market. As part of its diversification strategy, it has also begun an ecotourism project.

Access to financial resources

Management requires financing but the access to financial resources for community-based forest management is quite difficult or simply inexistent. Innovative ways of financing forestry activities for smallholders are shown in the case of Chinchiná. PROCUENCA has been able to attract public and private funding to create funding mechanisms (such as PES) to provide incentives for producers to improve their production processes and forest restoration.

8.3.3 Technological development, research, and monitoring

Technological innovation and research to add value to forest products and services

In all cases, research has been and continues to be part of the forest management process, commonly carried out with external support.

- In San Diego de Tezains, innovative adaptations to meet new market demands, a well-placed monitoring system, and key partnerships with various universities in different research areas have allowed the cooperative to stay in business while also maintaining the balance between the different dimensions of sustainability.
- In San Andrés, the association has a close relationship with ACOFOP and various research institutions and education centers to carry out research and provide interns to work in the concession. The community directly participates in the monitoring of chicle extraction and has supported the monitoring of other resources.

Flexible and effective system of surveillance and monitoring

Surveillance and monitoring seems to have gained acceptance and interest as a management tool in community forestry, mainly as result of efforts from external agencies (e.g. accompanying NGOs). In cases where timber production is the main economic output, the usual entry point for monitoring, as part of the technical package promoted by outsiders, consists of monitoring the impacts of harvesting operations. Only through strategic partnerships with research organisations can a more comprehensive monitoring system be found. On the other hand, a common practice appears to be the internal control of forest management activities by some sort of internal community organisation, as in the case of Cururú. This includes supervision and technical and administrative control of activities and surveillance to detect and control unauthorised entries.

8.4. Concluding remarks and recommendations

The successful cases described illustrate how the challenges of forest management can be met to achieve economic, social, and environmental benefits. Each case has been able to respond to the local context and evolving conditions in ways that reflect responsibility, commitment, and long-term vision, applying sustainability criteria and innovation in pursuing the management objectives and community expectations for local development. As important **conclusions** from the analysis, the following can be highlighted:

- Reforms in the policy and legal/regulatory frameworks have been instrumental in creating the conditions for the clarification and recognition of land-tenure rights in traditional community territories. This, in turn, has paved the way for communities to engage in the formalities of and become more involved in the CFM process.
- Local decisions regarding the protection of forest areas and the drawing up of rules and control measures for forestry activities have been important in empowering communities and strengthening their capacities in negotiation and conflict resolution. Cultural identity and tradition play an important role in facilitating the internal organisation for decision-making and compliance.
- The development of local capacities for forest management, in some cases also including enterprise development, has been key in the process. This was possible thanks to external support (from NGOs, governmental programmes, private sector, or research and educational institutions) that provided the technical and/or financial means.
- The forging of alliances and partnerships with governmental and non-governmental organisations has been instrumental in advancing community efforts for achieving their forest management objectives.
- Forests are important to very important to livelihoods in communities. Job creation, better salaries, and (re)investments in community infrastructure and services appear to be the main direct benefits from forest management.
- Management strengths are linked to the diversification of uses through technological innovation and research to add value to forest products and services. Efforts for developing product added value have mainly focused on lesser-known timber species, some non-timber forest products with established markets. However, direct payments from environment services are still quite limited.
- The access to financial resources for community-based forest management is still (quite) difficult, but there are innovative ways of financing forestry activities for smallholders.
- Surveillance and monitoring seems to have gained acceptance and interest as a management tool in community forestry, mainly as result of efforts from external agencies. The usual entry point for monitoring consists of monitoring the impacts of commercial timber operations through post-harvesting evaluations.

Finally, the following **recommendations** can be offered for policy and practice in support of CFM in the region and elsewhere:

- Recognise and, insofar as is possible, incorporate into legal and administrative procedures social control mechanisms for communities, such as local rules regarding the use and protection of forest resources that have been successful in their different contexts.
- Improve the supply of training, technical assistance, and outreach opportunities for CFM through structural measures of promotion and incentives for institutions or organisations involved in these functions. The role of governments is important in creating or improving training opportunities so that those responsible for management, and those who regulate and monitor it, have personnel who are properly trained and qualified for their activities.
- To improve profitability and competitiveness of forest management, encourage and systematically support the development of forest product value chains, helping community and smallholder organisations gain market access for lesser-known timber species and non-wood products and to use wood and forest waste more efficiently.
- Governments can facilitate a greater and better use of research in support of CFM processes by providing institutional incentives and by taking the results into account in the formulation of policies and forest management promotion strategies. Opportunities offered by mechanisms such as PES and REDD require investments in research to improve the economic, environmental, and social sustainability of CFM.
- Establishing and maintaining educational initiatives for academic formation of community members is probably one of the most accepted and rewarding investments of the benefits generated by CFM, involving in particular young people and women.

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Non-domestic sources of the Canadian boreal forest policy: Integrating theories of internationalisation and pathways of forest policy change

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Abstract: Environmental groups' interest in, and attention to, Canadian boreal forest protection and management is a relatively new phenomenon vis-à-vis the longstanding focus on Canadian temperate forests. Nevertheless, policy development affecting the Canadian boreal forest has, in the past decade, been punctuated towards a new equilibrium in which both protection and forest management policies have increased dramatically. What explains this punctuation? This chapter aims to shed light on the answer to this question by exploring the role of non-domestic forces in shaping Canadian boreal forest policies. We examine the International Boreal Conservation Campaign (IBCC) initiated by the Philadelphia-based Pew Charitable Trusts and the Canadian Boreal Forest Agreement, using Bernstein and Cashore's pathways framework (2002, updated 2012), which identifies four distinct pathways through which non-domestic factors can influence domestic policy change. Through inductive historical-process tracing, we develop two related arguments. First, non-domestic factors do not explain policy change itself, which arguably would have occurred even in the absence of international pressures, but they help explain both the pace and scale of change. In other words, the changes would have likely taken longer and been of lesser scale if not for the influence of non-domestic factors in general and the IBCC in particular. Second, we argue that while much attention has focused on the markets pathway, a significant amount of effort along the direct-access pathway helps account for much of the noted policy changes. As a result, we call for more study of direct access of international groups in domestic policy and interaction among the pathways. We conclude by reviewing the implications of these findings both for theories of internationalisation and policy change as well as implications for environmental and business strategy.

Keywords: Canadian boreal forest, policy change, punctuated equilibrium, pathways, internationalisation.

9.1 Introduction: A puzzling punctuation in Canadian boreal forest policy[1]

The Canadian boreal forest is one of the world's largest areas of old-growth forest, but in the past two decades, new roads and innovations in timber processing have made timber harvesting profitable in large new areas. This has sparked policy debates about the extent to which this newly profitable source of fibre should be commercially harvested, to what extent harvesting practices should be regulated, and whether greater protected areas ought to be established. In part owing to these public concerns, between 2000 and 2008 there was a significant "punc-

[1] Note: This chapter updates and is based upon research originally conducted by Irene Scher through her thesis for Yale University's Environmental Studies Program, where the argument about pace and scale of change was first advanced and developed (Scher 2008).

tuation" (Baumgartner and Jones 2002, Jones et al. 2002) in Canadian boreal forest policy in which protected areas expanded from about 8% to about 30% of Canada's boreal forest while regulations on forest practices also increased (IBCC 2008).

The policy change that has received the most attention is the Canadian Boreal Forest Agreement, which has been called "the world's largest conservation agreement" because it covers 72 million ha of boreal forest. The agreement incorporates commitments and governance beyond the state, including forest certification and enhanced protections. Companies agreed to defer harvesting for three years on more than 29 million ha. They also agreed to lobby governments to adopt more protective forest practice guidelines and conservation plans, including protected areas.

What explains this policy punctuation?

This chapter focuses on the role of international forces in shaping the development of policies governing forest protection and forest practices in the Canadian boreal forest during the 1990s and 2000s. We assess how international actors travelled distinct pathways of influence to help shape these domestic forest policies. In so doing, we provide a theoretically grounded explanation of the punctuation. We argue that existing literature on international influences on domestic policy-making and policy punctuations, while useful, cannot completely account for two findings that resulted.

First, while most scholarly attention to international forces has focused on market pressure, such as boycott campaigns, it appears that much of the durable impact of international forces occurred through what Bernstein and Cashore (2012) refer to as the "direct access to the domestic policy-making process" pathway – which represents, as we discuss below, a very different causal logic than that assumed by most of the literature.

This argument confronts popular accounts that primarily focus on market pressures resulting from NGO (non-governmental organisation) campaigns. In the early 2000s, several international environmental NGOs (ENGOs) ran aggressive boycott campaigns against companies selling products from the Canadian boreal forest. According to these accounts, the Canadian Boreal Forest Agreement (CBFA) came about because the Canadian forest products industry was pressured to make concessions in order for Greenpeace, Canopy, and ForestEthics to suspend their boycott campaigns as part of the agreement.

Upon careful analysis, market pressure alone appears to be insufficient to explain the scale of the CBFA, which also appears to have been influenced by an even longer-running campaign by the US-based Pew Charitable Trusts, which focused on domestic political processes. In fact, significant policy change in local and national policy venues preceded the market campaigns and the signing of the CBFA. Under this direct-access account, the cumulative effect of domestic and international forces over time helps explain the unprecedented scale of CBFA.

Second, international forces appear not to have played a significant role in triggering domestic responses, which had already begun to be developed before the campaign and which would have likely influenced the policy choices that followed. However, it does appear that non-domestic forces contributed to the pace and scale of policy change (Scher 2008). That is, international pressures appear to have increased the scope, and ultimate equilibrium, of the policy punctuation. This case underscores the importance of studying interactions among transnational policy advocacy efforts and further developing theories of how international actors gain direct access to domestic policy-making. Taken together, our arguments call for better integrating and expanding insights from the two relatively distinct literatures on international relations and public policy.

To illustrate the plausibility of these arguments, we focus on assessing the role of the International Boreal Conservation Campaign (IBCC) in influencing domestic policy choices. Following this introduction, we examine the case of the CBFA (the dependent variable). This section provides an overview of the policy changes, focusing on both forest preservation (areas with no logging) and forest practices (how and where to log). Next, we review the creation of the IBCC (the independent variable). Section 9.4 presents Bernstein and Cashore's analytical framework that identifies four distinct pathways and allows for a robust assessment of these international influences. Section 9.5 presents the results of our analysis, revealing how the market and direct-access pathways were most travelled. We argue that these efforts shifted the degree, but not the direction, of policy change. Section 9.6 explores the implications of these findings for theories of internationalisation and policy change as well as implications for environmental and business strategy. We conclude by assessing the implications of our findings for the next generation of research on understanding forces that shape policy-making in the global era.

9.2 The dependent variable

Accounting for a quarter of the world's remaining forest area, the boreal forest is of great interest to both environmental groups and forest products companies. A few hundred kilometres above the US-

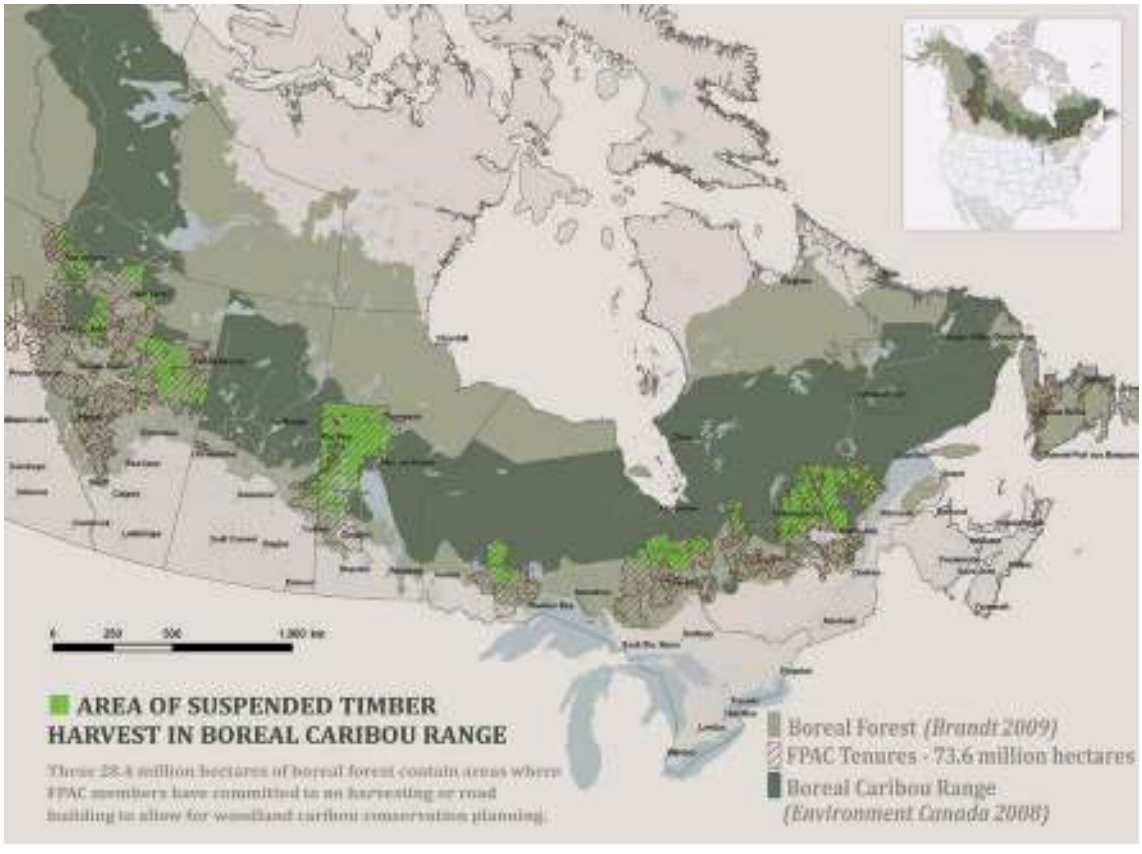

Figure II 9.1 Areas of suspended timber harvest in Boreal Caribou Range.
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Canadian border, the boreal forest dominates 10 000 continuous kilometres from Alaska to the Atlantic Ocean. At 600 million ha (1.4 billion acres), the boreal ecosystem covers more than half of Canada (Wilson 2003), plays a significant role in both ameliorating and contributing to the world's carbon emissions (Jardine 1994, Moen et al. 2014), and is the last of North America's frontier Forests (Figure II 9.1). Frontier forests are forest ecosystems that are large enough to continue to support viable populations of all indigenous species and can maintain those species even in the event of disaster or disturbance (Bryant et al. 1997). At the same time, with new logging roads and enhanced mill capacity and harvesting technologies, many forest products companies in Canada see the more remote northern reaches of the boreal forest as the next frontier from which to source fibre for domestic and international markets (ForestEthics 2004). Out of this tension emerged a surprising scale of policy agreement on forest practices and protected areas.

The CBFA, signed on May 18, 2010, has been said to be the "largest conservation deal ever" (Hubert 2011). The CBFA called for a three-year suspension of logging on 29 million ha and sustainable management of the remaining 43 million ha outside of these protected areas, as defined by best practices, including those of the Boreal Standard of the Forest Stewardship Council (FSC) (Yale Environment 360 2010). This agreement covered 15% to 20% of the boreal forest (Figure II 9.1). The 29 million ha with a three-year logging suspension represent "virtually all critical woodland caribou habitat in the lands managed by the forest companies that are party to this agreement" (Paterson 2010).

The CFBA is a non-binding voluntary agreement between nine ENGOs and 21 forest products companies. The companies party to the agreement were to suspend logging in certain sensitive areas and engage in forestry according to the FSC Boreal Standard in the remainder. ENGOs agreed to suspend boycott campaigns and cautiously started to praise the industry. News stories about the agreement cited strengthened relationships with customers and reputations for sustainable forest management as major incentives for the Canadian Forest Products Association and its associated members (Braun 2010, Boychuk 2011, Paterson 2010, Hubert 2011).

Of unprecedented scale, the CBFA is still contested by signatory parties. According to an interview with Steven Kallick (in 2007), director of the Pew Environment Group's IBCC, the aim was to make this logging suspension permanent. According to Greenpeace, "The goal is to have science inform

how much of the 72 million ha needs to be protected" (Paterson 2010). In contrast, Avrim Lazar, president and CEO of the Canadian Forest Products Association, emphasised that the land has not been permanently taken out of production (Austen 2010).

Implementation of the agreement has been monitored through annual auditing. The first audit for 2011 found that progress was underway in five of six goals but that milestone completion was lagging: five milestones were completed, 10 were works in progress, one had encountered an obstacle, and four had not yet been started (Gunn 2011). One of the milestones, the creation of Boreal Business Forum, a collaboration of customers and investors, had been launched with the purpose of monitoring progress and providing market recognition to participating companies (Canadian Boreal Forest Agreement Secretariat 2011).

This section has identified the dependent variable as change in both protected area and forestry practices and the relevant policy process as including both high-profile negotiations between environmental and industry groups and local and national conservation planning and policy processes. The next section discusses the independent variable – the international forces that might explain the unprecedented scale of overall change to policies governing Canada's boreal forest.

9.3 The independent variable

In the late 1990s, the Pew Charitable Trusts began to explore possibilities for land conservation in the northern forests of Canada. Scepticism about Canadian forest practices was piqued by new road development and harvesting concessions in the northern boreal ecosystem (Jardine 1994). An analysis of the potential for a Pew campaign in boreal forest suggested that there was an opportunity to secure large tracts of protected area and affect how the remaining forests were managed (Francis 2000). Pew launched its Canadian campaign in 1999 with an initial goal of protecting 100 million acres (~40 million ha) by 2010. However, it was clear that new strategies and tactics would be necessary in order for a US-based campaign to achieve ambitious conservation goals.

Pew launched the IBCC to serve as an umbrella organisation for the domestic and international NGO constituents of the new coalition. Two of these organisations were founded by Pew: the Canadian Boreal Initiative in Ottawa, Ontario, and the Boreal Songbird Initiative (BSI) headquartered in Seattle, Washington. Other environmental coalition partners include Ducks Unlimited Canada, Ducks Unlimited US, World Wildlife Foundation (WWF) Canada, Forest Ethics, Canadian Parks and Wilderness, and the Natural Resources Defense Council (NRDC) International Program located in Washington, DC (Scher 2008).

The campaign was built around a conservation plan laid out in the Canadian Boreal Forest Conservation Framework: a statement of the campaign's long-term goals and one of the most ambitious conservation declarations made in the history of land conservation. The campaign's director, Steve Kellick, felt that the Boreal Forest Conservation Framework could be a "compelling vision for the boreal, one that captivates public imagination while satisfying the pragmatic concerns of government and industry."[(2)]

The Boreal Forest Conservation Framework delineates a goal to protect 50% of Canada's boreal ecosystem and have the remaining half under sustainable management. This percentage was chosen in light of a review commissioned by the IBCC of existing quantitative conservation assessments. Six Canadian ecologists were hired to determine the literature range for the percentage of an ecosystem that must be conserved in order to preserve ecosystem function. Though preserving ecosystem function was a loosely defined goal, the review concluded that the median literature range was just above 50% (Schmeigelow et al. 2004). Campaign directors concluded that by advocating 50% strict protection and sustainable practices on the remaining half, the key functions of the Canadian boreal forest could be maintained (CBI 2003)

The IBCC received attention for the swift policy responses that followed its creation (Wilson 2003). This section assesses how the sustained international effort surrounding the IBCC (the independent variable) towards its ambitious goal might have effected the observed policy changes regarding protected areas and forest practices in the Canadian boreal forest. In the following sections, we assess possible pathways that may connect the inception of the IBCC and related international forces to the dramatic upturn in boreal conservation.

9.4 The analytic framework: Four potential pathways of internationalisation

Internationalisation is the process by which transnational actors influence domestic policy. While most scholarship on policy change focuses on the effects of domestic forces, internationalisation scholarship looks to international forces to explain domestic

[(2)] Personal Communication with Steven Kallick, Director of the International Boreal Conservation Campaign, Pew Charitable Trusts, 2007.

policy change. As a case where international actors have attempted to influence domestic policy with different strategies, the recent changes in Canada's boreal forest policy present an opportunity to test the utility of theories of internationalisation. Can theories of internationalisation improve our understanding of when different strategies are effective beyond common narratives? For this case, we selected Bernstein and Cashore's (2012) pathways framework because it squarely addresses the market campaigns that have received much popular attention as well as other strategies that have received less attention. By distinguishing strategies deployed by international groups according to their underlying causal logics, this framework purports to add leverage to questions about which actions by international actors could actually help explain observed policy changes. Additionally, because the framework was designed to integrate preceding constructivist and neorealist theories of internationalisation, multiple theoretical perspectives are represented (Bernstein and Cashore 2012).

9.4.1 Methods

We employ a historical institutionalist approach and the method of process tracing to analyse the influence of actors with respect to Canadian domestic policy changes. Our empirical data was collected through in-person interviews with key actors who participated in and closely observed the processes under investigation as well as hundreds of documents associated with these processes and agreements. Process tracing is a method that involves breaking down complex chains of events into discrete temporal observations that allow logic-based inferences about cause-and-effect relationships. Bennett and George (1997) note that "a process-tracing explanation differs from a historical narrative, as it requires converting a purely historical account that implies or asserts a causal sequence into an analytical explanation couched in theoretical variables that have been identified in the research design." In this case, the pathways framework of internationalisation offers such a research framework that posits different causal sequences, each requiring different conditions to explain change in the domestic policy process.

Process tracing allows assessment of complex questions of public policy distinct from statistical inference regardless of the size and scope of the inquiry, but especially with respect to within-case analysis. Such an approach cannot tease out precise causality, which might be impossible, but this method, combined with our analytical framework, is designed to better understand the causal logics at work over time to explain the scope and scale of the policy change.

9.4.2 Pathways

Bernstein and Cashore (2000) posit four pathways to internationalisation of domestic policy change: the *markets* pathway, the *international rules* pathway, the *international norms and discourse* pathway, and the *direct access to the domestic policy-making process* pathway. Each pathway suggests a set of hypothesis about how transnational actors affect domestic policy. These pathways and the conditions required for each to operate emerge from an integration of previous explanatory theories and have become a useful framework for empirical research (see review in Bernstein and Cashore 2012). The following paragraphs highlight relevant aspects of the pathways framework.

Market Dependence: Transnational actors use the power of international markets directly to pressure companies, industries, or governments by threatening exporting companies with decreased market share (e.g. through boycott campaigns) if they do not comply with the campaign's demands (e.g. product certification). In such cases, Bernstein and Cashore suggest that policy change depends less on domestic politics than on the dependence of the target country on susceptible foreign markets. This pathway is particularly relevant to the widespread adoption of sustainable forest management certification standards (e.g. FSC and the Canadian Standards Association) and other strategies directly targeting company behaviour (Bernstein and Cashore 2012).

International Rules: In this pathway, transnational actors use international policy-making processes such as treaties or trade agreements to force domestic changes in other countries. Legitimacy of the international rule-making body, enforceability of the agreement, and fear of losing international credibility and investor confidence can compel countries to change domestic policies in accordance with international laws (Bernstein and Cashore 2012).

International Normative Discourse: This pathway operates when transnational actors encourage states to follow certain norms by creating information, symbolism, and accountability. A norm in this sense is a cultural axiom. When transnational actors aid in the formation and adoption of a norm, durable domestic policy responses are observed. Bernstein and Cashore suggest that the success of transnational actors along this pathway depends on the moral vulnerability of the target state, the resonance of the norm with domestic ideology, and the ability of the transnational actors to engage other states and actors in placing the norm on the global agenda (Bernstein and Cashore 2012).

Access to the Domestic Policy-Making Process: Transnational actors utilise this pathway by participating directly or indirectly in domestic policy processes. Often this includes the transfer of informa-

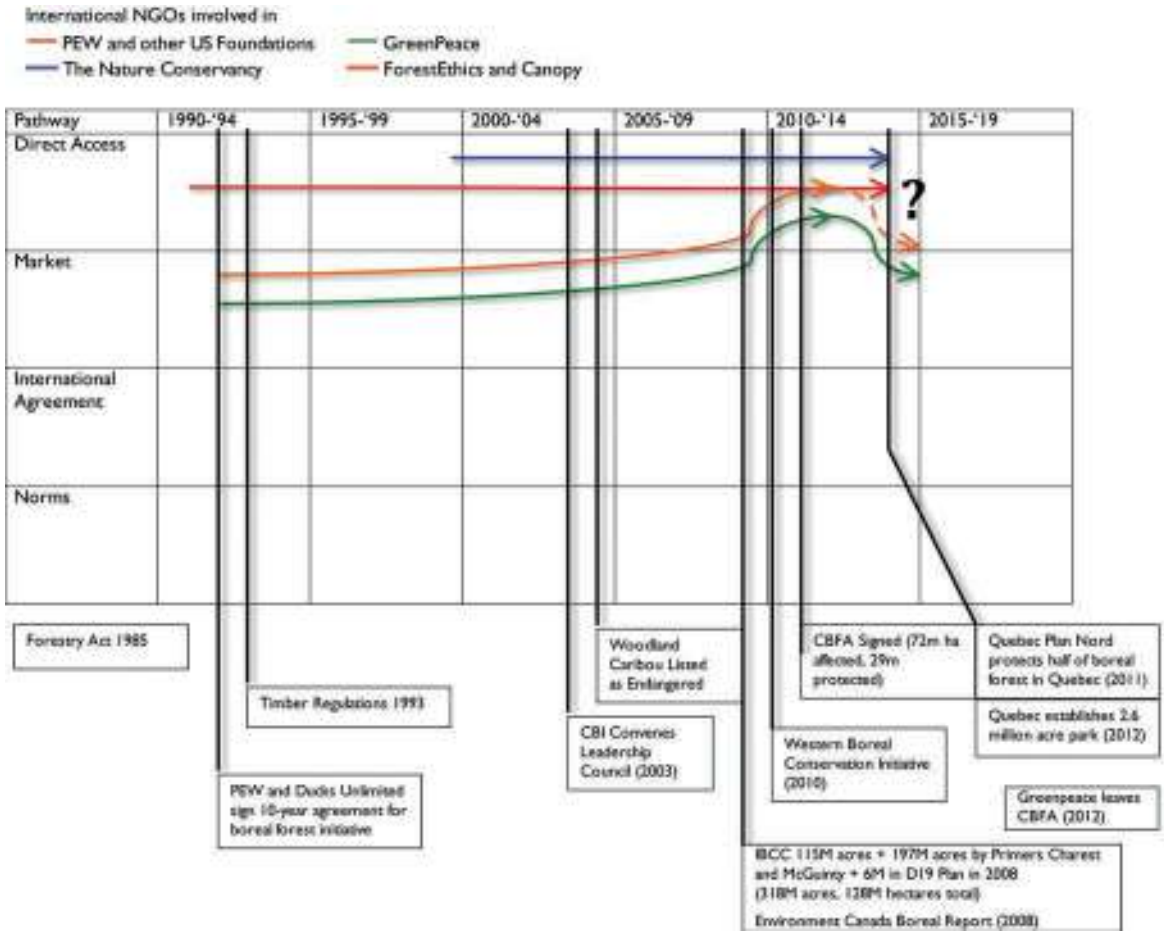

Figure II 9.2 Tracing pathways of international influence in Canadian boreal forest policy.

tion and/or resources from the transnational actors to groups or influential bodies within the target state. Bernstein and Cashore (2012) suggest that for this pathway to be effective, the existing organisations and networks that influence policy within the country must be open to working with external actors. Additionally, change is more likely when the target state's government is autonomous from business interests and when the state has the capacity to institute the proposed policy changes.

The framework draws on an analytic distinction made between the intersecting forces of internationalisation and globalisation. Internationalisation, defined as increasing external forces on domestic policy, is distinct from globalisation, which is defined as the increasing liberalisation of global trade. However, for the market-dependence pathway, international trade – to the extent that it creates dependence on foreign markets – is a necessary precondition. Globalisation is not required for the other three pathways but is often present and can influence the success of the pathway as a mechanism for domestic change (Bernstein and Cashore 2012).

To assess which pathways were active, we trace possible causal influences of different strategies employed by transnational actors in the boreal campaign. Through process tracing and systematic attention to counterfactual scenarios, we assess potential moments of influence by transnational actors in Canadian domestic policy-making. Figure II 9.2 presents a radically simplified illustration of how this method assesses causal connections and parses out hypothesised mechanisms by assessing hypotheses about expected values of key variables before, during, and after critical junctures (shown by black vertical lines). The observed context of each critical event was then matched with potential pathways (not shown) to provide an analytical account of the boreal case. In the larger analysis, Pew and other actors do not follow only one pathway at a time but often employ a mixture of interacting strategies with distinct causal logics. Applying the Bernstein and Cashore framework allows some assessment of which strategies were effective. Assessment of these processes and counterfactual analysis suggests that, enabled by funds, information, and legal assistance from Pew, First Nations and Canadian ENGOs achieved conservation commitments at a pace and scale that would not have been realised otherwise, primarily through patterns that best fit the direct-access logic.

The next section elaborates on this finding, describing the history of the IBCC and related campaigns with respect to each of each of the four pathways. While the Bernstein and Cashore framework delineates convincing mechanisms whereby policies can change in response to new transnational pressures, it does not immediately offer insights about the nature of the change itself. For this, we turn to the public policy literature, which stresses the importance of distinguishing between the directionality of change from its pace and scale (Cashore and Howlett 2007). Thus, in the following analysis, we parse out both the mechanisms of change and whether these help explain the directionality or the pace and scale of change.

9.5 How and when do international initiatives affect domestic forest policy?

Previous analyses have attributed Bernstein and Cashore's market pathway as the most important mechanism for transnational influence. However, evidence from the Canadian boreal case suggests that direct access to the domestic policy-making process may be more important than previously thought (Scher 2008). This section compares evidence to the necessary conditions that Bernstein and Cashore identify as required for each distinct causal logic to operate in order to assess which pathway(s) might have been travelled effectively at different times.

The markets pathway was certainty travelled with vigour, but the broader context weakens this pathway as a potential source of significant policy change. Market campaigns targeted companies such as Limited Brands and Kleenex for sourcing fibre from virgin boreal stands, placing pressure on their upstream pulp suppliers. ENGOs also negotiated with timber companies directly to encourage the adoption of FSC standards. Many of these corporations also became signatories of the Boreal Forest Conservation Framework and/or participated as constituents of the Boreal Leadership Council as means of brand management, as the logic of the markets pathway predicts.

By targeting retailers, ENGO market campaigns prevented the Canadian timber industry from entering niche green markets. ENGOs then bolstered these same companies' green brands after the CBFA was signed. The industry also sought out different revenue streams through production and innovation in bioenergy, bioplastics, and a zero-waste policy (CNTG 2009, Browne et al. 2010, Palma et al. 2010, Boychuk 2011). As Lazar stated, "Canadian timber companies needed to "extract more value from every tree. And we've got to be not just ahead of the curve on the environment – we've got to translate being ahead of the curve into some sort of market advantage" (Boychuk 2011). Today the Canadian Forest Products Association is actively advertising its sustainability standards and has created a substantial website about industry efforts on topics including climate change, responsible sourcing, forest certification, illegal logging, sustainable forest management, and green building (FPAC 2012).

However, Bernstein and Cashore (2000) also suggest that the success of influencing policy through the markets pathway is predicated on the company's or country's vulnerability to market losses from decreased foreign consumer or investor confidence. At first glance, Canada appears vulnerable to such pressure. The Canadian forest products industry is indeed export-driven. By using media to instil fear in US investors and consumers about Canadian forest products, ENGOs hoped to put pressure directly on firms, and indirectly on governments. The common narrative casts the CBFA as a truce forced by market pressure from environmental groups.

Broader shifting market pressures weaken the markets pathway account. Arguably, the commitment of the Canadian Forest Products Association, under the leadership of Avrim Lazar, to the CBFA was partially the culmination of the industry's own efforts to transition into the niche market of sustainably harvested forest products in response to significant market contraction unrelated to the boycott campaigns (Scher 2008). Canadian timber markets are linked to the US housing market (Dyson 2007, Boytano 2010, Boychuk 2011, Preston 2011). With the collapse of the US housing market, Canadian timber sales plummeted from USD 88 billion in 2005 to USD 54 billion in 2010 (Boychuk 2011). Figure II 9.3 shows how US housing starts directly correlate with lumber price and Canadian lumber output. A number of Canadian timber companies entered bankruptcy, and in response the industry sought out different markets (Boychuk 2011, Boytano 2010). With decreasing demand in the United States and increasing exports to other countries, especially China, the necessary condition of market vulnerability is weak.

Though many industry responses directly followed efforts to target Canadian markets and US business partners (such as FSC certification, commitments to stop harvesting of old growth fibre), this correlation, absent the necessary condition of market vulnerability, is insufficient to conclude that the markets pathway independently produced a policy response or has directly led to new conservation. Forest product companies seem to have been primarily pursuing niche sustainability markets and increased business with China rather than responding to boycott campaigns. As described later, if anything, the role of high-profile market campaigns seems to be in raising the profile of direct access strategies.

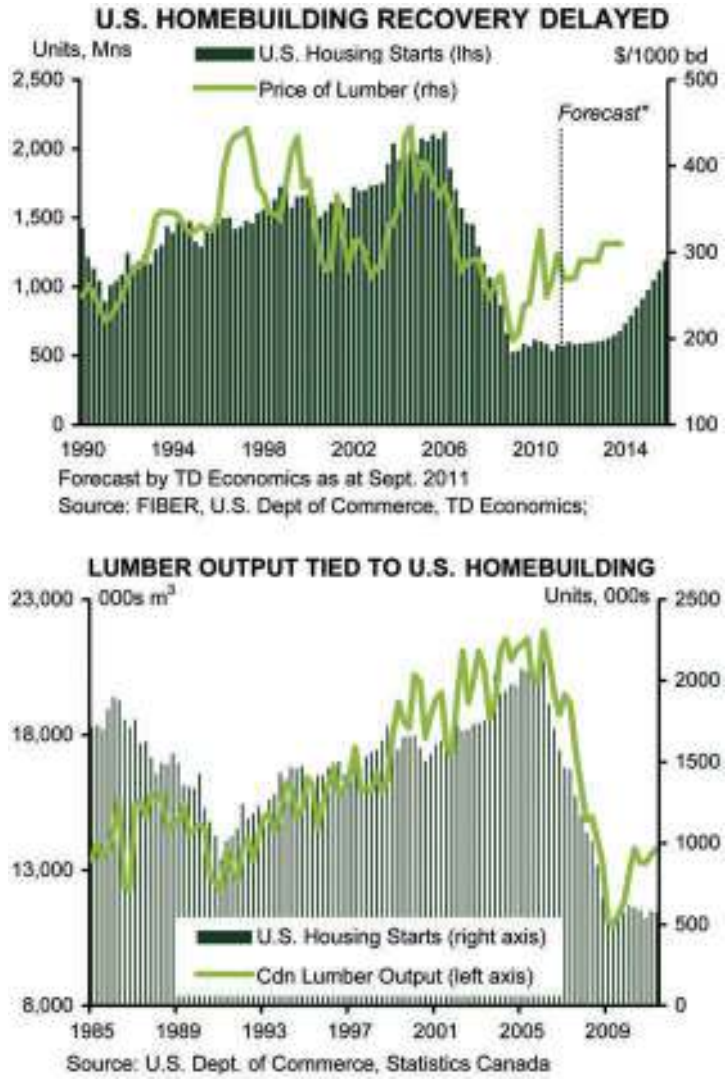

Figure II 9.3 Price of Lumber and US Housing Starts; Canadian Lumber Output and US Housing Starts (Preston 2011).

Additionally, the dissent of key domestic actors, especially First Nation groups, calls into question the independent policy impact of the CBFA as described by those who emphasised the markets pathway.

Many First Nations groups opposed the agreement because the negotiation process had largely excluded indigenous communities. The Assembly of First Nations rejected the CBFA because "ENGOs and forestry companies negotiated the CBFA without the prior consultation or meaningful participation of First Nations who have jurisdiction over the boreal forest that is located on their ancestral territories" (AFN 2011). The Nishanawbe Aski Nation (NAN) publicly condemned the CBFA for reasons including the failure to uphold the United Nations Declaration on the Rights of Indigenous Peoples and because it "violates the aboriginal and treaty rights of NAN" (Garrick 2011, NAN 2012). The Carrier Sekani Tribal Council called on all ENGOs to "improve their policies on working with First Nations communities. At minimum these ENGOs should be adhering to, supporting, and promoting the United Nations Declaration on the Rights of Indigenous Peoples" (The Dominion 2010). First Peoples Worldwide stated, "The Canadian Boreal Forest Agreement is the reigning example of global conservation's disregard for indigenous peoples" (First Peoples Worldwide Blog 2011).

However, the high-profile negotiation between ENGOs and the timber industry was not the only, or perhaps even most significant, venue of policy change. Much of the protected area associated with the CBFA was actually won cumulatively in more established local and national policy processes. In contrast with the CBFA, First Nations have played a much more significant and collaborative role with environmental groups in more open local, national, and international policy processes, travelling the direct-access and, to some extent, the international-rules pathways.

Despite some potentially relevant international rules pathways, international treaties and conventions appear to have had little discernible effect on achieving policy outcomes thus far. The campaign did secure a declaration from the International Union for Conservation of Nature (IUCN) about the conservation value of the boreal ecosystem and an official recommendation that the boreal ecosystems be protected at its 2004 congress, despite fierce opposition from Canadian IUCN delegates (IUCN 2004, Marilyn Heiman[3]). However, this recommendation is not binding and the Migratory Birds Treaty and the Convention on Biological Diversity do not appear to have been utilised to instigate policy changes. While actors certainty attempted to travel the rules pathway, observed policy outcomes with respect to protected areas and forest practices do not match the rules pathway predictions because none of the observed results were proceeded by or justified by enforcement of an international rule. The presence of germane international rules is insufficient to claim that they are effective in causing domestic policy change.

The FSC and its competitors that have international processes establishing principles and criteria for sustainable forestry were directly relevant to the level of protection achieved. However, as defined by Bernstein and Cashore, the international-rules references agreements enforced by states, while FSC and other forms of private governance are law-like, but not quite law unless officially adopted and enforced by a state. Canada is party to the FSC Principles and Criteria negotiations but does not enforce FSC standards. Thus, the use of FSC's boreal standard in making domestic policy is not an example of the rules pathway but rather a more complex interaction among pathways that does not fit neatly into the four pathways and deserves further investigation.

Through norms pathway, transnational actors may influence domestic policy by integrating normative discourse into their campaigns or by creating and utilising new norms. In Canada, there is a strong norm that ecologically significant areas should be preserved, and notions of conservation and intactness are becoming normative in Canada's environmental discourse (Hoberg 1997, Larry Innes[4], John Pierre Martel[5]). Because ideas about conservation, intactness, and global importance have already taken root in Canadian discourse, a key challenge for the IBCC campaign to travel the norms pathway was to present compelling science that demonstrated the ecological significance of the boreal forest and the ecological imperative to protect at least half of it in large, interconnected areas.

The campaign also worked to frame the boreal forest in light of international conservation norms, for example by referencing charismatic species (Wilson 2003). The public's new recognition and awareness of the boreal forest as a comprehensive ecosystem with high conservation value has been measurable through opinion polling. Interviewees attributed this new norm solely to the campaign and its media strategy that sought specifically to create a brand for the Canadian boreal ecosystem (Anne Levesque[6]).

Policy outcomes achieved via the international-norms pathway are likely to be the most durable. However, the influence of this pathway is, perhaps, the most difficult to capture empirically. The effect of the campaign's concerted effort to frame the issue of boreal conservation in terms of existing domestic and international conservation norms cannot be untangled from any policy successes achieved via the other pathways. Though direct linkages cannot be drawn between the campaign's efforts to influence and utilise norms and subsequent policy outcomes, it is plausible that these efforts played a critical role in setting the Canadian political agenda.

The first three pathways of internationalisation have been used to various degrees to influence policy outcomes in Canada, but direct policy outcomes cannot be demonstrated empirically. In contrast, new land protections can be directly traced back to the campaign's influence via the direct-access pathway. In this pathway, Bernstein and Cashore hypothesise that transnational actors can alter the balance of power among domestic interests by contributing monetary assistance or technical expertise.

In the case of the IBCC, transnational actors, primarily from the United States, integrated themselves into the domestic policy-making process through two main avenues: 1) through assistance to and creation of Canadian ENGOs and 2) by forging partnerships with Canadian First Nation groups, who have proved critical allies to the campaign and have benefited immensely from the funding and expertise contributed by US groups (IBCC 2007). Enabled by funds, information, and legal assistance from Pew, the First Nations, and Canadian ENGOs have achieved conservation commitments that likely would not have been realised otherwise. The next subsections describe how this pathway operated and the nature of its effects in the boreal case.

[3] Personal Communication with Marilyn Heiman, Director of the Boreal Songbird Initiative, 2007

[4] Personal Communication with Larry Innes, Executive Director of the Canadian Boreal Initiative, 2008.

[5] Personal Communication with John Pierre Martel, Vice President of Sustainability for the Forest Products Association of Canada, 2008.

[6] Personal Communication with Anne Levesque, National Executive Director of Canadian Parks and Wilderness Society, 2008.

9.5.1 Direct access – influencing pace and scale of policy change

Pew funding helped many domestic ENGOs in Canada build capacity, particularly for furthering conservation in the boreal forest. Pew, as the primary transnational actor in the IBCC, utilised the direct-access pathway by contributing funds, staff, and other expertise and support to Canadian ENGOs (Steven Kallick[7]). Pew started to move funds to Canadian ENGOs in 1999, primarily to aid Canadian Parks and Wilderness Society (CPAWS) with smaller conservation and land-use planning initiatives. The flow of assistance from Pew to Canada was supplemented by the support of groups such as Ducks Unlimited Canada and WWF Canada (Gary Stewart[8]).

In more than one case, enhanced capacity from Pew helped groups achieve protection that they had failed to achieve on their own. For example, CPAWS had been lobbying for the expansion of Nahani National Park since the 1970s, but it wasn't until 2008 that the extension was enacted. Resources from Pew may have given CPAWS the extra push it needed to convince government to expand Nahani (Stephen Woodly[9]). The relationships, funds, and other assistance brought by Pew allowed them to intensify their efforts, thereby achieving conservation goals that had remained elusive for decades.

Strategists at Pew also conceived of and started the Canadian Boreal Initiative (CBI), originally the Canadian Boreal Trust, to be the campaign's primary powerhouse within Canada's borders (Stewart Elgie[10]). The CBI was the hub of the IBCC in Canada and coordinated coalition members within Canada to work towards common conservation goals. Policy-makers were increasingly willing to work with the CBI because of the group's past successes in brokering solutions amenable to industry, aboriginal groups, Canadian ENGOs, and increasingly, the Canadian electorate. If the CBI continues to build legitimacy, the probability for realising future protection in Canada's northern forest appears to be high. By creating a single entity to concentrate on boreal protection in Canada, Pew facilitated strategic partnerships among different stakeholders in Canada.

These partnerships, new relationships, and unified objectives have not only influenced agenda-setting but have given political leaders the ability to satisfy more stakeholders at once by establishing timely and expansive conservation plans in the north. By delineating a long-term management proposal and consolidating support among scientists, businesses, First Nations, and ENGOs before the Canadian government put boreal conservation on the political agenda, the campaign took an approach that was deliberately a step ahead. The campaign also organized a letter of support for the Boreal Forest Conservation Framework that was signed by 1500 scientists, adding legitimacy to the campaign's eventual goals. Steven Kallick concluded that without the Boreal Forest Conservation Framework, it would have taken an additional three years of negotiating and lobbying; instead, the early articulation of the long-term policy goals for the boreal forced the government to deal with the campaign's pre-existing solutions (Steven Kallick[11]).

The CBI has also been successful at working with several First Nations communities to achieve mutual conservation goals in the boreal forest. Of the IBCC member groups, the CBI has forged the most partnerships with First Nations and now works with almost 20 communities and organisations. The indigenous, First Nations communities of Canada are emerging as powerful stakeholders with unique jurisdiction over the use of their traditional lands (Larry Innes[12]). The partnerships between First Nations communities and the CBI have resulted in the achievement of mutual goals that neither could have achieved alone, specifically through the creation of traditional land-use plans that incorporate conservation. New coalitions and alliances between First Nations and CBI follow a pattern of institutional change in Canada (Barry 2012), but in this case, the substantial and sustained inputs from the CBI can be seen as accelerating this change.

Encroaching development and polluted lands compromise the ability of First Nations to perpetuate their traditional land-use activities, leading First Nations to challenge government's and industry's activities as well as propose comprehensive land-use plans for their traditional territories. When ab-

[7] Personal Communication with Steven Kallick, Director of the International Boreal Conservation Campaign, Pew Charitable Trusts, 2007.

[8] Personal Communication with Gary Stewart, Senior Advisor to the International Boreal Conservation Campaign, 2008.

[9] Personal communication with Stephen Woodly, Chief Ecosystem Scientist for Parks Canada, 2008.

[10] Personal communication with Stewart Elgie, Faculty of Law University of Ottawa and first Director of the Canadian Boreal Initiative, 2008.

[11] Personal communication with Steven Kallick, Director of the International Boreal Conservation Campaign, Pew Charitable Trusts, 2007.

[12] Personal Commination with Larry Innes, Executive Director of the Canadian Boreal Initiative, 2008.

original chiefs signed treaties with the Europeans in Canada, they did not surrender the land but rather were granted rights to ensure the peace between the natives and settlers. The Canadian constitution delineates that aboriginal people in Canada are recognised and affirmed as having aboriginal treaty rights, which include the rights of indigenous peoples to sustain their cultural practices on the land, such as hunting, fishing, trapping, and other cultural activities. These land-use claims and related legal statutes have given First Nations the unique ability to halt development and secure protections on Crown lands (including the Canadian boreal forest) (JP Gladeau[13]).

Many First Nations, however, lack the capacity to take advantage of their treaty rights and have been denied access to the policy process. Pew, primarily through the CBI, contributed monetary resources to First Nation communities to increase their capacity locally.[14] The IBCC and its constituent organisations offered legal counsel and support, funds, and other technical information such as maps and ecological analysis to First Nation groups trying to secure lands for traditional use or to block industrial activity that compromises their land-use rights (Susan Casey-Lefkowitz[15]). First Nations communities became the human face of boreal conservation, and partnerships between IBCC member groups and First Nation communities have engendered many of the new protections in the boreal forest.

9.5.2 Assessing direct access into domestic forest policy

It is important to reassess Bernstein and Cashore's hypotheses for the direct-access pathway to ascertain whether they fit with the evidence presented. The hypotheses predict that the success of influence along this pathway is predicated on the openness of the policy subsystem to outside actors. While many Canadian ENGOs were open to joining coalitions, First Nations communities have been more hesitant to work with environmental groups to create parks or protected areas since parks, in the past, have been designed in ways that kept First Nations groups off of their traditional lands (JP Gladeau[16]). First Nations groups, however, are amenable to development on their lands as long as they can also preserve their traditional ways of life: indeed, most First Nations engage in multiple forms of collaborative relationships with both timber companies and other groups (Wyatt et al. 2013). The Pew campaign has successfully partnered with multiple First Nations groups by effectively demonstrating how protected areas can meet the needs of the community (JP Gladeau[17]). This is an example of an external ENGO aligning its conservation mandate with social, economic, and cultural goals of the First Nation community, creating a powerful policy coalition (Bennett and Lemelin 2013).

If policy networks are accessible, Bernstein and Cashore predict that the degree to which policies can be influenced will depend on the state's autonomy from traditional business interests. Environmental initiatives are largely favoured by members of both parties. Because of increased global attention to climate change, the environment has become a split issue that could potentially determine a Canadian election. Thus, Canadian politicians tend to seek environmentally beneficial accomplishments, and because no one is sure how to adequately or cost-effectively address climate change, it is much easier and less expensive to protect land (Jeremy Wilson[18]).

Bernstein and Cashore also predict that the success of new domestic organisations depends on the ability of those organisations to be involved in highly technical policy networks (Bernstein and Cashore 2000). The directors of the CBI have forged important relationships with government decision-makers and other high-level stakeholder groups within Canada. The CBI is set up to work with businesses (through the Boreal Leadership Council), First Nations in Canada, and governments and to be the broker of solutions when these interests come together to negotiate. For example, CBI provided consultation to Ontario's provincial decision-makers in a heated dispute between the Kitchenuhmaykoosib

[13] Personal communication with JP Gladeau, Senior Aboriginal Advisor for the CBI and Director of the Aboriginal Strategy Group, 2008.

[14] For analysis of similar cases in Canada and Finland through the lens of institutional capacity, see, respectively, Berry 2012 and Saarikoski et al. 2011, 2013.

[15] Personal Communication with Susan Casey-Lefkowitz, Senior Attourney at the Natural Resources Defense Council, 2008.

[16] Personal communication with JP Gladeau, Senior Aboriginal Advisor for the CBI and Director of the Aboriginal Strategy Group, 2008.

[17] Personal communication with JP Gladeau, Senior Aboriginal Advisor for the CBI and Director of the Aboriginal Strategy Group, 2008.

[18] Personal communication with Jermey Wilson, Professor of Political Science at the University of Victoria, 2008.

Inninuwug (KI) First Nations and a Toronto mining exploration company over unsustainable mining practices. The resolution of the conflict came when Ontario Premier Dalton McGuinty announced a complete overhaul of the outdated mining practices in Ontario and, in the spirit (and language) of the Boreal Forest Conservation Framework, established a commitment to protect 50% of Ontario's boreal forest from resource extraction. Campaign leaders agree that the CBI's involvement was instrumental in achieving this outcome (Stewart Elgie[19], Larry Innes[20]). In the absence of the CBI, it is likely that some degree of mining reform and reparations would have followed the dispute, but the involvement of the CBI in negotiations between the KI and the government of Ontario undoubtedly led to the adoption of a much more comprehensive resource management policy: the adoption of the Boreal Forest Conservation Framework.

The direct-access pathway appears to be the strategy that has had the most success at achieving protected areas on the ground (Scher 2008). Though the convergence of pressures from many pathways, including pre-existing domestic pressures, cannot be discounted, campaign directors agree that the IBCC's engagement with Canadian First Nations was the biggest boon to the campaign (Steven Kallick[21], JP Gladeau[22], Larry Innes[23]). This is notable given their absence from the CBFA process. With the aid of additional knowledge and financial resources from the campaign, the First Nations groups that have partnered with the CBI have possessed the political will and legal authority to conserve lands through local and national policy processes.

The main impact of this direct-access influence was not in direction but in the pace and scale of conservation (Scher 2008). Though Canadian ENGOs were moving policy in the direction of boreal forest protection and many First Nations would have eventually exercised their land-use rights, the legal and technical assistance from Pew allowed them to establish these plans more quickly and justify claims to larger land areas. Furthermore, the campaign was able to demonstrate the importance of conservation for these communities, likely resulting in more land dedicated to non-extractive uses in the final land-use agreements.

Following significant and sustained activity on the part of a transnational coalition associated with the IBCC, Canadian provincial and territorial governments enacted the cumulative protection of roughly 129 million ha[24] of new wilderness in the Canadian boreal forest (IBCC 2008). Between 1999 and 2005 (five years before the CBA), 26.5 million ha were strictly protected and 12 million more ha were under interim or imminent protection (IBCC 2007, 2008). In November of 2007, Canadian Prime Minister Stephen Harper announced the protection of 10.3 million ha in Canada's Northwest Territories. In July 2008, Premier Dalton McGuinty of Ontario pledged to protect half of Ontario's northern boreal forest from resource extraction, an area amounting to roughly 26 million ha of land and larger than the land area of Great Britain (The Gazette, Montreal 2008). Following on the heels of the McGuinty announcement, Quebec's Premier Jean Charest also announced that half of Quebec's northern forest would be protected from development and resource extraction, pushing the aggregate total area of protection to roughly 129 million ha (IBCC 2008). These protection decisions in Ontario and Quebec mark two of the largest conservation actions in the history of North America (Bernstein et al. 2010). Each of these incremental changes occurred before the CBFA and, in many cases, without the support of companies targeted by market campaigns (see Map "Boreal Forest Conservation Accomplishments since 2000" in Supporting Maps and Graphics for Carlson et al. 2009[25]).

With these new additions, permanent and interim protection since the inception of the campaign amounts to more than 22% of the boreal ecosystem. Prior to the campaign, roughly 8% of Canada's boreal forest was protected, resulting in an aggregate

[19] Personal communication with Stewart Elgie, Faculty of Law University of Ottawa and first Director of the Canadian Boreal Initiative, 2008.

[20] Personal communication with Larry Innes, Executive Director of the Canadian Boreal Initiative, 2008.

[21] Personal Communication with Steven Kallick, Director of the International Boreal Conservation Campaign, Pew Charitable Trusts, 2007.

[22] Personal communication with JP Gladeau, Senior Aboriginal Advisor for the CBI and Director of the Aboriginal Strategy Group, 2008.

[23] Personal communication with Larry Innes, Executive Director of the Canadian Boreal Initiative, 2008.

[24] This figure includes permanent protection, interim protection, and commitments that were still in the process of being translated to land-use plans at the time the figure was calculated. Campaign history suggests that backsliding is not a problem and that interim protections will be finalised.

[25] Map "Boreal Forest Conservation Accomplishments since 2000" Accessible at http://www.borealbirds.org/images/carbon/map-canprotected.png.

protection of 30% of the entire ecosystem prior to the CBA. Other new protection not specified here is primarily in the Northwest Territories, the Yukon, Quebec, and Labrador (IBCC 2008). Considering the substantial effects of the IBCC through the direct-access pathway prior to the CBFA, the CBFA itself is not the primary locus of policy punctuation but rather a moment at which changes that had long been in the works were recognised as a significant punctuation.

9.5.3 Implications for NGOs and business strategies and further research

Additional research is needed to refine how and when the direct-access pathway is likely to affect the pace and scale of domestic policy. Further research is also needed to assess interaction among pathways. As the case of the CBI and market campaigns leading to the CBFA illustrates, direct-access and market pathways interact and, in addition to being aware of the distinct logics and conditions described in this chapter, NGOs may want to sequence campaigns. Companies, aware of the effects that transnational actors can have on policy may want to manage their practices and brands accordingly, perhaps even aligning with transnational actors and their local partners to boost brands and expand markets for sustainable forest products.

Though certification is a popular demand of boycott campaigns, it, like the boycott itself, lacks durability unless fully embraced and integrated into a company's business model. Rather than advocating for certification or changed practices directly, NGOs might ask that companies lend their support to regulations – for example, ones that require certification practices as called for by the CBFA. This translates market power into durable policy change. For targeted companies that are primarily interested in differentiating themselves through certification anyway, advocating for policy changes might be an added cost that potentially dilutes brand differentiation. However, where the primary interest is ending a damaging boycott campaign, this strategy may work well because it imposes similar cost on competitors and because durable policy agreements create more predictable business environment than fickle industry-NGO agreements. The ability of an agreement like the CBFA to inoculate companies like those in the Canadian Forest Products Association from future market campaigns rests on the agreement becoming legitimate policy and then demonstrating compliance with that policy.

The boreal case shows that sequencing of pathways travelled by campaigns may be counterintuitive. While the high-profile agreement was announced as a settlement after the boycott campaigns had peaked, the groundwork laying the foundations for the process began many years prior to the market campaigns. An existing process with legitimacy among policy-makers and industry provides a place for boycott campaigns to translate power from the market to policy. It should be noted that while targeting modest, practical, achievable policy solutions, such a process must maintain strong environmental credentials in order to ensure that environmentalist brands are not damaged and that industry brands are bolstered. For industry, this approach, again, may be desirable because it focuses on broad policy solutions that spread regulatory costs across the industry and make these costs predictable. However, engaging in a process with lofty environmental goals may increase expectations for environmental performance. Depending on the process framework, industry representatives may have a veto on recommendations.

As seen in the boreal case, building capacity among local groups though funding, technical and legal assistance, and training can shift the balance of power among stakeholders at local and national scales, causing incremental policy changes that can add up to significant change, possibly more significant than more higher-profile strategies. However, more research is needed to identify potential strategies and causal logics that might connect local capacity-building to national-level balances of power and market dynamics. Further research might also explore the conditions under which powerful forestry companies might support such direct-access policy advocacy.

9.6 Conclusions: Internationalisation of domestic forest policy?

Actors empowered by the IBCC continue to be a force in Canadian domestic policy, and policy debates about relative levels of protection and harvesting in Canada's boreal forest are ongoing. On December 6, 2012, Greenpeace announced its withdrawal from the CBFA, citing road-building that it claimed violated the agreement and that the "only responsible decision for Greenpeace [was] to pursue other pathways to obtain results in the forest" (McDiarmid 2012). For those who saw the effect of the IBCC as emerging from market pressure that forced forest products companies to agree to the CBFA, this development may seem to question the durability of the results of such campaigns. However, a closer look at the multiple pathways travelled shows that the conditions required for market pressure to be effective are inconsistent with many of the observed policy

changes. Rather, the effect of the IBCC can be seen in multiple policy venues with substantial effects preceding and beyond the CBFA itself, primarily through forming partnerships and sharing resources with domestic groups.

This chapter has shown not only the importance of this direct-access pathway but also how more empirical and theoretical work is needed regarding the operation of this pathway and the interaction among initiatives. These conclusions are based upon evidence from the past 20 years with respect to two types of policy change: forestland designations (e.g. protected areas) and forest management practice requirements. Our units of analysis for process tracing included both governmental processes (provincial and federal) and private governance (forest certification and industry/NGO agreements) because each of these processes, state and non-state, was able to affect these land designations and forest practices. Applying Bernstein and Cashore's framework revealed two things: 1) Despite the emphasis placed on the markets pathway in the existing literature, the direct access pathway has been much more important than previously thought and 2) building upon Cashore and Howlett's critique of the "external perturbations" model, we can improve upon our understanding of the mechanisms of change, the pace and scale of policy change, and hence the resulting policy equilibrium.

Just as environmental problems often reach beyond sovereign borders, the effects of internationalisation cannot be neatly boxed off from pre-existing domestic forces at work. Indeed, in the case of the IBCC, our evidence suggests that transnational actors were not responsible for altering the directionality of boreal conservation. Nevertheless, transnational actors do appear to have amplified conservation in Canada's boreal forest. They increased the pace and scale of policy change, both by adding resources to domestic efforts and raising the issue on the national agenda. International pressures do matter, but just how they do (i.e. the precise nature of their causal influences) and their interactions with domestic processes are critically important questions in this era where prominent issues of domestic environmental management are global as well as local.

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Sustainable forest management on federal lands in the US Pacific Northwest – making sense of science, conflict, and collaboration

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Abstract: Sustainable forest management is a contested concept in the US Pacific Northwest, especially on federal forestlands. Over the past three decades, through political conflict and negotiation, the term has evolved from a focus on sustained-yield timber harvest to include species recovery, ecological restoration, and collaborative management. This chapter compares two mechanisms − the Forest Ecosystem Management Assessment Team and place-based collaboration − that have redefined how sustainable forest management on federal land is understood and practiced. Both innovations brought new approaches to forest management in the Pacific Northwest, ranging from interdisciplinary science-based analysis to a strong culture of participatory, inclusive deliberation on federal forestlands at the local level. They have undisputedly changed forest management since the Northwest forest crisis of the early 1990s. Yet, they operated in a context where older dynamics were in play, including the primacy of agency expertise, the role of courts as a venue for conflict resolution, and budget structures that make integrated management difficult and limit the capacity of collaborative groups to act. The legal frameworks of the federal land-management agencies have not changed significantly, creating a complex, hybrid system.

Keywords: Collaboration, planning, ecosystem management, community-based forestry, regional, conservation, Oregon, Washington, Forest Service

10.1 Introduction

The US Pacific Northwest region – covering Washington, Oregon, and northern California – is home to the largest trees and some of the last remaining virgin temperate rainforests worldwide. The region has a productive forest industry sector as well as a vibrant community of environmental activists. During the 1980s and 1990s, the land owned by the national government (so-called federal lands) in the Pacific Northwest was at the centre of one of the most intensive forest policy conflicts in the world. At issue was whether old growth trees would continue to be harvested or protected. This Northwest Forest Crisis ultimately resulted in a dramatic shift in forest policy on federal lands in the mid-1990s not only in the Pacific Northwest but on all federal forestlands across the western United States.

Sustainable forest management has long been a central concept to Pacific Northwest forest policy. However, as in so many other forest regions, the concept has been highly contested and has changed meaning over time (Winkel et al. 2011). Varied and contested ideas have been institutionalised into the processes of forest management over the past century, creating a complex mix of new and old ideas that drive forest management in the region (Moseley 1999, Johnson 2007).

Most of the controversy around sustainable forest management has been related to the vast federal forestlands in the region. For the past three decades, the Pacific Northwest has been a laboratory for new ideas. Forest management concepts such as ecosystem management, adaptive management, and ecological restoration were developed or tested in this region. Later, these concepts significantly influenced

forest management in other parts of the world.

Pressure for innovation was also significant in forest policy-making. The intensity of conflicts in the late 1980s and 1990s triggered the development of new approaches to federal forest management in the region. In this paper, we discuss two influential and innovative approaches to forest policy-making that developed at this time. First, the Forest Ecology Management Assessment Team (FEMAT) was established during the height of the Northwest Forest Crisis to develop a regional plan for managing the wet forests in the western part of the region. FEMAT brought together federal land managers and university and agency research scientists in a new regional-scale approach to land management analysis and planning. Second, at the same time, local, place-based[1] collaboration and community forestry approaches developed in the region. Since the early 1990s, an increasing number of place-based multi-stakeholder collaborative groups have sought to engage diverse stakeholders in processes to solve complex problems of restoring ecosystem function while creating local economic opportunity. These two approaches to forest policy aimed to redefine and implement sustainable forest management on the region's national forests. Although they are in many ways distinct approaches, both were driven by the same stresses and conflicts, and today both are part of a complex governance system for national forest management in the region.

In this paper, after to a brief chronology of the political development of sustainable forest management on national forests lands in the Pacific Northwest, we describe FEMAT and place-based collaboration and compare these two strategies as mechanisms to address conflict in the Pacific Northwest. We conclude with an outlook on major challenges related to the Pacific Northwest's forest policy and the issue of sustainable forest management on the region's federal lands in particular.

[1] We use the term *place-based* rather than *local* because these collaborative groups are organised around a particular geography or place but may include participants (such as regional interest-group activists) who do not live or work nearby and may participate in multiple collaborative groups.

10.2 A short history of forest policy in the US Pacific Northwest

10.2.1 The institutionalisation of the sustainable-yield forestry paradigm

The US Pacific Northwest is an ecologically diverse landscape due to the varied terrain. The west coast includes a temperate rainforest created by coastal mountains and the volcanic Cascade Mountain range (Figure II 10.1). The east side of the Cascades is arid and can only support trees at higher elevations, where there is adequate moisture. Wildfire is a frequent natural disturbance, especially in the dry forests in the eastern two-thirds of the region. Forests are largely coniferous, with broadleaf species only in the understory or in isolated pockets. The particular conifer species depend on moisture availability and include Douglas-fir, true fir species, cedar species, and many species of pine.

Prior to the European settlement in the 19th century, the forest landscapes of the Pacific Northwest were mostly used by Native Americans. Relatively little is known about how extensively and intensively Native Americans impacted forests, although it is clear that forests were sources of material for housing and transportation, food, and clothing. Native Americans in many places used fire to manage the forests (Johnson and Swanson 2007).

In the 19th century, Europeans brought cattle and sheep grazing, gold mining, agriculture, fishing, and, later, timber harvest and processing to the region. At the end of the 19th century, members of the so-called Progressive movement (a political movement that emphasised the importance of government-led scientific expertise and long term planning for the public welfare) were increasingly concerned about the prevalent timber harvest model in the US – clear-cutting followed by abandonment, which occurred in the Great Lakes states in the 19th century (Fries 1951, Dana and Fairfax 1980, Hays 1999). They feared that this practice would also occur in the far western United States once the timberlands further east were exhausted. These progressives, led by Gifford Pinchot, began to advocate for holding vast parts of the remaining forestlands in reserves rather than granting them to homesteaders and railroad companies. In 1897, Congress created the US Forest Service to manage forest reserves for, in the words of Pinchot, "the greatest good for the greatest number over the longest time" (USDA Forest Service 2007). Subsequently, large tracts of the forestlands in the West became forest reserves and, later, national forests. Today, the US Forest Service and Bureau of Land Management (BLM) together control approximately 58% of all (forested and not) lands in the states of

Figure II 10.1 Precipitation and forest cover in the Pacific Northwest.

Figure II 10.2 Public lands in the Pacific Northwest.

Oregon and Washington (Figure II 10.2). In addition, Indian Reservations account for approximately 4% of the land and state ownership is approximately 5%. Timber investment management companies (known as TIMOs), industrial timber companies (which own both forestlands and sawmills), and non-industrial, family forestland owners control the remainder of the forestlands.

Pinchot and his peers believed that the best way to manage these forests would be for the federal government to hire professional forest rangers as civil servants who would work for the long-term common good of the nation and be free from the influence of industrial timber companies and other local interests. Pinchot and those who followed worked to create a bureaucratic culture with a strong "can do" attitude that allowed the agency to efficiently implement management objectives such as fire suppression and scientific forestry (Kauffman 1960, Carpenter 2001). Yet, in the Pacific Northwest, a vast and sparsely populated territory where timber supply seemed infinite, there was limited demand for federal timber during the first half of the 20th century. Consequently, the Forest Service was focused primarily on controlling grazing, fire suppression, and building trails and roads during the first 50 years of the century, and its management approach was mostly described as custodial (Dana and Fairfax 1980, Steen 2004).

Yet, after World War II, timber harvest became the central focus of federal forest management in the Pacific Northwest. With private forestlands cut over during the War and in the post-War housing boom, especially in California, there was enormous demand for lumber, with the federal lands still largely unexploited. At the same time, the belief that scientist and professionals could improve upon nature was at its peak (Hirt 1994, Hayes 1999, Moseley 1999). The Forest Service and BLM focused efforts on conversion of natural stands into young, productive plantations. During this period, sustainable forest management was conceptualized as sustained-yield forestry (Burnett and Davis 2002, Johnson 2007). Well-supported by Congress, the Forest Service and BLM developed a strong bureaucratic culture and financial systems to harvest and convert old-growth forests to plantations (Clary 1986, Steen 2004). Timber harvesting produced low-cost building materials to rapidly growing California. The revenue from timber harvests created well-funded forest management agencies, numerous business and jobs opportunities in the region, and substantial payments to local government, which limited the needs for local taxation (LaLande 1979, USDA Forest Service 2007).

10.2.2 The Pacific Northwest Forest Crisis

The Forest Service's strengths of independence and efficiency focused on timber production eventually became weaknesses as the nation's attitudes changed about how national forests should be managed. With the rise of environmentalism in the United States in the 1960s, there was growing controversy over federal forest management, especially the practice of clear-cutting old-growth forests, which had been prohibited at the founding of the Forest Service but

the agency was practicing widely. Protests and court cases followed that sought to change management practices. Facing this political pressure and a court decision that determined clear-cutting to be inconsistent with federal law, Congress passed a number of laws to change how national forests were to be managed. The National Forest Management Act of 1976 replaced the original founding act of the Forest Service. It legalised clear-cutting on national forests but created requirements for forest planning, emphasized multiple use, and required protection of sensitive species of plants and animals. The National Forest Management Act was enacted in a period with significant other legislation, including the Endangered Species Act (requiring the protection and recovery of threatened and endangered species), and the National Environmental Policy Act (requiring the disclosure of the environmental impacts of federal actions) placed significant new environmental protection obligations on the agencies (Biber 2009).

Although these laws did increase a focus on environmental protection and opened the door to new forms of public engagement, they did not fundamentally change the focus of the agency on timber management in the 1970s and 1980s (Hirt 1994, Burnett and Davis 2002). In response to the new legal requirements, the Forest Service extensively engaged in professional planning in order to substantiate multipurpose forest management. The computer-based FORPLAN model tried to integrate different societal demands into bureaucratic decision-making, but it was driven by the calculation of the allowable sustained cut (Hirt 1994, Biber 2009). Moreover, with the forest products industry still the largest sector of the economy in the Pacific Northwest, local economies reliant on large-scale federal timber harvest and local governments dependent on revenue from federal timber harvest, there was enormous pressure to continue high-harvest levels despite new laws and growing environmental protest. Hence, it was not until the second half of the 1980s that the logging on federal forestland peaked in the Pacific Northwest (Moseley 1999).

These new laws did, however, create new leverage for environmentalists to begin to force changes in the agencies (Moseley 1999). During the late 1980s and 1990s, environmental activists used these laws to challenge forest management practices of the Forest Service and BLM. Grassroots environmental groups formed, which would become known as "forest watch" groups. They would read the environmental analyses for timber sales, write comment letters, appeal, and sometimes litigate them. Over time, many of these groups banded together to create the Ancient Forest Campaign, which had a political and legal strategy to end native forest logging on federal lands in the Pacific Northwest (Durbin 1996).

Through a series of lawsuits in the late 1980s and early 1990s in which environmental activists successfully argued that the federal land-management agencies had neither adequately disclosed the environmental impacts of their actions nor developed sufficient plans to protect the threatened northern spotted owl, environmental activities managed to get series of injunctions halting logging on federal lands in western Oregon and Washington (Yaffee 1994).

The land management agencies had written numerous plans during the Reagan and first Bush administrations, but with enormous political pressure and significant bureaucratic inertia, they were unable to develop a plan that would comply with the laws and courts and with the political expectations of their political allies at the same time (Yaffee 1994). With businesses, workers, and rural county governments highly dependent on federal timber harvest, the region found itself torn apart: major controversy developed, including social protests from both sides and heavy involvement of not only regional but also national media and politics.

10.3 New tools for sustainable forest management

10.3.1 FEMAT and the Northwest Forest Plan

After nearly a decade of conflict over federal forest management and federal agencies' efforts to write management plan after management plan that would satisfy the courts, environmentalists, and the timber industry, newly elected President Bill Clinton held a forest summit in early 1993 in Portland, Oregon. This conference brought together agency personnel, research scientists, and stakeholders to discuss how to move forward. Following that meeting, the Clinton administration convened the Forest Ecosystem Management Assessment Team (FEMAT) to create a plan to facilitate not only spotted owl and salmon recovery but also protect a large number of other species thought to be dependent on old-growth habitat.[(2)]

[(2)] In parallel to FEMAT, President Clinton created two other teams, one focused on coordination among state and federal natural resource and economic development agencies and a second whose task was to focus on easing the economic transitions that were going to occur as a result of reduced timber harvest on federal forest lands in the region (Hellström and Vehmasto 2001). Although this section focuses on FEMAT since it was this process where sustainable forest management was reconceptualised, these two other committees were also central to making the transition away from old-growth harvesting politically and economically feasible.

FEMAT had the task of collecting scientific evidence about ecological, social, and economic conditions and to develop options to meet the legal species protections requirements while providing timber supply and other resources from federal forestlands. In this sense, FEMAT had to redefine sustainable forest management and related policies in the region (Yaffee 1994, Hellström and Vehmasto 2001). FEMAT was a departure from previous approaches to environmental assessments in that it included non-agency scientists from the region's universities. It also included a number of prominent natural resource social scientists charged with determining the social and economic impacts of the new plan on timber-dependent communities in the region.

Over the course of 90 days, FEMAT processed vast amounts of interdisciplinary scientific information and evidence related to forest ecology, potential vulnerable plant and animal species, and management. It also brought together information about employment and other economic impacts of the pending changes as well as likely impacts to life styles and cultures of forest-dependent communities (Hellström and Vehmasto 2001). It synthesised scientific and professional evidence that had been created over the decades of struggle over forest policy and transformed this information into new policy and management recommendations. In this sense, FEMAT created a new, holistic perspective on forest policy that fundamentally departed from the old perspective focused mostly on timber (Shannon 2003).

FEMAT drew on a decisionist model of policy advice. Scientists analysed the issues and developed several management options based on scientific evidence, with policy-makers responsible for deciding on one of the options based on a value judgment. Yet, FEMAT was constrained by significant political dynamics. For example, when the involved scientists presented eight policy options that differed according to their effects on forest ecosystems and on forest-based economies and forest-dependent communities, the Clinton Administration was concerned that the options that would adequately protect species, as required by law, would not produce enough timber to create a politically viable solution. Political pressure led to the development of a ninth option that provided for the legally required and politically demanded protection of species dependent on old growth species while enabling a higher annual cut. The Clinton Administration selected this ninth option, which became the basis for the Northwest Forest Plan. This plan covered the federal land in the range of the northern spotted owl (western Washington, Oregon, and northern California). It created a "meta framework revising all the administrative-unit plans of the agencies within the analysis area" (Shannon 2003, p. 264).

FEMAT and the Northwest Forest Plan institutionalized a major shift in the Pacific Northwest's forest policy on public land (Table II 10.1). They greatly reconceptualised the former model of forest management and policy based on sustained yield. Ecosystem management and conservation, including ecological restoration of harvested forests and plantations, became the central paradigm of sustainable forest management in the Northwest federal forests. The Forest Service and BLM's former concept of community stability via continuous timber support for the local mills was replaced by a broader concept for rural development based on community well-being. The Plan further foresaw extensive ecological monitoring and assessment for all management operations on federal forestlands and introduced the concept of adaptive management. Finally, broader public involvement in forest policy and collaboration with all affected stakeholders was set up as an important paradigm for public forest policy.

Following FEMAT, the Forest Service and BLM initially sought to continue efforts to engage key stakeholders and experts in forest management. With a bioregional focus, the agencies created public advisory groups to provide input regarding the implementation of the Northwest Forest Plan. A central challenge of sustaining these agency-led collaborative groups was the Federal Advisory Committee Act (FACA). The law was originally designed to prevent undue influence of interest groups over government decision-making by formalising processes in which the federal government asks for advice from nongovernmental individuals and entities. FACA meant that agency-led groups, such as these advisory groups, were quite formalised, with limited and controlled membership. As political focus shifted away from wet Northwest forests by the end of the Clinton Administration, these groups, along with much of the inter-agency collaboration, faded away.

In a similar vein, the concept of adaptive management envisaged by FEMAT and the Forest Plan was never really implemented. Adaptive management sought to establish a management philosophy that departed from long-term, expert-based static planning and would replace it with an approach characterised by continuous monitoring of management effects and continuous societal renegotiation of management objectives. There is no consensus on why this concept did not succeed, but one important reason was that planning and management institutions in place still favoured upfront planning (such as national forest and project planning regulations) and processes that inhibited post-activity collective learning and adaption. As Shannon (2003) notes, given the persistency of path-dependent institutional and organisation cultures, the implementation of rather rationalist, technical, or science-based management options and tools was more successful than the implementation of the more postmodern elements of FEMAT and the

Table II 10.1 Shifting goals of forest management in the Pacific Northwest.

	Environmental goals	Socio-economic goals	Governance/ public participation structure
Pre-1890	Develop western natural resources.	Provide families and businesses with access to resources; develop transportation infrastructure.	Use land grants to families and railroad companies to encourage resource exploitation and economic development. Hired federal employees via patronage rather than training/skill.
1890s–1945	Conserve resources for future generations; suppress fire to protect forests; protect particularly beautiful landscapes as national parks.	Protect citizens from monopolistic corporations; provide controlled access to resources.	Involve public through representative democracy (via Congress). Employ technical professionals for government work for the common good.
1945–1970	Improve upon nature through scientific forestry and fire suppression, protection only in national parks and (later) wilderness areas.	Provide logs to sawmills to create economic stability; provide recreation opportunities for urbanising population.	Involve public through representative democracy (via Congress). Employ technical professionals for government work for the common good.
1970s–1990s	Improve upon nature through scientific forestry and fire suppression; protect special places via protected areas; protect species and water; limit negative impacts of management via planning and disclosure.	Provide logs to sawmills to create economic stability; offer opportunities for urbanising population.	Involve public via Congress and direct public comment on proposed plans and activities, lawsuits to oppose.
1990s–present	Protect and restore ecological functions and processes and species protection on all national forestlands.	Provide forest products as by-products of ecological restoration, ecosystem service provision, and recreation.	Encourage public participation via multi-stakeholder collaboration; public comment and appeals, and Congress.

Forest Plan. In that way, it was not only – or even not so much – FEMAT and the Forest Plan but also the subsequent implementation process that led the whole instrument, to a certain degree, to reinforce the hegemony of professional expertise and science-based management in the region. Yet, the science that drove the new policy was dramatically different from the forest economics and silvicultural models that had coined management before the change.

Despite these shortcomings, FEMAT and the resulting Northwest Forest Plan were the decisive tools and catalysts for a tremendous policy change that resulted from a major forest policy crisis. The policy concepts developed and legitimised by FEMAT were able largely to stop the cutting of remaining old-growth forests in the region. The new policy ended the era of timber orientation of the Forest Service and destroyed the iron/wooden triangle that had dominated forest policy for several decades. With the federal forests being designated primarily for species recovery and ecological restoration being the management paradigm, the annual timber cut in the Pacific Northwest's national forests decreased sharply from about 6 billion board feet at the end of the 1980s to well below 1 billion board feet in the second half of the 1990s, where it remained.

Although the Northwest Forest Plan effectively protected the remaining old-growth forests in the

region, the agency never achieved the timber harvest envisioned in the plan. Even with federal funds to support economic adjustment and the booming economy 1990s, some communities suffered considerable economic decline (Charnley et al. 2008). FEMAT and particularly option 9 – the option the Northwest Forest Plan was based on – turned out to be too optimistic in what it could accomplish in terms of trade-offs between conservation and timber production. This was especially true as the agencies responsible for implementing the plan had lost most of their credibility. Moreover, these agencies were confronted not only with sustained political polarisation and continued environmental litigation but also severe budget cuts, caused in large part by the loss of timber revenue (Shannon 2003). Hence, timber harvest from public lands never achieved the desired output, and even the measures that had been established by the government to compensate timber-dependent counties and communities for the loss of revenues and industrial capacities were not able to avoid the decline of some rural communities where alternative economic activities could never be established (Haynes et al. 2006, Charnley et al. 2008).

Nearly 20 years later, the Northwest Forest Plan, especially its management direction and species protection components, have proven remarkably durable. The Plan has been institutionalised into agency management. Arguably, it has created significant rigidities in forest management in the face of changing scientific understanding of the forests and growing understanding of some of the ecological shortcomings of the plan, as well as the desire, especially from timber companies and county governments and their allies, for increased timber harvest.

It is interesting to note that, given its political importance, FEMAT was unique. Although there was a similar process in the Sierra Nevada in California that successfully created a regional management plan, similar efforts to create large-scale plans based on intense interdisciplinary scientific assessments, for instance in the arid region of the Pacific Northwest east of the Cascades Mountains, failed. During the 2000s, the second Bush administration attempted to revise the Northwest Forest Plan on BLM lands within the Northwest Forest Plan area. Despite significant resources that have been spent on analysis and planning in these processes, they were abandoned when either legal or political considerations came into play. Hence, one may conclude that FEMAT was possible only in the specific climate of major political crisis and stalemate.

10.3.2 Early place-based collaboration

Beginning in parallel to FEMAT were the rise of grassroots, bottom-up efforts to resolve conflicts in federal forest management and identify activities that could at once, improve ecological conditions and provide economic opportunity for local workers and businesses displaced by the decline of federal timber harvest. These were place-based, multi-stakeholder groups that included local community residents, environmental activists, and timber industry representatives. Such processes engaged non-experts more deeply than previous efforts. In addition, they conceptualised the role of science and knowledge differently, to include not only science but also local knowledge as a legitimate basis for forest-related decision-making. These efforts were similar in some ways to the community forestry movements in other parts of the world. Some of the early leaders in the Pacific Northwest were connected to the international community forestry efforts through their own international experience, scholars at the University of California, Berkeley, and program office from the Ford Foundation.[3]

Among the first of these in the Pacific Northwest was the Applegate Partnership, which was founded in 1992 in southwest Oregon. A number of community leaders believed that if they could work together across interest groups along with the Forest Service and BLM, they could develop new forest management projects that would manage all lands – public and private – to improve wildlife habitat while sending logs to the sawmills. The Applegate Partnership formed at the peak of the Northwest Forest Crisis, while the injunctions were still in place. This group met weekly for several years and has continued to meet monthly for 20 years (Applegate Partnership 2013).

Given the severe strife and resulting low trust in the Pacific Northwest at the time, participants spent considerable time working to build civil dialogue and trust. Frequently potluck meals and field tours were centrepieces for building trust and identifying common ground. Participants sought to identify common values and areas of agreement and avoid interest-based negotiation that so dominated regional forest politics. They developed a motto, "practice trust, them is us" (Moseley 2001). When the Clinton administration was looking for models to help solve the Northwest Forest Crisis, the Applegate Partnership became an example of the kind of approach that could both improve the environment and provide wood products.

[3] Key informant interviews conducted by the first author and her colleagues at University of Oregon in 2012 with various collaborative group participants.

Initially, the Applegate Partnership developed projects at the forest-stand level, where the group carefully negotiated timber harvest prescriptions that incorporated goals for habitat improvement and other priorities. Over time, the partnership increased both the scope and scale of their efforts. As the agencies' declining staffing made it difficult to implement innovative environmental analyses to match the group's agreements, they experimented with collaborative environmental analysis. The work in forestry developed a collaborative culture that led the partnership to be among the first in Oregon to engage in collaborative fisheries recovery work. In addition, the group also was among the first in the nation to create a watershed wide "fire plan" consisting of a landscape analysis of forest conditions and fire risk. The fire plan, along with a handful of other plans helped to shape the first Bush Administration's Healthy Forest Restoration Acts' wildfire planning provisions (Applegate Partnership 2011).

Despite the Partnership's innovative efforts, on-the-ground success in forest management proved difficult to achieve at times. This was for a wide variety of reasons, often having to do with institutional limitations such as declining staffing, budgets, and the limited decision space created by the Northwest Forest Plan. In addition, the ongoing regional political conflicts over timber harvest on federal lands, continued lawsuits, and the limited organisational capacity of the Partnership itself hampered its impact. Consequently, successes and accomplishments have ebbed and flowed over its two decades of existence.

10.3.3 Maturing place-based collaboration[4]

Over the next decade following the Applegate Partnership's founding, collaborative groups expanded across the Pacific Northwest, including the arid eastern Oregon and Washington (Figure II 10.3). These more arid regions have faced similar conflicts over forest management and endangered species protection. By the late 1990s, timber harvest had dramatically declined, and many of these communities had fewer economic alternatives due to their isolation than communities in the wetter, more populous western part of the region. In some places, the sense of shared fate led to the creation of collaborative groups that focused not only on forest management planning and analysis but also on protecting the last remaining sawmills in their communities or building new types of small-scale manufacturing capacity to utilise the by-products of thinning and other forest restoration projects.

In the late 1990s, residents of Wallowa County in northeastern Oregon started to come together to see if they could reduce conflict and find a way forward for their county. Wallow County historically relied on grazing and timber harvest on public lands. Its rugged beauty also attracted nature tourists and artists. Although outside of the spotted owl area, Wallowa County saw the near end of timber harvest on its federal lands by the late 1990s due to court injunctions associated with the protection of threatened and endangered salmon, the culturally and economically most important fish in the Pacific Northwest. More physically isolated from transportation corridors and urban areas than the Applegate Valley, and more natural-resource dependent, sawmill jobs were the only manufacturing jobs in the county. By the late 1990s, all but the last sawmill had closed, and long-time residents were moving away. Remaining residents were pessimistic about their future.

After local protests against reduced timber harvest became increasingly divisive, a number of residents came together to try to identify common ground. Over time, the local county government began to sponsor this nascent collaborative group and they developed a basis for on-going collaboration. Local residents quickly realised that their efforts would require a nongovernmental organisation to facilitate the collaborative work and implement the agreements that the group developed. Community leaders, with the assistance of Sustainable Northwest, a regional organisation focused on fostering conservation-based economic development and place-based collaboration, founded Wallowa Resources. This organisation became a major source of organisational capacity to foster agreement around federal forest management and rural economic development and to work toward implementing those agreements. Community residents and their partners developed ideas and strategies that went well beyond what could have been implemented through volunteer efforts of community residents.

From the beginning, Wallowa Resources and its community partners simultaneously pursued strategies and activities that would at once improve ecological conditions and create economic opportunity via land management. For example, working closely with the Forest Service, they developed a detailed watershed analysis that covered both public and private lands and included not only forest resources but also rangelands, water, and fisheries. This process identified a number of restoration activities to improve ecosystem conditions. In paral-

[4] This section is based on research by the convening lead author and her collaborators, Emily Jane Davis, Autumn Ellison, and Branda Nowell.

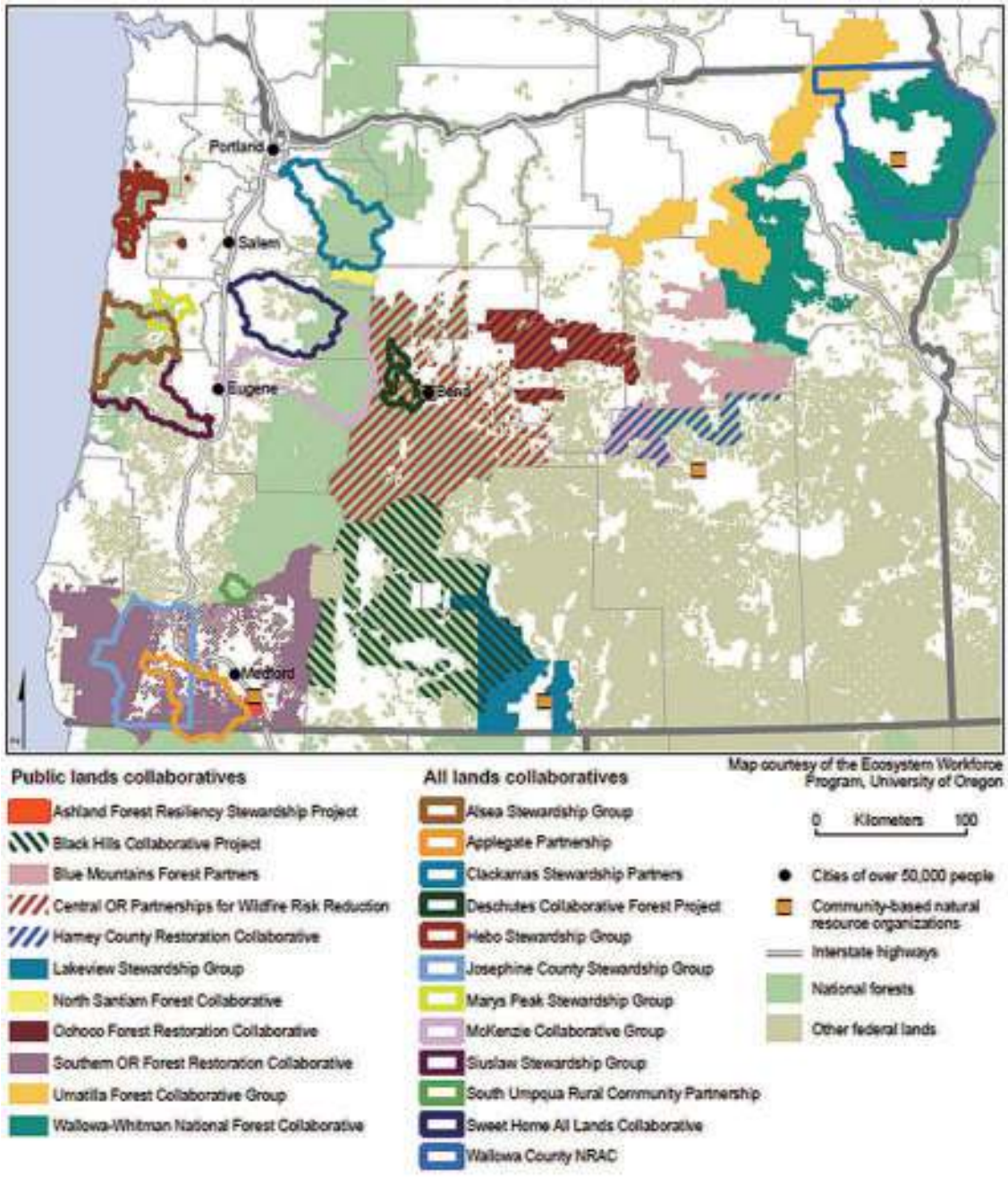

Figure II 10.3 Collaborative groups in Oregon.

lel, they discovered that local businesses were not competing effectively for restoration work on the federal lands, and embarked on an effort to increase the skills and competitiveness of local contractors, in order to increase the local economic benefits from the restoration work.

In parallel, Wallowa Resource began to purchase and modernise the last remaining saw mill. This effort ultimately they could not save the saw mill, but their efforts evolved into a strategy that was less capital intensive and focused more on local wealth creation, not only for local citizens but also as a strategy for generating revenue for local government, which experienced dramatic declines in revenue due to the decrease in federal timber harvest. Because available material was small logs and chips from fire-hazard reduction and forest restoration projects, they focused on a strategy to create multiple value added products using this low-value wood. They created an integrated wood-utilization campus that includes value-added manufacturing and bioenergy production using low-value logs and other woody material. Today, the campus includes a wood-fired boiler, a commercial kiln for drying firewood (producing disease-free firewood that can be transported out of the county), and capacity to create densified fuel

products (e.g. biobricks) and posts and polls. They also worked to convert the local school to wood-fired heating, which created significant savings over heating with oil.

In addition to this focus on restoration and economic development, Wallowa Resources also provides nature-based education to local school children on Fridays, when no public school is offered due to lack of funding (most US schools have five-day school weeks; Wallowa County has only four). Finally, by partnering with several universities, they have developed field classes that integrate learning about natural lands, wildlife, and rural livelihoods.

Wallowa Resources and the collaborative efforts in Wallowa County and across the region have embarked on integrated strategies around forest restoration and stewardship and rural economic development. They have focused on building agreement around federal forest management activities and have used these restoration projects and the wood they produce to create local economic opportunity. In communities with limited local capital and human resources, these organizations often act as conduits between regional and national grant and loan programs. They have also worked regionally and nationally to change federal forest policy to create an environment more favourable to place-based approaches to forest management.

Despite the longevity of place-based collaboration, these efforts continue to face significant barriers. One of the most notable has been the massive disinvestment in federal land management in the region over the past two decades, just as problems have become more complex legally, socially, and ecologically. Moreover, federal land management agencies retain decision-making authority over national forest management, so that, unlike many other contexts where community forestry is practiced, there are no formal co-management arrangements. In addition, these collaborative efforts are dependent on community volunteers and people whose employers can pay for them to participate, which means that participants are often professionals or residents with leisure time, such as retirees. Along with the democratic shortcomings of this arrangement, it can also limit the capacity of these collaborative groups to implement their agreements, especially as the financial resources of the federal land management agencies continue to decline. Finally, in many places, the economic conditions are so poor that the necessary human and financial resources to integrate conservation and development are difficult to attract.

10.4 Comparing FEMAT and place-based collaboration

Both approaches to national forest management described in this chapter – FEMAT and place-based collaboration – share some similarities (Table II 10.2). Both depart from traditional forest policy-making in the Pacific Northwest in that they place greater emphasis on mutual understanding across new and different distinct scientific disciplines (FEMAT) and local stakeholders groups (place-based collaboration) and on collaboration among government and non-governmental actors. In both cases, the processes have sought to simultaneously improve ecological conditions and provide economic benefits from national forest management. Both processes were initiated in response to major problems of the dominant forest policy-making paradigm. And both approaches developed with a primary focus on national forestlands.

Yet, the tools are also fundamentally different. First, FEMAT and the institutionalisation of the Northwest Forest Plan were sudden and abrupt. The Plan was established 'top down' via a presidential direction to catalyse and legitimise a major forest policy change. It bypassed the established forest policy subsystem, which was unable to organise the change within the traditional institutional setting. Even though the knowledge foundation of FEMAT has been slowly generated over decades, the process itself worked quickly. FEMAT had to do so given its mandate to contribute to the solution of the Forest Crisis at its peak. Under conditions of enormous political and time pressure, FEMAT channelized the complexity of the issue into a small set of concrete policy options, thereby transforming scientific knowledge into (possible) policy road maps.

Although the Plan's species protection focus marked a dramatic change in the way biophysical sustainability was conceived, FEMAT and the resulting Northwest Forest Plan also meant a continuation of the professional, top-down decision-making system that has been so central to forest policy on federal lands in that region. Some of the participatory and adaptive policy tools of the plan could not be implemented as some plan writers had hoped. The Northwest Forest Plan continued and even reinforced other old mechanisms as well. For example, the rise of ecosystem management was focused on achieving multiple goals on the same patch of ground – simultaneously managing for owls, salmon, aesthetics, and timber. The plan also continued and even strengthened the long-standing practice of zoning the national forest to meet particular primary objectives.

FEMAT also increased the influence of science on forest management decision-making or, at least,

Table II 10.2 Comparison of FEMAT and place-based collaboration – patterns of governance.

	FEMAT	Place-based collaboration
Scale	Regional (whole wet forest, Pacific Northwest public forestland)	Local (watershed/community/forest district)
Political aspiration	Solve the Northwest Forest crisis Legitimise/catalyse policy change	Legitimise/reinstall a certain degree of active management, including timber harvest, on public land; integrate local demands into decision-making
Discursive	Supremacy of science; institutionalized in 1970s' federal laws and supported by federal judges, requiring more and recent scientific knowledge	Participation discourse originating from societal movements in the 1960s as well as experiences of innovators in social and community forestry internationally
Type of knowledge that counts	Scientific knowledge, including, to a lesser extent, social science	All types of knowledge, including local knowledge; scientific knowledge still important
Major rationale	Conduct comprehensive interdisciplinary scientific analysis of the current situation; develop options for future development/solving the crisis	Develop a legitimised/sustainable option for forest management at the local level based on local agreement
Forest management paradigm	Ecological (and social) scientific forest management	Community forest management
Mode of decision-making	Scientific evidence crucial, argumentative/interdisciplinary assessment/ decisionist (developing options for policy-makers to decide)	Deliberative/consultative (develop consensus, prepare/legitimise decisions by managers), although science still with a key role to play
Most powerful groups	Federal judges (setting the frame), scientists and national policy-makers	Diverse, depending on the local power structures/leadership and collaboration culture
Innovative potential/ achievements	Policy change: creating new pathways via interdisciplinary assessment/combining different paths of evidence	Depolarisation, creating new pathways via local negotiation/deliberation processes
Important limitations	Restricted to scientific knowledge and evidence, reduced to a focus given by both the president and the court's interpretation of relevant legal institutions, including agency regulations	Localised decision-making, tending to downplay demands that originate from outside the region, yet those activities should be guaranteed by the given institutional framework

dramatically changed the kind of scientific evidence that was seen as valid for decision-making. Hence, the timber-production-focused silvicultural and engineering sciences were replaced by conservation biology and, to a lesser extent, social science analysis. In the plan, the professional ethos of foresters who had been focused on timber primacy was replaced by new types of scientific expertise on conservation. In this way, FEMAT and the Northwest Forest Plan did not only paradigmatically change forest policy on federal lands but also shifted decision power from foresters to ecologists, hydrologists, and others. Although FEMAT itself lasted less than a year, the Northwest Forest Plan that it created has been remarkably du-

rable, even in the face of legal challenges, attempts at law-making, and growing scientific knowledge suggesting that some of the management strategies are not achieving their attended species-protection or timber-production goals.

In contrast, local collaboration emerged over a longer time period and did not have the unique political momentum and impetus that FEMAT had. The process of institutionalising collaboration has been incremental, occurring initially in isolated places without active support from actors and institutions operating beyond local places – only over time leading to realignment of institutions operating at higher scales. It is much harder to capture the diversity of approaches presented in this chapter in analytical categories. What is common to place-based collaboration is a greater departure from an experts-only decision-making mode that has determined forest policy-making on federal lands since the Progressive Era; it places greater emphasis on deliberation among people with a wide set of ways of knowing. At the same time, these approaches aimed to redefine the level of decision-making down to the local level. In other words, they pushed decision-making downward while, at the same time, broadening the notion of what acceptable knowledge was.

Driven by a combination of supporting factors, including local communities that felt excluded by capitalist or expert-based decision-making at higher policy levels, social scientists and activists that shared a desire to improve democratic policy-making, and diverse local interest groups, local collaboration grew in frequency, abundance, and reach. In many places, local collaboration has become a "commonly accepted way of doing things" (Abers and Keck 2103). Yet, collaboration is institutionalised largely through creation of culture and habit rather than via law and policy. Consequently, advocates of collaboration cannot use the courts to ensure that the Forest Service will collaborate or act on the desires or will of collaborative groups. The successes of collaboration often come through the ability of participants to create solutions that are socially appealing, allow the agency to avoid environmental lawsuits, and/or align with agency priorities. Although regional policymakers have long supported place-based collaboration rhetorically, re-aligning Forest Service policies, practice, and funding to support place-based collaboration has come much more incrementally. National forest managers at the local level have responded to these efforts in inconsistent and conflicting ways, due to a mix of institutional pressures and norms about professional expertise and democracy. Collaborative groups are often thwarted by larger, more deeply institutionalised dynamics such as legally mandated planning and budget processes that often do not prioritise collaborative agreements. In addition, the primacy of scientific knowledge continues to be of central importance partly because it is embedded in the legal mandates and culture of the federal forest management agencies and because of its strong support by some interest groups, especially environmentalists.

However, both the Forest Service and Congress found the promise of collaboration among diverse stakeholder groups politically compelling, especially with their focus on conflict reduction and solutions. Over the past 20 years, there has been slowly growing institutionalisation of these collaborative approaches in national forest management, accelerating in the past five years. Examples of recent laws and policies that are focused on increasing community engagement include the Secure Rural Schools and Community Self-Determination Act, which created local resource advisory committees to select restoration projects for funding; national guidance for stewardship contracting, which requires collaboration for certain types of forest restoration projects; Healthy Forests Restoration Act, which reduced planning/analysis requirements for fire-hazard reduction projects that were collaboratively agreed upon; Collaborative Forest Landscape Restoration Act, which was designed to fund collaborative landscape-scale forest restoration; and the new national forest planning rule, which requires upfront collaboration. However, the political organisation of already active collaborative groups has driven these laws and policies rather than the other way around.

To conclude, both FEMAT and place-based collaboration have redefined how sustainable forest management on federal lands is understood and practiced. Yet, they operate in a context where older dynamics are in play, including the primacy of agency expertise, the role of courts as a venue for conflict resolution, and budget structures that make integrated management difficult and limit the capacity of collaborative groups to act. The legal frameworks of the federal land management agencies have not changed significantly, creating a complex, hybrid system. Yet, both innovations brought new approaches to forest management in the Pacific Northwest, ranging from interdisciplinary science-based analysis to a strong culture of participatory inclusive deliberation on federal forestlands at the local level. They have undisputedly changed forest management since the Northwest Forest Crisis. Together with the traditional forest policy-making and management paradigms built in the era of timber primacy, they build the pillars of the Pacific Northwest's public forest governance: ecosystem science, local collaboration, professional expertise, and global timber markets.

10.5 Outlook – challenges for the future

The massive transformation of federal forest policy in the Pacific Northwest came largely without significant new legislation but happened in a legal framework that was established in the 1970s (Moseley 1999, Cashore and Howlett 2007). Although there have been small changes in laws and congressional funding, it was first and foremost a combination of lawsuits, political campaigns, new science (conservation biology, landscape ecology, social science), and collaboration, as well as economic development, that has triggered the dramatic change in the operating definition of sustainable forest management. Sustainable forest management on national forestlands is no longer defined as sustained-yield forestry (as a practice and paradigm) or multiple-use management (as a paradigm). Instead, de facto sustainable forest management on federal lands increasingly involves (1) multi-stakeholder participation; (2) management focused on ecosystem, watershed, and landscape; (3) species protection; (4) wildfire management, community protection, and hazardous fuels reduction; (5) economic opportunity only as a by-product of conservation, restoration, and stewardship of public lands and the natural amenities that this conservation-oriented management creates. The Northwest Forest Plan and local-level collaboration have together helped drive these changes. As a result, the forest-production-oriented term *sustainable forest management* is rarely used anymore in the region, with conservation, ecological restoration, and ecosystem management dominating the forest management rhetoric on federal lands. Yet, regardless of this shift in rhetoric, the content of sustainable management of the region's vast federal forestlands remains contested.

Seen from a broader perspective, the policy change of the 1990s led to a sharp division of forest management across different ownerships. Today, forestland in the Pacific Northwest is divided in public land managed for conservation and recreation values, private industrial forestlands managed for commodity production and equity investment, and non-industrial forestlands managed for a diversity of purposes. With some of its private forestlands among the most productive temperate-zone timber plantations on earth, and some highly efficient and globalised forest product firms being located in the region, Oregon and Washington continue to be among the top forest products/producing states in the United States. Global wood demand, publically traded companies, and the investment decisions of large institutional investors such as retirement funds increasingly drive private land harvest and processing decisions in the region. The relative importance of forest products to the economy and culture of the region has, however, declined significantly. At the same time, growing and changing population, urbanisation and in-migration is moving rural and urban communities socially and culturally further apart because the economic ties between them are increasingly obscure. Urban economies have diversified to include high technology, among other sectors. Natural amenities associated with large protected areas and a "sustainability" culture attracts young, recreationally minded residents to the urban areas in the region. Many isolated rural areas, however, are economically depressed, with few economic options beyond recreation and tourism. Many of these trends are related to a complex set of social and economic developments, not simply effects of the shifts in federal forest management. Yet, the Northwest Forest Plan and its implementation, could not prevent or even accelerated these trends, including the economic decline of isolated communities surrounded by public lands.

Although movement towards comprehensive sustainable forest management and a related forest policy has been substantial over the past two decades, with growing citizen engagement and collaboration, a focus on landscape-scale restoration, and local economic development efforts, there are many open questions about what the future holds for the people and forests in this region. In conclusion, we raise several questions that those engaged with forest management in the region grapple with:

- How can place-based collaboration, which has been based largely on interpersonal relationships and trust at the community scale, co-evolve with the increasing focus on planning and managing at geographic scales well beyond those of the social relationships and economic relationships and patterns that exceed even regional and national boundaries?
- Much of the success in collaboration has been in dry forests where the socio-ecological need to manage wildfire has coincided with the economic desire for logs. In the wet western forests, the link between needs for restoration and timber harvest is more complex and less clear, especially outside of the plantations. Consequently, the path to conflict resolution between those who want to see environmental restoration and those who want continued timber harvest is less clear in the wet forests than in the arid areas. How will collaboration evolve as it grows in these wetter areas?
- With growing agreement about how to manage public lands in complex multidimensional ways, there is a growing need for funds to implement projects. With the decline in timber harvest levels and an unchanged budget system, the Pacific Northwest saw dramatic declines in funding,

which resulted in greatly reduced staffing even as forest management became much more complex. During the 1990s, the number of agency personnel working on national forests was cut in half, largely due the decline of timber revenue. Where will the money come from to implement restoration and stewardship of public lands?

- Should timber harvest beyond what is required for restoration be a part of federal forest management? Social agreement has coalesced around plantation restoration and fire-hazard reduction. But, after 20 years of restoring plantations, some national forests and BLM districts in the wetter parts of the region are coming to the end of their plantation restoration activities. How much, if any, timber harvest should come from public lands once the restoration is done, and how will stakeholders in the region reach agreement?
- How will increasing demand for timber in Asia and other rapidly growing economies exert pressure and create opportunities for the Pacific Northwest forest products industry? What kinds of pressures will it create for access to timber from federal lands? And what role, if any, should public policy and federal forest management play in helping to sustain wood processing capacity?
- How will climate change and other disturbances change forests and, in turn, change social agreement about how forests should be managed? The Forest Service is increasingly incorporating climate considerations into is forest and project planning processes, but there are unanswered ethical, scientific, and policy questions about the climate-change adaption strategy for the future (Spies et al. 2010).
- Isolated forest-dependent communities have growing poverty and limited economic opportunity. Although many have sought to participate in the economic opportunities from ecosystem management by developing business capacity to undertake restoration and manufacturing of value-added wood products, for many communities this has not replaced the losses caused by the transformation of the timber industry (Jungwirth 2000). How can isolated rural communities reverse the trend towards multigenerational poverty?
- Although economic development via forest restoration has been a major focus of the adaption of the Northwest Forest Plan as well as place-based collaborative efforts, some forest restoration jobs, such as manual thinning, are often conducted by Hispanic immigrants who are vulnerable to exploitation (Sarathy 2012). How can the region ensure that restoration jobs are high-quality jobs and avoid conflict between native-born and immigrant workers?

Obviously, responses to these questions will to a large degree depend on larger social, economic, and ecological forces that originate beyond the influence of the region's forest policy stakeholders. Yet, the experience of more than 30 years of conflict and debate over federal forest management in the region has not only led to polarisation (a problem not only for forest policy but also for the overall US society) but has also created a rich pool of concepts, tools, and collaborative processes to deal with social, economic, and ecological challenges. In this sense, the people of the Pacific Northwest created not only competing expectations towards the region's rich forests but also invented tools to overcome the cleavages. With this rich social capital in place, there is no reason for pessimism regarding the future of this beautiful forest landscape.

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Land grabbing and forest conflict in Cambodia: Implications for community and sustainable forest management

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Abstract: As a global phenomenon, land grabbing has significant economic, environmental, and social impacts, often resulting in serious conflict between the local community and outsiders. The aim of the study is to get a deeper understanding of the extent to which land grabbing and resulting land-use conflicts affect the move towards sustainable forest management (SFM) in Cambodia. Two case studies were conducted involving community forests (CFs), with data collected through literature review, key informant interviews, focus group discussions, and field observations. The results indicate that land grabbing in Cambodia, particularly through economic land concessions (ELCs), is often associated with conflict and thus has serious implications for sustainable land management, including SFM. Ambiguous property rights and overlapping claims, lack of coordination among government agencies, and lack of consultation and impact assessment prior to the decision-making process are the underlying causes of conflict. The study suggests that the Cambodian government should revisit the policy on ELC to ensure the policy goes hand in hand with sustainable land management objectives, including SFM. Additionally, the study underlines the importance of consultation and environmental and social impact assessment before the granting of an ELC license and the provision of capacity-development activities for conflict management. Finally, further research is needed to carefully evaluate ELCs and their role in SFM in order to gain deeper understanding of the impacts and to evaluate the strengths and weaknesses of ELCs within the context of the goal of SFM.

Keywords: Land grabbing, forest conflict, Cambodia, sustainable forest management, community forestry, economic land concessions

11.1 Introduction

This paper addresses the fundamental land-use-management issue of land grabbing, which affects a large number of developing countries throughout the world (Borras and Franco 2010, Zoomers 2010). While often defined differently, the term *land grabbing* in this paper refers to large-scale acquisitions of land by domestic and transnational investors in the Global South either through leases or concessions, normally for plantation and agricultural production (GRAIN 2008, Cotula et al. 2009, Graham et al. 2010). The International Food Policy Research Institute (IFPRI) estimated that during the period 2005–2009, land grabbing affected about 20 million ha worldwide (von Braun and Meinzen-Dick 2009). A number of drivers inducing this phenomenon include the impacts of the current global crisis (e.g. food security, climate change, the financial crisis), globalisation, the liberalisation of land markets, and increased foreign direct investment (e.g. in agribusiness, mining, food and biofuel production) (Borras and Franco 2010, Zoomers 2010).

Land grabbing has been going on for centuries in many forms, though it has only come to prominence

in academic literature, and global news media, in recent times. It has significant economic, environmental, and social impacts, often resulting in conflict between the local community and outsiders (e.g. the company, government) caused by displacement and dispossession of local people's land, loss of access, threats to livelihoods, and environmental degradation (Yasmi et al. 2010b, Borras and Franco 2011, Schneider 2011).

Nonetheless, although this land-grabbing phenomenon is on the rise and increasingly studied and covered by the media (Graham et al. 2010), academic work has tended to focus more on the issue in Africa than in Southeast Asia (Borras and Franco 2010, 2011). In the context of Asia, Cambodia is considered a salient example of forest and land-use conflict (Davis 2005). Since the fall of the Khmer Rouge in 1979, the country has been confronted with serious conflicts related to land-use management, including land grabbing, that are set against a backdrop of unsustainable natural resource management practices favouring the elite over indigenous and local communities (de Lopez 2002).

Though a relatively recent phenomenon in Cambodia, land grabbing has become an increasingly critical issue. Often the land grabbing results from the establishment of economic land concessions (ELCs), most of which are for agro-industrial plantations (Neef and Touch 2012). The extensive granting of land concessions has resulted in widespread conflicts over land and forest in Cambodia (Poffenberger 2009, Schneider 2011, USAID 2011), particularly conflicts between forest-dependent communities and ELC companies (NGO Forum on Cambodia 2010a, Yasmi et al. 2011). The land grabbing reflects the chronic land-tenure insecurity and weak policy frameworks as well as significant overseas investments in the agriculture sector and deficient governance related to the issue (e.g. lack of transparency in granting concessions) (e.g. Schneider 2011, Neef and Touch 2012).

This chapter aims to provide a deeper understanding of how land grabbing and resulting land-use conflicts affect the efforts to achieve sustainable forest management (SFM). Based on two case studies from Cambodia involving community forests (CFs), we examine how social, political, and environmental conditions evolved, interacted, and affected forests, people, and the diverse ecological, social, and economic conditions, with a particular focus on the implications of these conditions on CF and the efforts to achieve SFM in Cambodia. While SFM is a long-term goal of forest management in Cambodia, our study provides insights into how it can be affected by conflict associated with the recent phenomenon of land grabbing.

SFM represents a vision of balancing the ecological, social, and economic values in the utilisation and conservation of forest (Angelstam et al. 2004), and community forestry is considered one of the best approaches to preserve and sustain forests in developing countries (Ascher 1994, Rebugio et al. 2010). Local people who live in or near the forest are often considered to be the most appropriate managers and regulators of forest uses, given that they have been managing the forests for a long time, and since they depend on forest resources, they will more likely guard the long-term future of forest resources (Ascher 1994). To make sure that social values are in place, active and informed participation of all forest stakeholders, especially communities whose lives depend on forest resources for their survival, are vital to the credibility and sustainability of the forest management process. Moreover, efforts to achieve SFM require support and meaningful participation from a variety of stakeholders in the decision-making concerning forest management (e.g. government, local communities, civil society organisations, industry, experts) (FAO 1993, SCBD 2009, Rebugio et al. 2010). Reluctance to address social problems will likely lead to negative impacts towards SFM, one of the most frequent being conflict among forest stakeholders that can be a significant obstacle to SFM (Yasmi et al. 2010b).

Considering the wide range of issues affected by and related to land grabbing, the use of the term *SFM* in this chapter includes not only forest but also forest land management. In this context we formulated these two research questions:

- What are the underlying causes of conflict in the context of land grabbing?
- What implications do land grabbing and conflict have on efforts to achieve SFM?

Recommendations are made for how ELCs can be better governed to minimise their impacts, taking into account the often-conflicting national and subnational needs.

11.2 Overview of forest and forest policy in Cambodia

Cambodia is blessed with relatively abundant forest cover, encompassing approximately 59% of the total land area (about 10.7 million ha), one of the highest proportions in Asia (FAO 2010). It consists of large tracts of evergreen, semievergreen, and deciduous forests concentrated in the southwest, east, and north of the country (Bradley 2011). Forest resources are critically important for socio-economic development in Cambodia. The Cambodian government's revenue from the forestry sector reached approximately USD 1.4 million in 2005 (FAO 2010). The

Figure II 11.1 Forests in Cambodia have significant cultural and religious values. ©Yurdi Yasmi

agriculture sector contributes 34% of the GDP, of which 6.9% comes from the forestry sector (MAFF 2009 in Sovann and Saret 2010).

11.2.1 Forests and local communities in Cambodia

For most Cambodian rural people, forests are a fundamental asset. For them, forests – timber forest products and non-timber forest products (NTFPs) – and agriculture are the main source of their economic income and daily consumption. Forest resources contributed 30%–42% of local households' livelihoods, equal to USD 280 to USD 345 annually (Hansen and Top 2006). Moreover, land and forest are also important in their cultural and spiritual life (UNOHCHR 2007, Figure II 11.1). In this regard, unclear tenure and the loss of forest due to the increasing demands of land for developments have increased the vulnerability of these forest-dependent people (FA 2010).

While forest lands are owned by the state, under the authority of Forestry Administration (FA), the 2002 Forestry Law guaranteed the rights of local communities to forest resources by giving traditional user rights to forest products and by-products, including collection of NTFPs (such as dead wood, wild fruit, honey, and resin) as well as timber for houses, stables for livestock, and agricultural tools. The law also allows the extraction of forest resources for the purpose of traditional customs, beliefs, religion, and subsistence without requiring permission from forest authorities.

There have been changes, or reforms, in Cambodian forest policy that include adoption of more policies targeting SFM (Bradley 2011). In 2010, the royal government of Cambodia (RGC) issued its National Forest Programme (NFP), a policy document that serves as a guide for planning, implementation, monitoring, evaluation, and coordination of forest management in the country. Its aim was to put good forest governance in place and achieve SFM. A key component was development of the community forestry programme (RGC 2010a, 2010b).

CF has emerged as a new approach to managing forests and recognising local communities' rights to forest resources. The government has promoted CF by issuing supporting legislation (i.e. Sub-Decree on Community Forestry Management and the Guidelines for Community Forestry), laying out a process for granting rights to local communities to manage

the forests for 15 years, and finalising legislation for community protected areas (Dahal et al. 2011). While supported by substantial governmental legislation, most of the CFs were initiated and promoted mainly by various national and international NGOs as well as donor agencies to achieve SFM. From 1990 to 2004, 150 CF units were established in 15 provinces in Cambodia, covering 55 568 ha of forest area (Beang and Sethaphal 2004). This number has gradually increased, by 2012 totalling 227 CFs with formally signed agreements (covering 182 354 ha) and at least 250 in developmental stages (FA, personal communication). The CFs are considered vital to forest-dependent communities as a source of timber and NTFPs. The government has set an ambitious goal in the National Forest Program to allocate 2 million ha of forests for community forestry and expand the number of CF to 1000 groups by 2029 (RGC 2010a).

11.2.2 Economic land concessions in Cambodia

Since the early 1990s, the Cambodian government conceded significant tracts of land to private companies for investment in large-scale plantations and agriculture through a concession system, covering up to 7 million ha, approximately 70% of the country's forest (RGC 2010b).

The 2001 Land Law (Article 48) defined land concessions as "a legal right established by a legal document issued under the discretion of the competent authority, given to any natural person or legal entity or group of persons to occupy a land and to exercise thereon the rights set forth by this law." The Land Law recognises that there are three types of concessions designed to contribute to social and economic development: 1) social land concessions, which respond to a social purpose (e.g. build a residence or cultivate for subsistence), 2) economic land concessions, which respond to an economic purpose (e.g. industrial agricultural exploitation), and 3) concessions related to the use, development, or exploitation of state land (e.g. mining, port, airport, industrial development, fishing).

Sub-Decree No. 146 on ELCs (2005) establishes the legal and regulatory framework for the granting and management of land concessions for large-scale, market-oriented development, including requirements to conduct public consultations and environmental and social impact assessments (Grimsditch and Henderson 2009). The main official motivation of the ELCs was economic development, with implications for poverty reduction. Against the backdrop of a growing population, economic development, and suboptimal forest law enforcement and governance (Sovann and Saret 2010), however, these concessions have adversely affected the rights and livelihoods of Cambodia's rural communities (UN-OHCHR 2007, NGO Forum on Cambodia 2010b, Ratner and Parnell 2011, Schneider 2011) and led to rapid and extensive deforestation (Poffenberger 2009, Broadhead and Izquierdo 2010).

Cambodia, along with agricultural expansion (both small and large scale), unsustainable logging, infrastructure development, wood fuel demand, and mining exploration (Poffenberger 2009). In 1965 the forest cover was estimated at approximately 73% of the total land in the country, while in 2006 it was estimated at 59% (FA 2010). Because of its deforestation rate, Cambodia has been classified as a country that has high forest cover and a high rate of deforestation (HFHD) (Griscom et al. 2009).

In response to international pressure and to reverse the trend of deforestation and forest degradation due to illegal logging and the industrial concession system, the government issued a temporary moratorium on logging in 2002, leading to the cancellation and suspension of numerous logging concession permits issued by the government and the promotion of CF. However, although the moratorium clearly affected timber supply, there is no clear and accurate statistical data about its impact on illegal logging (Amariei 2004).

There has been growing concern about the impact of economic land concessions on the rights and livelihoods of rural forest-dependent people. The United Nations Cambodia Office of the High Commissioner for Human Rights (UNCOHCHR) found these impacts to include: loss of livelihoods, environmental destruction, encroachment on agricultural and grazing land, displacement, and alienation of indigenous people (UNCOHCHR 2007). The area granted for ELCs often overlaps with the land of local people (such as farmland), which leads to conflicts between the company and local community. These conflicts mainly result from an incomplete process in the granting of ELC, which does not comply with the procedure outlined in the Sub-Decree on ELCs (for example, lack of public consultation and an environmental and social impact assessment (ESIA) prior to the granting of ELCs) (Sothath and Sophal 2012).

11.3 Material and methods

11.3.1 Description of case study sites

This chapter is based on two forest-conflict case studies involving community forests in Kratie and Kampong Speu Provinces of Cambodia. The field data was collected between 2009 and 2010 as part of

a regional research project examining forest conflict in Asia (e.g. Yasmi et al. 2010b, 2012, 2013).

The first case study was conducted in Kbal Damrei Commune, which is part of Sambo District, Kratie Province, in the northeast of Cambodia and has a total population of 3643. Of the five villages in Kbal Damrei, three (Opo, Sre Treng, and Chang Horb) were selected for the study as the people in these villages were directly involved in the conflict. The majority of people in this commune are Khmer (58%) living together with other ethnic groups: Cham, Phnorng, and Moel. The villagers are heavily reliant on agriculture and natural resources for their livelihoods. About 80% of villagers are farmers and many of them rely on forest resources such as firewood, rattan, bamboo, resin, medicinal plants, charcoal, timber production, and fishing to supplement their incomes.

The second case study was conducted in Kampong Speu Province, which is located about 40 km west of Phnom Penh. It is one of the most forested provinces in Cambodia, with more than 60% of its area covered by forestland (Thong et al. 1998). Due to this potentiality, most of the province land use has been categorised and allocated for protection and conservation purposes, including the well-known Central Cardamom Mountain Protected Forest and Kirirom National Park. Some areas in the province have also been granted as economic land concessions for biofuel, ecotourism, and mining purposes.

11.3.2 Research methods

This study employs a qualitative approach. In order to understand the underlying causes, the manifestation, and the impacts of conflict as well as its management, we used data from several sources, including: 1) semi-structured interviews with key informants, 2) focus group discussions (FGDs), 3) a literature review, and 4) field observations.

The field data collection in Kbal Damrei was done in 2009 using semi-structured interviews with 103 key informants. Additionally, field observation and three FGDs were also conducted. The participants of both interviews and FGDs included village chiefs, members of the commune council, Forestry Administration triage officers, community economic development (CED) staff, and villagers.

For Kampong Speu case, 30 semi-structured interviews were conducted in three villages that are members of Community Forestry Kirirasmey Deydos (CFKD), including Prom Rolork, Kirirasmey, and Deydos. Additionally, field observations and two FGDs were conducted. Fieldwork was undertaken from July through September 2009. Representatives from the local communities (including gender and minority groups), a mining company, local authorities, and local NGOs participated in the interviews and FGDs.

Additionally, an extensive literature review was conducted from the early (2009) to final stages (2012) of the study, which included a review of relevant forestry and land-use conflict literature, relevant government policies and publications, as well as reports by forestry organisations and civil society groups. The objective was to develop the analytical framework used in this study, verify the findings from the field, and update the information to the current situation.

11.4 Results

11.4.1 Description of conflict in Kbal Damrei

The conflict case in Kbal Damrei took place between Kbal Damrei villagers (including the local community of Khmer and indigenous people (Moel and Phnorng) and a rubber plantation company (Sun Kuy Thy) holding an ELC permit.

To secure the rights to their land, the Kbal Damrei Commune applied and began the process of establishing a CF in May 2006. Accompanied by local authorities and the Forestry Administration, they marked out an area of 2725 ha for the proposed CF. Villagers also sent letters to the relevant authorities requesting an official designation of the CF. In response, the local commune council issued *deika* (a recognition letter), recognising village election results for the Community Forestry Management Committee (CFMC). Nonetheless, when the conflict occurred, the Ministry for Agriculture, Forestry, and Fisheries (MAFF) had not responded to the proposal and had not officially recognised the land as a CF.

In 2008, though most likely aware of the community initiative to establish a CF, the provincial governor granted an ELC to the Sun Kuy Thy Company for investment in the development of a rubber plantation in Kbal Damrei on land overlapping the community's proposed CF. This led to direct conflict between the company and the villagers.

A protest involving about 200 villagers from the three villages (Sre Treng, O Po, and Chang Horb) occurred when the company started operations and began to clear land in Sre Treng, affecting the proposed CF, farmland, and a burial site. The community was also disappointed that the company employed people from outside its community. The protesters agreed to stop the demonstration only after long discussions and mediation between villages and commune councillors, a facilitator from a local NGO, and the commune chief of Kbal Damrei as well as a

promise to resolve the conflict.

Several meetings were facilitated by the commune, district, and provincial authorities without any significant results for the community. However, these meetings helped prevent escalation of the conflict. All meetings involved participation of community representatives, who had a chance to talk to government officials to discuss their concerns and needs. Then the villagers changed their position from demanding that the company cease operations in the conflict area to requesting the company leave them with a land area of 3 km from the national road number 7. However, the community said that the company left them only about 1 km from the national road number 7. Villagers have had no further interaction with the company since they did not believe that they would win.

11.4.2 Description of conflict in Kampong Speu

The conflict in Kampong Speu is between CF members (local community) and a rock mining company. The overlapping boundaries between the company and CF, as well as contradictory ownership documents for the overlapping land, have caused the conflict. In this case, the CF members argued that their CF (called Community Forestry Kirirasmey Deydos – CFKD) is legally recognised by the provincial government and Forestry Administration, while the company claimed that they obtained a license to operate their mining activities from the Ministry of Industry, Mining, and Energy (MIME).

According to a discussion with the company representative, before its establishment, the company began to purchase land in 2006 from some community members to expand its area, and in late 2008 the company obtained approval from the ministry to dig the area for rock mining. These lands, however, were not properly demarcated until early 2009.

In January 2009, the company started to clear forestland for plantations but was stopped by CF members. The community members were angry because about 4 ha of their forest were cleared by the company. The community also said that company activities caused dust and noise pollution. As a result, the CF's chief immediately gathered together CF members and reported to the Taing Svay Commune chief. On the same day, the chief, with the villagers, went to the area to halt the clearing of forest, but the request was denied. After protests that failed to garner a response, about 65 community forestry members, armed with knives, sticks, and poles, returned to the area and forcibly seized a bulldozer that was being used to clear the land. The stand-off resulted in intense discussions between the two parties, both claiming rights to the land. The commune chief helped facilitate the conflict resolution between villagers and the business group. Following discussions with the commune chief, the company eventually decided to suspend its activities and agreed to stop clearing community forestland.

11.4.3 Direct and underlying causes of conflict

In both locations, a number of immediate factors were identified that triggered the conflicts: the acquisition of community forest and land, loss of source of livelihood (e.g. farm), destruction of community properties (farmland, trees), pollution, and the lack of employment for the local community, with jobs going to outsiders. Several fundamental factors or underlying causes allowed such things to occur, including ambiguous property rights and overlapping claims, lack of coordination among government agencies, and lack of consultation and impact assessment prior to the decision-making process.

Ambiguous property rights and overlapping claims was a primary driver of conflict in the two cases. The state has retained full ownership of most forested land and constitutionally the government has the right to grant forests to logging concessions and mining and plantation companies. However, the concessions sometimes are allocated on land that has been traditionally and historically managed by the local people. In Kbal Damrei, for example, the government granted legal user rights to the company on land that has been managed by the local community for generations. The Kbal Damrei Commune claims customary rights as it has acted as de facto manager of the land and considers it to belong to the commune. The villagers were in the process of obtaining legal title to the land and obtaining the CF approval at the time.

In the Kampong Speu case, according to a short discussion with a company representative regarding to conflict there was a confusion over the boundary between the company and the CF. The conflict arose because of an overlap between the map from the ministry and the CF map, due to an improper ground survey by relevant authorities before the license was granted. Additionally, although the company claimed it had been buying land from the local community since 2006 to expand its area, the land boundary was not clearly marked – it was marked only using wooden poles.

The lack of coordination among government agencies in granting the rights to manage a piece of land caused conflict in both cases. The conflicting parties felt that they had the rights to the same

piece of land. In the Kampong Speu case, for example, both parties had legal documents issued by the government. The local community had its CF approved by the provincial government and Forestry Administration while the company had obtained a license to operate mining activities from the Ministry of Industry, Mining, and Energy.

The lack of consultation and impact assessments prior to the decision to grant the land concessions drove the conflict in the two cases. In Kbal Damrei, both villagers and the company were unaware that there was an overlap in the area of the concession and the community land prior to the conflict. According to the villagers, at that time they did not know that there would be an ELC company in their area and did not know about the boundary, the aims of the company, the risks, or the possible advantages of the ELC. Likewise, the company and its workers were completely unaware of the villagers' land status and land-use practices.

Public consultation and social and environmental impact assessments (SEIA) are actually required under ELC legislation (Sub-Decree No. 146). Interviews indicated that the villagers were unaware whether the SEIA had been conducted before the company began operation. The lack of consultation and improper application of the SEIA reflect the gap between policy and practice at the local level.

11.4.4 The impact of conflict

According the interviews and FGDs, there were both negative and positive impacts of the conflict. Interestingly, the two cases share some similarities in the conflict impacts described below.

Negative impacts

Anxiety and fear were the common impacts of conflict in the two cases. The community in Kampong Speu expressed its sadness and anxiety over damage to forest resources by the outsiders. The CF members had protected those trees and limited extraction, even for their own usage. Some said that they cared for the forest as baby and could cut only a small pole for their backyard and chicken cages. Moreover, because of the conflict, Kbal Damrei villagers were afraid they and the next generation would not be able to access the forest area to collect NTFPs such as resin, firewood, rattan, and wood for building houses.

Fear of violence was also felt by both parties. In Kampong Speu, for example, the bulldozer driver and company representatives were frightened because many armed villagers forcefully seized the company's bulldozer used for clearing the land. Such incidents generated fear on both sides.

Conflict also caused *high costs* for the communities and companies in both cases. On the one hand, the company had to spend money for compensation and suspend its operations. On the other hand, the community experienced high cost in terms of loss of land, money, and time. In Kbal Damrei, the villagers said that they had lost their farmland, which was crucial to their livelihoods, and also lost their CF, which they had developed since 2006. In both cases, the villagers also said that the conflict impacted their livelihoods and income because of time spent opposing company and governmental activities and also patrolling the CF more frequently.

Distrust between and within parties became another impact of conflict in Kampong Speu. Many respondents said the conflict made them distrust each other and they perceived that some community members took side with the company, particularly those who had sold land to the company. They also suspected that the commune chief may have had relations with the company.

The natural *environment was degraded* during the conflict. The CF members at the two sites stated that during its operation, the company destroyed their CFs (trees and wildlife habitat). Additionally, the villagers in Kampong Speu were worried that the pollution generated by the company during clearing the land affected their health.

Positive impacts

Though negative impacts predominated, positive impacts were observed at the two sites. Conflict increased *collective action* of the villagers, which emerged in the form of organised protest. In the Kbal Damrei case, collective action was also manifested in the form of advocacy by the Community Forest Management Committee, and later, in a proposal to change the CF location and therefore begin the application anew.

The conflict *increased awareness and pressure for tenure clarity.* Conflict over land and forest have made communities more aware of the value of the land, their rights to the land under the law, and the steps they would need to take to protect these rights. In the Kbal Damrei case, for example, the communities are more aware that having a good relationship and coordination with the local government, including the Forestry Administration, is important for strengthening their efforts in developing the CF. In addition to the increased awareness, the conflict also reiterated the importance of addressing tenure. In the Kampong Speu case, the company representative mentioned that the conflict became a starting point in the discussion to clarify the boundary between the CF and the company.

11.5 Discussion

The aim of the study was to arrive at a deeper understanding of the extent to which land grabbing and resulting land-use conflicts affect the community and SFM efforts. This section discusses how social, political, and environmental conditions evolved, interacted, and affected forests, people, and the diverse ecological, social, and economic conditions. While SFM is a long-term goal of forest management in Cambodia, our study provides insights into how it can be affected by conflict associated with the recent phenomenon of land grabbing.

The study indicates that the land grabbing and conflict that resulted from it have various social, environmental, and economic impacts that can directly affect the efforts to achieve SFM in Cambodia. This includes feelings of fear, loss of land, high costs, distrust, and forest degradation.

11.5.1 Forest policies, institutions, and governance

The study shows that changes in forest policies, institutions, and governance in Cambodia, particularly related to ELC, contributed to conflict at the two study sites. The enactment of Sub-Decree 146 on ELC in 2005 and policies related to the promotion of large-scale land investment have driven a new ELC boom in Cambodia. This is reflected by extensive granting of concessions, which have resulted in widespread disputes and conflict over land ownership and use (Schneider 2011, USAID 2011). The analysis of the NGO Forum on Cambodia (2010a) found that the majority of large-scale land conflicts in recent years usually involved a dispute between forest-dependent communities and ELC companies. Our study confirms findings of other studies that land grabbing and ELCs cause forest conflict in Cambodia (e.g. Schweithelm 2005).

The government actually has set the essential preconditions in the Sub-Decree on Economic Land Concessions (No. 146), which can be used as a social and environmental safeguard in granting land concessions, such as the requirement for public consultations and SEIA before granting concessions. However, according to the findings of this and other studies (e.g. UNOHCHR 2007, Phalthy 2010), these safeguards have not been fully implemented. This lack of compliance and poor enforcement of these requirements lead to conflict between the concession company and local villagers – in these cases, CF members. The non-participatory process coupled with elite capture that dominates the granting and management of the ELCs clearly need to be addressed, a view supported by de Lopez (2002) and Hughes (2008). These underline the need for the development and institutionalisation of social processes that will ensure that local communities and other key stakeholders are actively involved and meaningfully participate in the management of forest resources (Rebugio et al. 2010).

The Sub-Decree 146 on Economic Land Concession requires that the ELC contracts only be granted on state private land, which, on paper, will help to avoid the violation of land and use rights of local communities. However, the categorisation of areas as state private land is often recklessly conducted. Non-private land is often defined as idle and degraded, although in reality it is inhabited and forested (Schneider 2011). Additionally, ELCs often encompass people's lands, especially the lands that have not been formally registered. This has placed people without formal land title in a high risk for eviction because of ELCs or private investment interests (Schneider 2011). This is worrying because the majority of rural Cambodians do not have formal documents proving their ownership of land (UNOHCHR 2007).

Land grabbing has significant implications for Cambodia's ability to meet international commitments and obligations, such as dealing with illegal logging (Lacey Act and Forest Law Enforcement, Governance, and Trade (FLEGT) Action Plan) as well as successfully taking part in the development and implementation of REDD+ (Sovann and Saret 2010). REDD+, for example, offers financial incentives to the Cambodian government to increase its efforts to halt deforestation while also encouraging more transparent and participatory governance, though admittedly the development of REDD+ in Cambodia is beset with numerous challenges, not the least, leakage. While Cambodia is in the pre-negotiation phase of FLEGT Voluntary Partnership Agreements (VPAs) and exports very little in the way of forest products to the European Union (Phuc 2010), nevertheless FLEGT efforts could further encourage the government to address the issues related to land grabbing, such as supporting initiatives aimed at improving governance at the local level. However, one could also envision these commitments, particularly REDD+, as being a justification for further land grabbing. For instance, the perceived increased value in forests (in this case for the carbon they sequester) may lead the government to exclude communities or severely restrict their management and, therefore, livelihood options (Gupta 2012), and this would have severe implications for conflict management.

11.5.2 Livelihoods, culture, and socio-economy

Changes in livelihoods, capacities, and cultural and socio-economic aspects contribute to conflict. This study shows that local people had their farmland, which is the source of livelihoods, taken away when it was cleared by a company. The incidence of this confrontation is likely to occur in many places in the country and its intensity is likely to increase if not addressed properly and in a timely fashion.

It is predicted that there will be increasing demand for land in Cambodia, driven by foreign capital inflow, free trade, foreign direct investment (e.g. ELCs), the increase in GDP, and a growing population. Following this increase in demand, it is predicted that there will be a significant increase in land prices and competition in the future (Löhr 2011).

If such competition occurs, it is expected that smallholders and poor people will be less powerful in the competition over land than large-scale domestic and transnational agro-business companies that have more money and a proximity to the government (Löhr 2011). With no guarantee that these investors will devote resources to social and environmental responsibility, it is expected that the rural poor will be vulnerable, with impacts on their livelihoods and rights (e.g. GRAIN 2008). Insecure land titles and unclear land-use rights exacerbate this situation and make it more difficult for Cambodia's rural poor to secure their livelihoods. This study has shown that conflict can arise when people lose the source of their livelihoods and when assets such as trees and farmland are destroyed.

An analysis by the NGO Forum on Cambodia (2010a) shows that the largest number of unresolved land dispute cases in Cambodia in recent years involved agricultural land. This fact may signify that community livelihoods and food security are at high risk as agricultural land is the most likely type of land to be disputed.

11.5.3 Natural resource conditions

The two case studies presented indicate that both companies cleared the land for the preparation of their operations. This confirms other studies showing that land concessions have severely degraded and diminished forest resources (Hughes 2008). This study found that this degradation of forests (community forests and trees) has triggered conflict.

It is predicted that there will be bigger impacts on forest resources as demands for food and products from timber plantations will likely increase in the future (Godfray et al. 2010, Indufor 2012), especially from within Asia. Moreover, McMahon (2008) stated that the existing forests are under high threat because of the flow of investments that spur the conversion of forestland to agricultural plantations or ELCs. Continuous illegal logging exacerbates this situation (McMahon 2008).

The combination of widespread forest conversion and land grabbing due to ELCs, the increasing demands for forest products and forest land for agriculture, and a growing population may complicate efforts of the Cambodian government to achieve its Millennium Development Goal to have 60% of the country covered by forest by 2015 (Yasmi et al. 2010a).

Cambodia, rich in natural resources, is defined as one of the least developed countries in Southeast Asia. These resources must be utilised for the betterment of the country as a whole, in a sustainable manner. The challenge is ensuring that the governance framework is in place to accomplish this. The government of Cambodia has a duty to improve the lives of its people, including poverty reduction. In Kampong Speu, the community does not use the forest for economic purposes because of fear, which means it needs to source its timber from elsewhere, placing additional pressure on neighbouring forests: this community's choices can negatively impact other communities' attempts to sustainably manage their forests. The government, however, will view this community's forest resource as being underutilised.

Industrial forestry proved to be a failed strategy for the country, with unsustainable exploitation leading to widespread forest degradation while generating limited income for the national government (Poffenberger 2009). This again highlights the weak governance that besets many aspects of forest management and poses risks to efforts such as REDD+ (Evans et al. 2012).

11.6 Conclusions and recommendations

This study and other similar studies have demonstrated that land grabbing through ELCs in Cambodia is often associated with conflict, with serious implications for SFM. Ambiguous property rights and overlapping claims, lack of coordination among government agencies, and lack of consultation and impact assessment prior to the decision-making process have become the underlying cause of conflict in the context of ELC.

The study findings have various implications for SFM. First, in order to achieve SFM, the study suggests that the Cambodian government should revisit the policy on ELC to ensure that it goes hand in hand

with SFM and community forestry development and includes clarification of tenure and protection of community land rights. This is crucial because tenure will be a strong determinant of who benefits and loses from ELC policy.

Second, the study suggests that the enforcement of the regulation that requires consultation and SEIA before granting of an ELC license is critical. This will require a concerted effort by government and also by non-governmental organisations that may act as control and balance and provide feedback on how SEIA is applied on the ground. Strengthening the capacity of both government officials and non-governmental organisations on how to conduct, monitor and evaluate the SEIA is necessary. SEIA is critical not only for getting consent from the local community but also for understanding and accommodating its needs and rights. Unnecessary conflicts can be anticipated and prevented if there is a community consultation before any development plan, including ELCs. The consultation and SEIA will allow the stakeholders to understand the interests and concerns of other parties, find ways to incorporate them, and identify areas that might have impacts on environment and community. Participatory processes and transparency should therefore be institutionalised.

Third, support will also be needed to strengthen conflict management capacity at all levels. This may require a gradual process of building awareness at local levels on various aspects of policies and legislation related to resource management, including CFs and ELC, what the rights of local people are, etc. At the national level, capacity and willingness of government and investors to take a community's interest into account must be improved. Investing in this community consultation is beneficial for their long-term interest since social conflict resulting from improper consultation processes may cause serious damage to their operations, as shown by these two case studies. The high frequency of conflict in the country underlines the importance of people who can effectively manage and address conflict. It is widely accepted that without proper conflict management, conflict can escalate and spread (Wall and Callister 1995, Yasmi et al. 2006). The protests raised by communities can be attributed to the failure to address the conflict through other avenues, such as assistance from local government or direct negotiation with the company, as well as to mistrust of the formal court or complaint mechanisms, which are widely considered ineffective by rural people in Cambodia (Ratner and Parnell 2011). This highlights the needs for alternative approaches to resolving conflict. A study on forest conflicts in Asia found that mediation is one of the effective approaches to resolving forest conflict in the region (Yasmi et al. 2010b). However, the capacity of mediator in the region is weak and needs to be strengthened (Yasmi et al. 2010b).

Finally, more research that looks carefully at ELC and its role in SFM is necessary in order to gain deeper understanding of the impacts (positive and negative), evaluate the strengths and weaknesses of ELCs, and determine how to move forward toward SFM.

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Role of corporate responsibility: Insights from three forest-industry multinationals investing in China

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Abstract: Recent geographic reallocation of forest industrial production has been associated with the rapid expansion of foreign direct investment to emerging BRIC (Brazil, Russia, India, China) countries, where China has attracted the main interest globally. Simultaneously, expectations regarding corporate governance in the global forest industry have been shifting towards placing more emphasis on environmental and social sustainability of the industry. In this paper, we provide insights into the corporate internationalisation process and implementation of corporate social responsibility by investigating three leading pulp and paper companies International Paper, Asia Pulp and Paper, and UPM-Kymmene Corporation, which have large-scale investments in China. First, we compare investment paths of the three companies and address the impacts of global conventions and policy initiatives on corporate operations. Second, taking a corporate responsibility perspective, we look into processes of local-level corporate responsibility and stakeholder involvement. Finally, we examine the visions of operations and the future of corporate responsibility of the case-study companies in China. The scope of corporate sustainability agendas of three multinational companies in China appears to have followed a standardised fashion. The decision to integrate the plantation-based pulp-industry model in the local context of China seems to be a source of controversy towards corporate legitimacy among the three companies, suggesting establishment of land tenure and enforcement of ownership rights as a key condition in problem solving. In addition, broadening social impact assessments in China might help to prioritise good relationships with government authorities, local communities, and civil society members to ensure sufficiently wide stakeholder support and legitimacy.

Keywords: Foreign direct investment, pulp and paper industry, corporate sustainability, CSR, plantation-based strategy

12.1 Introduction

Recent geographic shifts of forest-industry production capacity have been associated with the rapid expansion of foreign direct investment (FDI) particularly targeting emerging BRIC (Brazil, Russia, India, China) countries. Simultaneously, issues regarding corporate governance in the global forest industry have been shifting to place more emphasis on environmental and social sustainability of the industry. While many proactive forest-industry companies have brought responsible business practices visibly into their corporate strategies and communication efforts, impacts of such strategic shifts (e.g. corporate contributions to stakeholders) in local operations are not yet well-understood. Thus, better understanding of foreign expansion paths, corporate responsibility development, and responses to growing local and global pressures would become necessary.

China is regarded as one of the most dynamic countries for FDI due to its high pace of development (average GDP growth 9.9% per year since 1995) and large potential market (World Bank 2012). Since implementation of an Open-Door policy in 1978, the Chinese government has actively encouraged foreign trade and investment by establishing special economic zones and giving preferential taxes

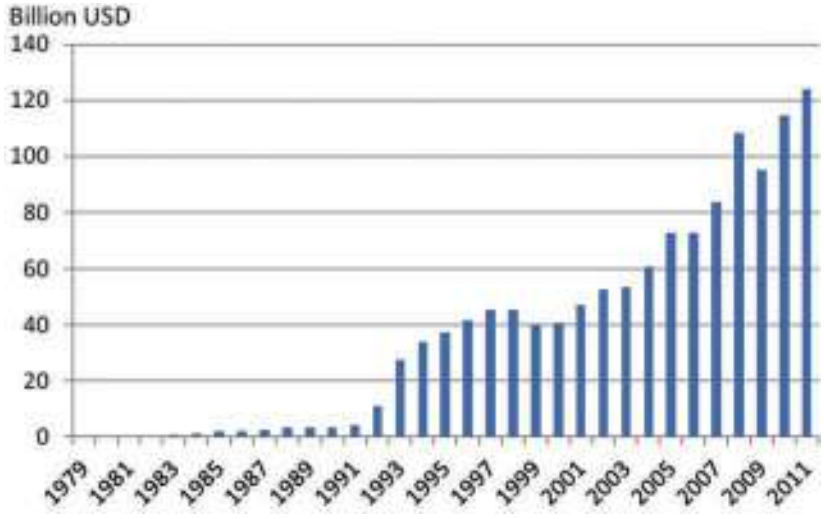

Figure II 12.1 Inward FDI flows in China 1979–2011 (UNCTAD database 2012).

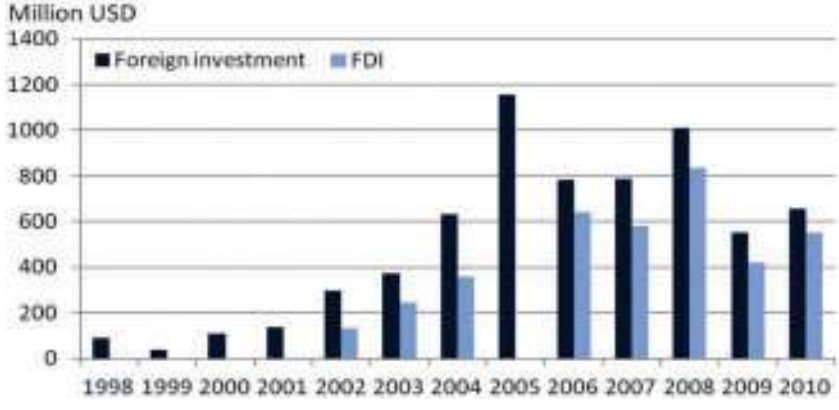

Figure II 12.2 Foreign investment and FDI in the forest industry in China 1998–2010. (China Forestry Development Report 2000–2011).

to foreign investors. Deng Xiaoping's Southern Tour in 1992 accelerated the open-door process and brought the first inward FDI flow period in China from 1992 to 1998. Furthermore, the confirmation of China's membership in the World Trade Organization (WTO) in 2001 initiated a second growth period of FDI inflows in China (see Figure II 12.1). Along with the accumulation of FDI inflows, the Chinese government has significantly improved regional infrastructure in terms of transportation, communication, and supply of water, electricity, and natural gas. In addition, relevant laws, regulations, and policies have been revised according to requirements of a market economy and WTO membership. Overall, the stable investment environment, attractive investment policies, a low-cost labour force, and huge market potential have attracted significant foreign investment to China.

Within the Chinese forest industry, foreign assets had been accumulating since the late 1980s in the backdrop of China's Open Door policy and the reform process in forestry (Table II 12.1). The WTO membership (2001) also induced an upsurge in inflow of foreign investment in the forest industry (Figure II 12.2), in which FDI has accounted for about 70% of total foreign investment. The cumulative amount of foreign investment during the 2000s reached USD 6.4 billion, which is almost three times the cumulative investment (USD 2.4 billion) in the 1980s and 1990s (China Forestry Development Report 2000–2011, Liu 2002).

The evolution of the forest industry and the growth of foreign investments in China provide a solid national background in terms of exploring foreign operations of multinational enterprises (MNEs). Thus, the objective of this study is to analyse the process of local-level corporate responsibility of MNEs and stakeholder involvement in foreign investments by taking a glance at China as a host country. In the following sections, we first review relevant theoretical background and then compare and analyse investment paths, implementation of corporate

Table II 12.1 Forest-related institutional evolution in China (1970–present).

	Country level	Forestry related
1970s	1978, Open Door policy Start of economic reform: from planned economy to market economy	Collective forest management dominant Forest sector as a supplier of cheap raw materials Forest resource devastated: extensive timber cutting and inefficient afforestation (successful rate of plantation: 20%)
1980s	Establishment of special economic zones on the east coast	1984, launch of the first Forest Law Start of forest-tenure reform from collective to individual household management (household production responsibility system)
1990s	1992, Deng Xiaoping's Southern Tour: acceleration of the open-door process 1995, the launch of the Provisional Regulations upon Guidance for Foreign Investment Orientation and the Guiding Directory on Industries Open to Foreign Investment 1992–1998, first progressive period in FDI	1992, launch of Barren Land Auction policy 1998, Forest Law revised 1998, launch of Six Key Forest Programs Reorientation of forest policy from a strategy of timber production to resource and ecosystem conservation
2000–present	2001, membership in WTO, start of second progressive period of FDI 2008, new Corporate Income Tax Law 2011, latest version of Catalog of Industries for Guiding Foreign Investment	Significant increase in forest coverage Largest plantation estate in the world Forestry foreign investment in 2000–2010 tripling that of the 1980s and 1990s

responsibility and stakeholder involvement, and finally explore the future business orientations of the three MNE cases in China. Finally, some common contextual circumstances faced by these three MNEs in China are discussed to point out ways to improve responsible business operations.

12.2 Background

Calof and Beamish (1995, p. 116) describe internationalisation as "the process of adapting firms' operations (strategy, structure, resources) to international environments." Corporate motivation to internationalise operations has been defined either as a resource-seeking, market-seeking, or efficiency-seeking mode using variable expansion mechanisms of FDI, joint ventures (JV), licensing, or exporting (Mudambi and Mudambi 2002). China, as an investment destination, has evoked research concerning perspectives of investment policy, governance, economic and social impact, and technology spillover (e.g. Han et al. 2004, Wang 2007, Cole et al. 2009, Huang and Tang 2012). However, in the forest sector, research on MNEs' foreign investment in China is limited (Zhang et al. 2013).

Along with economic globalisation and increasing environmental concerns, national-level management standards can no longer efficiently regulate MNE operations, putting more weight on corporate self-governance and orientation towards sustainable development. Emerging in the 1970s, the concept of corporate social performance (CSP) has become an attempt to offer a managerial framework to deal with and to measure corporate responsibility (CSR or CR) (e.g. Wood 1991). Van Beurden and Gössling (2008) have conceptually divided CSP into three categories: the extent of social disclosure about matters of social concern; corporate actions (e.g. philanthropy, social programs, pollution control); and corporate reputation rating agencies (e.g. in KLD, Fortune). In addition, widely accepted international conventions, policy initiatives, and unified standards based on voluntary participation have been carried out. The Global Reporting Initiative (GRI) and the UN Global Compact are designed to standardise corporate sustainability. MNEs could meet local stakeholders' expectations and gain competitive advantage by subscribing to internationally recognised standards (Angel et al. 2007, Perkins and Neumayer 2010). MNEs could also positively stimulate local companies through mimetic effects to help in development of the host country's economy (Perkins and Neu-

mayer 2010). From the industry perspective, voluntary implementation of sustainable management standards may also bring benefits to operational efficiency. Released by the International Organization for Standardization (ISO), ISO14001 environmental management system and ISO 9000 quality management system have become the most successful and widely adopted sets of standards in assessing corporate environmental management and firm quality management (Clougherty and Grajek 2008, Perkins and Neumayer 2010). Specifically in the forest industry, the concept of forest certification was created as a market-based instrument to promote sustainable forest management. After 20 years of development, the Forest Stewardship Council (FSC), Pan European Forest Council (PEFC), and other national-level forest certifications have been gradually implemented all over the world.

Managing social and environmental legitimacy with a wide set of stakeholders at local, national, and international levels is of increasing importance in the global forest industry (see e.g. Mikkilä 2006). Local communities affected by the business activities of MNEs are a considerable stakeholder group, particularly when the cultural and political environment differs from that in home (headquarter) countries. Also, the context of operation influences consideration of various stakeholders (e.g. Kourula and Halme 2008). Schepers (2006) has proposed that when MNEs operating both in developed and less-developed countries gain international exposure through consumer or investor pressure, their CSR practices tend to be skewed towards developed-country stakeholders. Therefore, the impact of the home country may differentiate corporate conduct at various locations. Muller and Kolk (2010) argue that pressures by home-country stakeholders to exhibit high levels of CSP motivate MNEs to embed higher CSP both within their own subsidiaries through FDI and in their trade with arm's length partners in lower CSP contexts as a way to solidify a good corporate reputation and manage risk. However, according to Misani (2010), social practices of firms can very often be driven by pressures to conform to prevailing industry practices without a strategic intention to excel and differentiate themselves from competitors. In any case, empowerment of local stakeholders and increasing attention to issues such as equity in stakeholder involvement represent hot-spot areas for forest-industry multinationals.

The gap in environmental and social standards between industrialised and developing countries is evident in the controversy about large-scale North-South shifts in pulp and paper production. In recent years, a number of FDIs in the forest-based industry (e.g. Veracel Celulose S.A. eucalyptus pulp mill in Brazil, Botnia cellulose pulp mill in Uruguay, Asia Pulp and Paper and Stora Enso plantations in China) have received intense criticism in terms of unsustainable wood supply, negative environmental impacts, controversial social benefits, insufficient scientific evidence on the large-scale effects of the plantations, and greenwashing accusations (e.g. Lang 2007, Varmola et al. 2010, Laasonen 2012), placing increasing pressure on FDIs to be more environmentally and socially responsible by balancing the diverse demands and claims of the different stakeholders. Having realised that challenges and risks in FDI are socially, politically, and culturally derived from objectives and strategies of different stakeholders, Aaltonen and Kujala (2010) have proposed a project life-cycle perspective to understand secondary stakeholders' influence on behaviour in the forest industry through investment preparation and operational project execution, enabling the use of more effective stakeholder-management approaches in a project.

As described in the background information, the internationalisation process in the forest industry is associated with multiple themes, from international-level policies and a range of environmental and social issues to market and policy uncertainties in the emerging countries. Thus, in this case study, by controlling the context of analysis to a single country, China, we aim to capture the interplay between corporate investment paths (expansion process), impacts from international conventions and policies, and local-level corporate contribution and stakeholder involvement to analyse the potential future of MNEs in China.

12.3 Data and methods

Qualitative analysis on activities of three multinational companies was selected as the research methodology. Case studies are "the preferred strategy when the investigator has little control over events and when the focus is on a contemporary phenomenon within some real life context" (Yin 2003, p. 1). In this study, UPM-Kymmene Corporation (referred to as UPM), Asia Pulp and Paper (APP), and International Paper (IP) have been chosen as focal companies to represent different corporate backgrounds. The comparison of three companies may help to draw stronger and more convincing conclusions about implementation of internationalisation strategies and corporate responsibility.

Data consists of both document analysis and interviews. The secondary documents include corporate annual reports, financial fillings, sustainability reports, corporate websites, and brochures, as well as information from all relevant digital channels of newspapers, journals, magazines, and NGO publications. The effective time period for documentary

information was from 2002 to 2012, i.e. the second growth period of FDI inflows to China. A semi-structured interview protocol was designed based on the research questions about corporate responsibility, stakeholder interactions, and the operational situation and prospects in China. Eventually, one senior manager from each focal company, two representatives from NGOs, and one industry expert of Finnish origin were interviewed via video or telephone. The thematic interviews were conducted in the second half of 2012, each of them lasting from half an hour to two hours. The interview language was either Chinese or English, and all of the interviews were recorded for the purpose of information accuracy. The data was analysed using thematisation.

The integrity of case study research in terms of validity and reliability ensured methodological rigor and decreased the possibility of bias (Yin 1989, Patton 1990). In this study, we use triangulation of data (both secondary documents and interviews) to improve the reliability of the study and the use of quotes from interviews illustrates interviewees' authentic responses. The pre-designed protocol is followed during the interviews to ensure data consistency. In addition, top-level managers and experts with rich professional experiences are targeted in the interviews to guarantee validity of the information obtained. However, our interview data is still quite limited, especially from the viewpoint of external stakeholders, providing areas for future research.

12.4 Results

12.4.1 Company investment paths in China

Before China joined the WTO in 2001, joint ventures were a key priority for MNEs in their entry strategy to set up contract manufacturing structures in China, with a view to targeting overseas customers. Today, foreign MNEs in China are facing increased challenges, including issues of increasing complexity that touch on risk management and frequent regulatory change, rising economy of inland provinces, strengthening of local competition, rising labour and production costs, the war for talent, and an economy that is not immune to the current global economic malaise. All of these require foreign MNEs to adapt their strategies in China according to the scale of their operations and ambitions regarding corporate sustainability.

Key features of company operations in China are shown in Table II 12.2. The Finnish company UPM expanded its business into China in 1998 by taking a 49% minority interest in the APRIL Fine Paper mill and set up its first paper machine in Changshu, Jiangsu Province. In 2000, UPM obtained 100% ownership of the Changshu mill and established its wholly owned subsidiary. After 14 years of development, UPM has gradually gained ownership of a paper mill, a label-stock factory, and an Asia research-and-development Centre in Changshu, and expanded its sales offices over the southern and eastern parts of China. UPM's main business areas in China and Asian Pacific areas include paper, label materials, plywood, sawn wood, and radio-frequency identification (RFID) tag products. By 2010, UPM had cumulatively invested USD 1.2 billion and had a total of 1367 employees in China. In August 2012, UPM announced a new USD 500 million paper-machine investment to increase production of fine and label paper at Changshu mill, to begin operation in 2014. Shortly afterwards, a new strategic partnership with the giant Hengan Group, which produces household paper products, was announced to bolster UPM's direct sales operation in China.

Indonesian Asia Pulp and Paper (APP) entered China in 1992, which is the earliest of the three case companies. APP set up joint ventures with Chinese paper and pulp companies at the initial stage of expansion. In 1994, APP set up its first plantation base in Guangdong Province, which established APP's development strategy of plantation-pulp-paper integration in China. Since 1996, APP has successively invested in wholly owned subsidiaries in eastern and southern parts of China and set up its headquarters in Shanghai. After two decades of operations, APP's asset base in China has reached USD 13 billion through ownership of 18 pulp and paper enterprises and more than 20 plantations (more than 300 000 ha) in the Yangtze River and Pearl River Deltas. APP's main business categories in China include copperplate paper, pulp, industrial paper, packaging paper, household paper, and carbonless copy paper. By 2010 (latest available figure), APP had 38 900 employees in China, many more than the other two companies.

International Paper (IP) from the United States started its Chinese business in 1994 by establishing an office in Hong Kong focusing on business development. IP has gradually established its industrial packaging production and sales plants in China and moved its Asia headquarters to Shanghai in 2004 to expand its Chinese operations. In 2006, IP invested USD 140 million into a joint-venture business with Shandong Sun Paper Ltd. to produce premium coated paperboard. In 2010, IP purchased SCA's packaging business in Asia (primarily in China), consisting of 13 corrugated box plants and two specialty packaging facilities. To date, IP has cumulatively invested about USD 2 billion in China and currently owns 19 production and sales plants operating both consumer and industrial packaging businesses in 17 cities.

Based on the information about the three com-

Table II 12.2 Operational information of case-study companies in China.

	UPM	APP	IP
Business areas	Energy and pulp Paper Engineered materials	Paper Pulp Packaging	Printing papers Industrial packaging Consumer packaging
Forms of investment in China	FDI	FDI and joint venture	FDI and joint venture
Assets in China	USD 1.2 billion (2010)	USD 13 billion (2010)	About USD 2 billion
Sales in China (% of total sales)	USD 592 million (5.37%) (2010)	USD 5.9 billion (% N.A.) (2010)	USD 706 million (2.8%) (2010)
No. of employees in China (% of company total)	1367 (6.25%) (2010)	38900 (% N.A.) (2010)	3500 (5.9%) (2010)
Headquarters in China	Changshu	Shanghai	Shanghai
No. of facilities in China	3 paper and label plants 1 R&D centre 6 sales offices	18 pulp and paper enterprises More than 20 plantation farms	19 container plants 1 Asia Customer Solution Centre 1 IP-Sun joint venture

panies' activities in China, some differences in their expansion paths can be observed. All three entered China during the 1990s, which makes them among the very early MNEs to invest in China. Concerning investment type, UPM established a wholly owned production unit almost from the initial stage; however, APP and IP chose the incremental strategy through establishing a JV or a sales office, respectively. As stated by a manager of APP, "JV acts as learning tool during the early stage of corporate expansion; however, wholly owned subsidiaries are preferred since ways of communication have been established."

The sales value among the three companies in China differs as well. For UPM and IP, sales in China only accounted for 5.3% and 2.8% of its global sales respectively in 2010, indicating that currently China is still a minor market. However, the sales of APP in China reached USD 5.9 billion in 2010, which was about 10 times more than that of UPM and IP. Although the global share of the sales of APP China is not available, representatives from both APP and an NGO said: "China is still the most important market for APP." From the business point of view, APP also differs from other two companies: UPM and IP have only invested in production plants, while APP has both production and plantation investments. However, all three companies have maintained almost the same organisational structure in China as globally.

The different investment paths of these MNEs indicate different strategies for implementation of corporate responsibility through, for example, local-level contribution and stakeholder involvement and emerging future business trends in China. These are elaborated in more detail in the following four sections.

12.4.2 Impact of global conventions, international policy initiatives, and market-based mechanisms

Based on disclosures of the companies, all show commitment to global sustainable development goals (UPM and IP are members in the World Business Council for Sustainable Development, WBCSD;

UPM in the Dow Jones Sustainability Index, as the only paper company in 2012, and in the UN Global Compact since 2003) to align corporate operations and strategies with human rights, labour, environment, and anti-corruption issues. In their paper and paperboard manufacturing, all companies have adopted systems of quality management (ISO9001) and environmental management (ISO 14001); and acknowledged the importance of health and safety (OHSAS 18001) with their employees. Driven by the Global Reporting Initiative (GRI), each company actively participates in publishing annual corporate sustainability reports. According to the latest reporting profile, the application levels of UPM, APP, and IP are B+, B+ and B, respectively, which indicates comparatively detailed and well-defined reporting under different GRI domains of sustainability. However, in a previous study by Toppinen and Korhonen-Kurki (2013), adoption of standards such as GRI on sustainability reporting was not found to improve the transparency of social practices in forest industry MNEs.

Regarding adopting forest certification, UPM, APP, and IP either have FSC or PEFC Chain of Custody in their Chinese factories. By 2011, 60% of APP plantations have been certified by the China Forest Certification Council (CFCC), which had joined PEFC International in 2011, but the process of endorsement and mutual recognition between the China Forest Certification Scheme and PEFC is still ongoing.

Referring to corporate green image, interviewees from all of the companies consistently indicated its importance for corporate operations, especially when dealing with global customers. However, considering the domestic market in China, all interviewed managers voiced that impacts of green image are still very limited and the product-level sustainability can be considered as an advantage but not a source for price premiums for products. In the future, however, case companies expected that the green image will have more influence on the Chinese market.

12.4.3 Contribution of companies to the local level and linkages to market value chains

Foreign investment contributes, for example, employment opportunity, technology transfer, and market values to the local economy. In case companies, the current number of employees in China varies from 1367 in UPM and 3500 in IP to more than 38 000 persons in APP. Localisation of the management team in China is a common trend in all of the companies. In UPM, the proportion of Chinese employees is on the rise due to new investment decisions, while there is simultaneous decrease in European facilities. UPM has tried to localise corporate organisational structure by employing local employees up to the management level and currently has only six to seven expatriate managers in Asia. Similarly, IP employs very few expatriates working at the management level in China. In contrast, APP local employees account for about 70% of those employed; at the management level, the ratio is 60%. As explained by an APP manager, "The high ratio of expatriates will decrease when the ongoing projects are completed."

Businesswise, UPM focuses on printing and writing paper markets and labels in China. UPM has also established a research-and-development centre, illustrating commitment to developing solutions for non-wood-based pulp production (accounting for more than 53% of the paper industry's raw material in China in 2010, UPM 2012). Customised products offered to meet local needs and the Asian Pacific market represents about 14%–15% of total sales. UPM cooperates with local distributors to support its sales network in China. However, as stated by a UPM manager: "As the distributors in China are small, we have to have deeper involvement in taking care of warehouses, etc. than we did in Europe." Product quality and reliability in supply are considered as the key competitive strengths of UPM in China.

IP operates as a packaging-and-paperboard-driven company serving markets both in China and Asia. IP uses third-party logistics for products distribution in most cases to keep up operational efficiency. The best manufacturing system in the industry, with a global footprint and vision, is considered as IP's key strength in China. However, brand recognition is still low for even IP: as stated by one manager, "Brand awareness is very weak in the overall China market, and the price is still the most important issue. It is a long way to go before building a close relationship with the domestic clients."

APP operates a larger business portfolio in China than UPM and IP. Although APP sets China as the main target market, some of its paper products manufactured in China still serve globally. APP has 17 sales companies (45 sales offices) covering all provinces in mainland China. APP uses third-party logistics for products distribution. In addition, APP has a centre in Shanghai to supervise logistic systems for each of its mills in China. As explained by an APP manager, "Performances and services can be ensured through the connection between sales offices and distributors/end users." APP considers clean production, efficient management, and solid actions on plantations as key operational strengths in China and points out that "cultural similarity and mutual recognition have helped the operational efficiency in decision-making and communication with local communities." APP also has undertaken a long-term

brand-building process in China, and it was recognised as "the best brand-image enterprise" by China Finance Summit in 2012.

In sourcing raw materials and pulp, UPM and IP rely strongly on imports of pulp and recycled paper into China, which not only simplify corporate operations but also limit the scope of environmental and ecological impacts on local livelihoods, as no wood raw material is procured locally. Based on our interviews, UPM considered the establishment of plantations in China 10 years ago; however, the plan did not go through. As a reason a UPM manager stated, "The timber [land] is very expensive and the establishment of plantations was not found sufficiently profitable." In addition, the limited land availability for plantations and the lack of resources for large populations were also mentioned, all of which prevented UPM from achieving its intention towards an integrated plantation-pulp-paper model in China.

APP leased 300 000 ha of plantations in Guangxi, Yunnan, and Hainan Provinces. As stated by an APP manager, "Plantations provide 100% of raw materials for the Guangxi pulp mill but only provide 30% to 40% of raw materials for the Hainan pulp mill. In order to meet the needs of the rest, we have to buy pulp from our overseas plantations or global markets." The pulp mills have brought benefits for the development of urban economic zones; however, there could be risks of impoverishing and simplifying the local economic system. An NGO interviewee argued that "in APP's plantation project in Hainan Province, instead of bringing benefits and job opportunities to local communities, APP hired cheap labourers from remote areas of Sichuan and Guangxi Provinces to minimise operational costs." As underlined by an NGO representative, "MNEs should assure benefits for local peasants" and "the value of the land should be evaluated fairly before signing the lease contract."

12.4.4 Stakeholder involvement

The representatives of the three MNEs each expressed their company's aims to maintain good stakeholder relationships in order to effectively implement their operations in China. When viewing implementation of their corporate responsibility strategies, no incidents were found regarding UPM and IP that would have reflected negative public scrutiny in China (comments on APP are below). For example in 2004 and 2005, UPM was recognised by both state and local governments as an environmentally friendly enterprise. From the NGO side, Greenpeace has also stated its support since UPM announced that it has no intention of establishing plantations in China. In addition, UPM was also designated as one of China's top employers by the Corporate Research Foundation (CRF) institute in 2012, which affirmed the company's human resources strategy and competitiveness in Chinese labour markets.

In managing local stakeholder relations, an interviewee from UPM emphasised the importance of multiple-level public stakeholders for its smooth operations. As stated by a UPM manager, "Good relationships with government officials are essential to open communication. Showing respect is very important." In addition, the company viewed stakeholder management by working through its employees, as "pensions, medical care, learning opportunities, training programs, and promotion opportunities have attracted local young people to work for Western rather than Asian companies." An UPM representative claims that his company maintains an open attitude, communicating with the general public, and insists "the consistency of oral promises with practical actions". However, results from carrying out any formal social-impact assessments were not mentioned during the interview.

IP actively participates in philanthropic and environmental projects in terms of scholarships, tree planting, and charity programs in China. As said by a manager, "IP is still learning the best way to work with stakeholders." However, considering the social impact assessments, the IP manager admits that these have not yet been implemented in China. More specific information concerning IP's operations in China is lacking from the corporate website and sustainability-related documents.

As for APP, different from UPM or IP, it implements plantation-pulp-paper integration through land leases and plantation activities, which have more substantial local impacts through upstream activities and broader stakeholder involvements beyond mill gates. APP has a corporate CSR report and a Paper Contract with China (PCWC) forum as its key communication channels with stakeholders. APP also actively participates in philanthropic projects in China, having donated nearly USD 100 million. Concerning community relationships, an APP interviewee states that "APP treats local communities as part of its stakeholder group by providing job opportunities, participating in e.g. road construction, and taking care of peasants' daily needs." However, APP is not so optimistic about the future prospects for plantations in China, and as stated by an APP interviewee, "Difficulties in verifying owners of forest tenure, problems of forest theft, pressures from rising costs, and lands availability for plantations are main obstacles."

In the eyes of many NGOs, the plantation behaviours of APP and its relationship with local communities have been controversial issues. As an interviewed representative of an NGO said, "Forestry MNEs with plantations in China have more conflicts and contro-

versial issues with government and NGOs than those that just run production mills." For example, Greenpeace has made several accusations over the years that APP has participated in illegal logging activities that have led to the deforestation of natural forests in Yunnan and Hainan Provinces. Zhejiang Hotel Association which boycotted APP products based on environmental reasons is considered to be China's first civil-society boycott of a company's products. "A more open, reliable, practical, and scheduled plan for the improvement of the operation of APP plantations is expected," commented an interviewee from a local NGO. In response, an interviewee from APP stated, "There are small problems during operations, but huge progress has been made in environmental protection." In 2013, APP Indonesia announced a new forest conservation policy, which put a halt to clearing natural forest; however, its impacts have yet to be evaluated.

With respect to the main forms of community and local stakeholder involvement, practices in the case-study companies are fairly similar: they have participated in various philanthropic projects in terms of disaster relief, environmental improvement, community construction, and scholarships. However, as Kourula and Halme (2008) maintain, corporate philanthropy can be seen as separate from strategic company goals, an instrumental way towards achieving business legitimacy. Therefore, corporate views towards implementation of strategic CSR were not yet clearly visible in the context of China. Also, according to interviewed representative of civil society, MNEs' CSR activities in China and Asia in general are very often driven by company needs, and projects such as attempts to involve local communities are emerging only after conflicts arise. In conclusion, stakeholder management in China is more reactive than proactive, aiming to minimise conflict, rather than to solve the roots of some future conflict.

12.4.5 Corporate insights on future business in China

Finally, we focus on insights available from corporate views concerning future development in China and the surrounding Asian Pacific region (see Table II 12.3). The competitive landscape is set to change with the Chinese government's plan to shift the economy from manufacturing to consumption (or from manufacturing to services). The Chinese tax authorities have implemented several regimes (i.e. the VAT reforms introduced in 2012 to replace the business tax with a value-added tax for cross-border transactions) to grant favourable tax treatment to inbound FDIs. In the long term, greater opportunities are seen for foreign MNEs that establish full-fledged manufacturing operations in China and with a primary focus on the Chinese market, seeking organic growth or growth through mergers and acquisitions.

From the viewpoint of market demand, UPM and IP both appear to expect solid demand growth in China in the foreseeable future. In contrast, APP clearly points out the intensified market competition in China and Asian Pacific markets, possibly because of its high market presence and reliance on local and regional markets. Based on corporate website information, APP aims to consolidate corporate internal resources, develop new international markets by increasing exports, and create high-quality value-added products for its customers in the future. Concerning strategic objectives, UPM states that it will continue to invest in its paper and label business in China by building a new wood-free specialty paper machine at Changshu and expand its markets to reach the target of "having more than 50% of sales from well-performing emerging businesses in the latter part of the decade (UPM 2012)." IP will continue to build on the JV cooperation with Sun Paper by investing in a fourth board machine to strengthen its leading position in consumer packaging in China. Meanwhile, IP set the profitable growth strategy by utilising a national network of box plants for its industrial packaging sector and an export strategy for its printing paper sector in China. APP aims to increase investments in environmental protection and clean production to strengthen its competitiveness.

As for perceived challenges, case-study companies concern economic and political risks, overcapacity, and fierce competition in China. For UPM, overcapacity is not perceived as such a threat since increasing exports can provide a solution. For APP, fierce competition for imported raw material and the public's stereotyped impression about the paper industry challenge its operations in China.

The emerging stakeholder issues are perceived to be quite similar among the three companies, each of them prioritising sustainable operations, improving customer relationships, and environmental performance. UPM aims to have an 80% share of certified fibre by 2020 to maintain sustainable development and, in a recent campaign in 2013 with ELLE China, to reach a target of 100% FSC certified fibre. IP states that it will develop the sustainable product life cycle from product design to end use, while APP expects to focus on innovation and clean production and to building long-term relationships based on customer needs.

Table II 12.3 Corporate insights on future development of the three companies in China.

	UPM	APP	IP
Market expectations	Solid demand growth expected to continue	Intensified market competition	Large market, strong demand growth In short term, excess supply possible
Strategic objectives	Commitment to serve market-growth opportunities Reshaping of the business portfolio and expansion in most profitable growth segments Regional strategy: Asian label-paper customers with multiple end-use areas identified as a further strategic opportunity	Expanding into new markets through market integration Consolidating financial resources to explore alternative financing options Solidifying firm's financial risk management Building diversified product mix to create high value-added products Practicing integrated plantation-pulp-paper model Improving efficient use of resources and promoting a recycled economy (corporate-level goal)	Commitment to serve market-growth opportunities with FDI Industrial packaging strategy: profitable growth utilising national network of box plants Printing paper strategy: export to fast-growing Asian markets Consumer packaging strategy: strengthening of leading position in fast-growing markets and growth with established customer base
Perceived challenges	Political risks, corruption, the unequally distributed wealth	Overcapacity in markets Fierce competition for raw materials Policy changes and stringent environmental regulations	Economic and political instability Being competitive and profitable in over-supplied markets of Asia
Top three prioritized stakeholder interests	Achieving high profitability Improving customer relationships Maintaining superior environmental performance	Controlling waste and emissions Managing natural resources, Maintaining ecosystems	Building a sustainable product life cycle from product design to end use

12.5 Summary of corporate internal and external issues

Currently, China is the most important target market for investment in the global forest industry, and the three case-study companies (together with many others in the forest industry) share an interest in having a strong local presence in its growth markets. Based on comparative analysis of the activities and communications of the companies, common contextual circumstances and identified stakeholder-related issues seem to prevail in China (synthesised in Table II 12.4).

From the corporate internal point of view, market-driven investments, high localised workforces, and use of local logistic suppliers in China appear to be common for all three companies. In addition, companies have a strong self-perception of their corporate sustainability. However, low brand recognition and weak customer relationship are regarded as challenges in the Chinese market, and local consumers still have very limited awareness of corporate green images. Comparing corporate Chinese operations with their other operations internationally, the three companies appear to maintain consistently global organisational structures and raw material procurements.

From the corporate external point of view, importance of good relationships between companies and government was emphasised. All case-study companies actively participated in philanthropic projects in China; however, the scope of dialogue with local communities appeared quite limited. Plantation busi-

Table II 12.4 Emerging stakeholder-related corporate internal and external issues, both in China and at the international level.

	Corporate internal	Corporate external
China	Market-driven investments with domestic and export-oriented production Heavy dependence on local workforce, also at the management level Reliance on local logistic suppliers Strong self-perception in corporate green image Efforts needed to enhance local brand recognition and customer relationships	Good company-government relationships Active participation in local philanthropic projects but lacking substantial local community dialogue and empowerment Lack of social impact assessment and narrow sense of implementation High environmental and social sensitivity about plantation business Increasing influence of local NGOs in the future
International	Establishment of sustainable raw material procurement Aligning with corporate organisational structure	International sustainability standards and conventions as an influence pathway International NGOs pressure in promoting forest certification, civil and land-use rights Increasing consumer pressures and demand for certified products

ness has high environmental and social sensitivity in China, and criticisms from many NGOs have emerged. In addition, pressure from global market demands for certified forest products has also evidently driven the companies' operations in China.

12.6 Conclusions

The rapidly growing and profitable Chinese market has, and will, offer future lucrative opportunities for forest industry multinationals. Based on the evolution of investment paths and identified stakeholder issues, it appears that when operating in China, the integration to local fibre supply and leasing plantations locally will make a substantial difference in maintaining acceptability of company operations. Among the case companies, APP has the largest presence in China and has also had more critical stakeholder scrutiny. For UPM and IP, focusing on paper or paperboard production in urban or semi-urban areas, the social issues have remained relatively uncomplicated, permitting business as usual. When sourcing wood fibre locally, issues with land ownership, incomplete leasing contracts with communities, and employment-related issues at rural plantations are sure to arise in China.

Estimating the full economic and social impact of MNEs locally is not a simple task, but it is a procedure that ideally evaluates the circumstances for broader sustainable development. In this analysis, the scope of the corporate-responsibility agenda of MNEs and their approaches to engaging stakeholders in China appears to follow a philanthropic emphasis and a narrow understanding of stakeholder concept and community involvement. The main source of controversy about corporate legitimacy emerged from APP's decision to integrate a plantation-based pulp-industry model. Land tenure and enforcement of ownership rights are critical conditions for establishment of plantation-based pulp industry in the local context of China.[1]

Furthermore, the three companies in this study have not yet considered their full-scale social impact in China, or they appear to have varying notions about their societal role, which signals a somewhat limited view of the implications of social-impact assessments in general. Hence, the evidence from the forest industry suggests the need for broadening the corporate scope to include improved stakeholder involvement in the future. In China this would play out not only in prioritising good relationships with government authorities but also in increasing dialogue with local communities and emerging civil society members to ensure sufficiently wide stakeholder support and legitimacy.

[1] The similar finding is also evident in recent media publicity on a land-ownership conflict of another Finnish company, Stora Enso, in Guangxi Province.

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Khasi responses to forest pressures: A community REDD+ project from Northeast India

Mark Poffenberger

Abstract: This paper examines the experiences of 10 indigenous Khasi kingdoms in Meghalaya, India, that are responding to rapid deforestation by developing a federated sub-watershed management institution that will build the capacity of their traditional governance bodies to conserve and restore ancient community forest lands. The Khasi have protected their forests for centuries but have been experiencing accelerating deforestation over the past decade due to growing demands for agricultural land, fuelwood, charcoal, coal, and limestone. The Khasi seek to finance this initiative through the sale of carbon offset credits (under REDD+) and through payments for other environmental services (PES), including protecting a major water source for the state capital in Shillong. Carbon and other PES mechanisms are providing an effective catalyst and programmatic framework for institutional innovation, mapping and boundary demarcation, and long-term planning, with potential funding for mitigation, restoration, and income-generating activities.

Keywords: Community forestry, REDD+, indigenous governments, northeast India, payments for environmental services, PES

13.1 Forests under pressure

Khasi communities of Northeast India possess indigenous forest conservation values reflected in an unbroken 500-year-old tradition of sacred forests possessing ancient stone megaliths. Threats to these valued ecosystems have catalysed 62 villages and 10 indigenous governments to establish a federation to coordinate the protection and restoration of their community forests within the Umaim sub-watershed. The Khasi Hills initiative represents a unique locally driven response to forest pressures that utilises innovative financing mechanisms. Indigenous institutions including indigenous multi-village governments (*hima*) and tribal village councils *dorbar*) still remain the active governance organisations for civil society at the local level. These institutions set and enforce traditional social norms and rules through transparent and democratic processes that characterise Khasi society. Through the project a number of new village institutions have also been established, including the watershed federation to coordinate resource management and local working committees at the micro-watershed level. The new institutions are developing capacity to use scientific forest monitoring systems, which include remotely sensed data and field-based measurement conducted by community members. This initiative is India's first PES/REDD[(1)] project to be certified under the international Plan Vivo standard.[(2)] In understanding the significance of the Khasi Hills Community REDD+ project as a local response to growing pressures and global issues, it is helpful to review the larger forest

[(1)] Payments for environmental services (PES); Reducing Emissions from Deforestation and Forest Degradation plus enhancing forest carbon stocks in developing countries through conservation and sustainable forest management (REDD+).

[(2)] A Plan Vivo certificate is an environmental service certificate representing the long-term sequestration or avoided emission of one tonne CO_2, plus additional livelihood and ecosystem benefits.

sector context in India as a whole. This case study examines some of the historically based underlying causes of deforestation and forest conflict in India, as well as local drivers of forest loss and degradation. The paper then examines some of the conditions that support positive adaptation and change by communities, analysing the case study of the Khasi Hills.

13.1.1 India's forest context

Over the past century, India's upper watersheds and forests have been commercially exploited for the benefit of urban industrial and agricultural centres. Exploitation has been facilitated by the centralisation of legal control over forest resources in state forest departments that dictate management goals and controlled-use operations. The 150 years of forest governance under this management system has resulted in a gradual depletion of natural resources and a deterioration of the capacity of forest ecosystems to deliver important environmental services and socio-economic benefits. This management paradigm has frequently created conflicts with India's forest-dependent communities, currently estimated at 250 to 300 million people.

During the colonial period, indigenous communities periodically resisted outside encroachment into their ancestral domains by the state and the private sector (Arnold and Guha 1995, Duyker 1987, Poffenberger and McGean 1996). During the 1980s and 1990s, grassroots resistance from forest-dependent communities spread as India's multiparty political system expanded in a number of regions of the country, including southwest Bengal, southern Bihar, Jharkhand, Orissa, the Western Ghats, Uttarakhand, North Bengal, and other areas (Poffenberger and McGean 1996). At that time, tribal communities in the Chota Nagpur region of eastern India, as well as in some other forest districts, began actively protecting local forests, often resulting in rapid natural forest regeneration.

In 1990, the government of India established a national Joint Forest Management (JFM) initiative to provide a programmatic framework for forest communities to participate in management. The JFM strategy extended to communities certain rights and responsibilities related to local forests, based on government JFM orders passed in 28 Indian states. The JFM program currently covers more than 22 million hectares and involves 100 000 villages that share management responsibilities for one-third of India's forests (World Bank 2006). While the program represents one of the largest public land-reform initiatives in Asia in recent history, it has been criticised for failing to sufficiently empower community tenure rights and management authority to improve environmental conditions and economic condition of forest dependent communities.

Over the past 30 years, Maoist insurgency groups have spread throughout many of India's forest districts (Singh 2006). Dissatisfaction of forest-dependent communities, including many of India's 60 million tribal people, with government policies and agencies, including state forest departments accused of corruption and poor implementation of the JFM program, has created a fertile environment for insurgency (Singh 2006).

Over the past two decades, India's forests have been increasingly engulfed in social and armed conflict. More than 20 of India's 28 states are affected by Maoist insurgencies. In the words of Home Secretary G. K. Pillai, these insurgencies are one of "the gravest threats to India's national security" (BBC News 2010). In states such as Jharkhand and Orissa, local non-governmental organisations (NGOs) report that up to two-thirds of these heavily forested regions are either controlled by insurgents or tribal communities, who often restrict the movements of government officials.

The apparent alienation of forest-dependent communities in many parts of India appears linked to the following factors: 1) a failure of government to effectively transfer forest rights to communities and local governments, 2) antiquated state forest departments that ineffectively manage government natural resource management (NRM) and livelihood projects, 3) illegal logging, 4) corruption among foresters and local government, and 5) leasing of forest lands to mining and industrial concession interests (Poffenberger and McGean 1996).

In 2006, under pressure to address the tenure problems of forest-dependent communities, the government of India approved a Forest Rights Act (FRA) to strengthen the forest rights of tribal communities. The implementation of the FRA has been slow and is frequently resisted by state forest departments, leaving the problem of forest tenure conflicts among communities, forestry agencies, and the private sector unresolved. At the national level, the Indian government has yet to finalise a national REDD policy. The continuing struggles of many of India's forest-dependent communities for greater tenure security and ongoing conflicts with government agencies raise concerns for the future of REDD initiatives in India.

While the tenure situation raises barriers to community-based REDD project development, strong community tenure rights granted under the Sixth Schedule of the Indian Constitution that apply in many upland areas of the Northeast may provide better opportunities for community-based forest carbon initiatives. The Sixth Schedule was formulated for selected upland tribal areas in Northeast India after independence, providing indigenous

communities representation and rights over lands and forests through autonomous district councils. The following case study focuses on early REDD project experiences among the Khasi communities of Meghalaya. The case is significant as it is one of India's first REDD+ projects and could provide a model for expansion, both in the Northeast as well as in the rest of India.

13.1.2 Khasi Hills context

The Khasi Hills of Meghalaya is a propitious site for REDD+ pilot projects because of the long-established traditions of community forest management, the resurgence of community interest in strengthening protection of sacred groves and communal forests, and the unique flora and fauna of this region. Khasi community leaders approached Community Forestry International (CFI) staff at a workshop in Shillong in 2005 to request institutional, technical, and financial assistance to strengthen the capacity of their traditional management systems to conserve and restore community forests. This request was in response to community concerns about degradation of forests and growing pressures on sacred groves and other natural resources both from their own community fuelwood needs as well as from private sector firms engaged in quarrying, mining, and logging.

The ecosystems of the Khasi Hills of Meghalaya are unique in the world. Cyclonic air masses churning in the Bay of Bengal during the heat of summer generate storms that slam into the Meghalaya Plateau, which rises sharply from the flood plains of Bangladesh, creating torrential monsoon rains that make the Khasi Hills one of the earth's rainiest places. The wet, subtropical forests represent a unique habitat with impressive biodiversity, including 400 tree species, unusual and unique orchids, mushrooms, amphibians, and birds. Ancient stone megaliths dedicated to fallen warriors stand sentry throughout the dense forest of oaks, rhododendrons, chestnuts, alder, and figs; a prolific variety of epiphytic growth includes aroids, piper, ferns, fern allies, and orchids. The Khasi classify their forests as those with ritual significance, which are viewed as sacred groves and are usually well-protected, and various types of production forests where management varies from good to poor. Over the past seven years, the project sought to strengthen community management of these unique habitats and assist villages to expand and restore community forests throughout the Khasi Hills watershed.

The Umiam sub-watershed defines the 27 000 hectare project area situated at an elevation that varies from 150 m to 1961 m above the mean sea level and is characterised by a great diversity in relief. The plateau is highly dissected; steep regular slopes to the south border Bangladesh, into which the Umiam River drains. The Central Plateau region within the project area consists of rolling uplands intersected by rivers and dotted with rounded hills of soft rock. The Umiam River is one of the state's major rivers and an important source of water for the state's capital, Shillong.

While indigenous governance structures have continued to operate with reasonable effectiveness in the Khasi Hills, the landscape has changed dramatically. It is clear from historical records that the East Khasi Hills have experienced heavy land-use pressures for more than 150 years. Limestone quarrying and coal mining have been expanding for more than a century, while clearing forest for agriculture and settlements has progressed rapidly as the population has grown. One 78-year-old village man noted: "Our land was once covered with dark green hills and deep blue streams. We were once the rice bowl of the East Khasi Hills, but now the hills are barren and the streams run dry." A recent socio-economic baseline survey for the newly formulated community REDD+ project in the Khasi Hills found that nearly three-quarters of the respondents from 15 villages reported declining availability of water (CFI 2012) during the dry season from October to May. Water shortages result from declining steam and spring flows during the dry season, which may be caused by the loss of vegetative cover as well as climatic changes.

The Khasi communities place a high cultural value on their forests, as reflected in their oral histories. Khasi clans residing in the project area can trace their ties to the sacred groves, which retain many stone megaliths dedicated to historic figures and fallen warriors, back five centuries. Rituals continue to be performed in sacred places within and around the forest, while rules for forest conservation and use are generally well-respected by the community. The Khasi also value their forests for their capacity to protect springs and stream beds and conserve wildlife. Equally important, the forests provide a diversity of food products including mushrooms, green leaves, fruits, and nuts that are an important contribution to the family kitchen. Bamboo and timber for construction and tools are drawn from community forests, while demands for firewood from community forests are high for most households – 20 to 30 kg of fuel required each day. This high social and economic dependency upon the forests has catalysed the Khasi response to forest loss reported here.

Analysis of SPOT satellite imagery between 2006 and 2010 indicates annual forest loss of 4% per year, reflecting rapid deforestation and degradation occurring in the area (see Figure II 13.1). Red-coloured areas indicate "hot spots" where forests are being converted to non-forest areas. During discussions

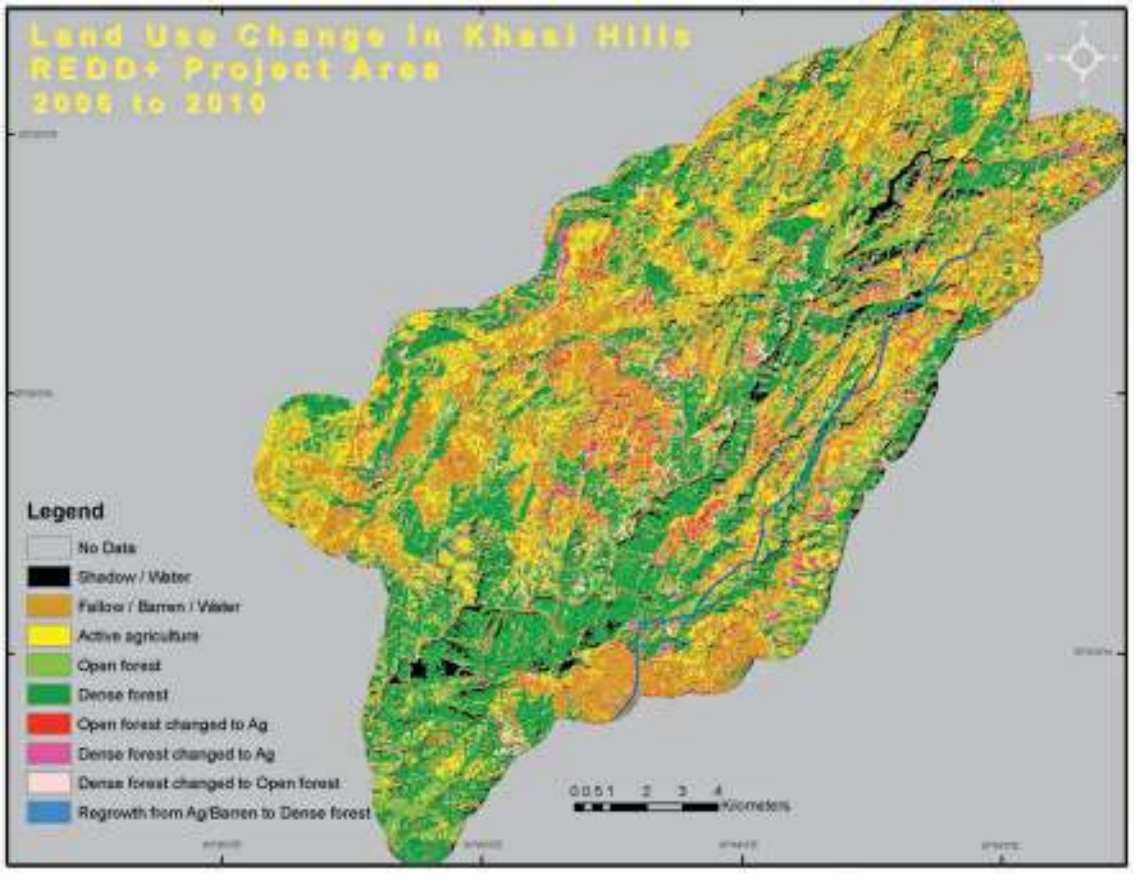

Figure II 13.1 Land-use change in Khasi Hills REDD+ project area 2006–2010.

of forest-cover change in the map, members of the 10-kingdom federation expressed clear understanding of site-specific drivers of forest loss, including charcoal making and clearing of forest for commercial farming of broom grass.

13.1.3 Challenges facing indigenous institutions in forest management

According to the Sixth Schedule of the Indian Constitution, the state of Meghalaya has a dual system of administration that includes the modern bureaucratic structure common to other Indian states and the traditional (customary) system found within the state (Nongkynrih 2002). Khasi villages retain autonomy through traditional organisations to manage their own affairs and collectively control their natural and human resources. All affairs within the jurisdiction of the village are controlled through the village council, or *dorbar shnong*. Each adult male member of the village may participate in the village council. The council is responsible for ensuring the maintenance of forests, paths, and water sources; control of fire; and sustainable harvesting of production forests and conservation of sacred forests. Resources outside the jurisdiction of the village or that cross village lines are managed through an apex council, with representatives from the communities and clans within the area. The apex council, called the *dorbar hima*, may include a few villages or up to several dozen villages and hamlets. The hima is responsible for mediating inter-village boundary disputes, approving land sales, discussing ways to secure development grants, and coordinating with the district council. According to the Sixth Schedule, these indigenous institutions are overseen by the autonomous district council.

While the Khasi have a long tradition of forest conservation, in recent decades a growing demand for timber, fuelwood, limestone, and coal has resulted in the disappearance of extensive forest tracts of upland watersheds throughout the Khasi Hills. The privatisation of community and clan forests has often resulted in clearing forest for agricultural land. Privatisation may occur when clan leaders sell communal forest lands to outsiders without consulting community members. Privatisation is driven, in part, by the growth of land markets and entrance of private-sector investors in commercial agricultural crops and mines, as well as by the breakdown of traditional institutions. In such cases the hima may

or may not have authorised the sale of land. Problems stemming from deforestation have been compounded by widespread quarrying for stone, limestone, coal, and other construction materials. Forest loss, soil erosion, and mining have all had significant impact on the hydrology of these critical watersheds. Due to the high demand for quality stones produced from quarries in the project area, the communities face some loss of income by closing these enterprises, which REDD project revenues must address. In the project area, most quarries are relatively small and income to the indigenous government (hima) that leases the mining rights is modest. However, low-income families working as day labourers in the quarries can lose income with quarry closings. The REDD+ project has created income-generating activities for these family members within community microfinance organisations.

While indigenous communities control approximately 90% of the forests of Meghalaya, growing political, economic, and demographic pressure on traditional institutions and customary management systems have eroded their capacity to sustainably manage natural resources. Throughout Northeast India, while community institutions continue to play a vital role in managing village society and natural resources, these institutions receive limited or no recognition or support from federal or state agencies. They frequently have weak linkages with government and line departments and agencies, in part due to their diversity, complexity, and varied constitutions, composition, and functions.

While government of India legislation supports the land and forest tenure rights of indigenous communities in the northeast hills according to the Sixth Schedule of the Constitution, the state government has done little to document community forest lands or support indigenous community institutions or their resource management capacity. Community, clan, and private forests are generally categorised as "unclassified" forests by the state forest department. This status implies that they may be eligible to be reclassified as reserved forests or protected forests at some point in the future. Some Khasi communities have expressed anxiety over potential encroachment by government, particularly state forest departments, and have often rejected overtures by this agency to participate in national forestry schemes such as JFM activities. This alienation is exacerbated by a tendency of the Indian Forest Service to appoint outsiders to senior positions in the forest department who possess limited understanding of the Khasi language and culture.

Another institutional weakness that has undermined forest cover in the East Khasi Hills district is the breakdown of community forest-use rules and regulations. While indigenous community institutions have rules and regulations governing resource use, these are often unwritten and may not reflect the growing pressures on forests, land, and water. Typically, such traditional forest-use regulations were established generations ago and continue to be accepted social norms that guide behaviour. Nonetheless, as demands on the forest have grown through population growth and market expansion, and as outside cultural communities have moved into the area, systems for monitoring and enforcing these regulations lack technical and financial support to allow effective operation. Updated rules that respond to current resource pressures need to be adopted and codified with adequate enforcement mechanisms in place. Furthermore, indigenous communities rarely have short-, medium-, and long-term management plans for their forests and watersheds that reflect a clear set of goals. As a consequence, the communities are unable to address management problems or take proactive measures to improve management. This project may provide an opportunity to systematically address these weaknesses in ways that strengthen and build the capacity of indigenous institutions to better manage their forest resources.

13.2 Early responses to local issues – lessons learned from the Mawphlang Pilot Project (2005–2010)

The Khasi Hill Community REDD+ project is an expansion of an earlier PES strategy that CFI supported in the kingdom of Mawphlang Lyngdohship (Hima Mawphlang), one of 10 kingdoms (hima) that comprise the federation (synjuk). This early experience involving two Khasi hamlets provided useful lessons regarding the effectiveness of socio-economic, technical, and institution building interventions that strengthened the capacity of indigenous governments to participate in the program. Key learning emerging from the initial pilot project includes the following:

- Communities in the project area were aware and concerned about forest loss, erosion, changes in stream flows, and shortages of forest products but lacked the financial and technical resources to address the problem.
- When financial and technical assistance was provided, local leaders and community institutions mobilised members to renew and strengthen resource management rules and regulations and implement them through consensus-based community action.
- Community discussions were held to identify the opportunity costs of conservation and restoration

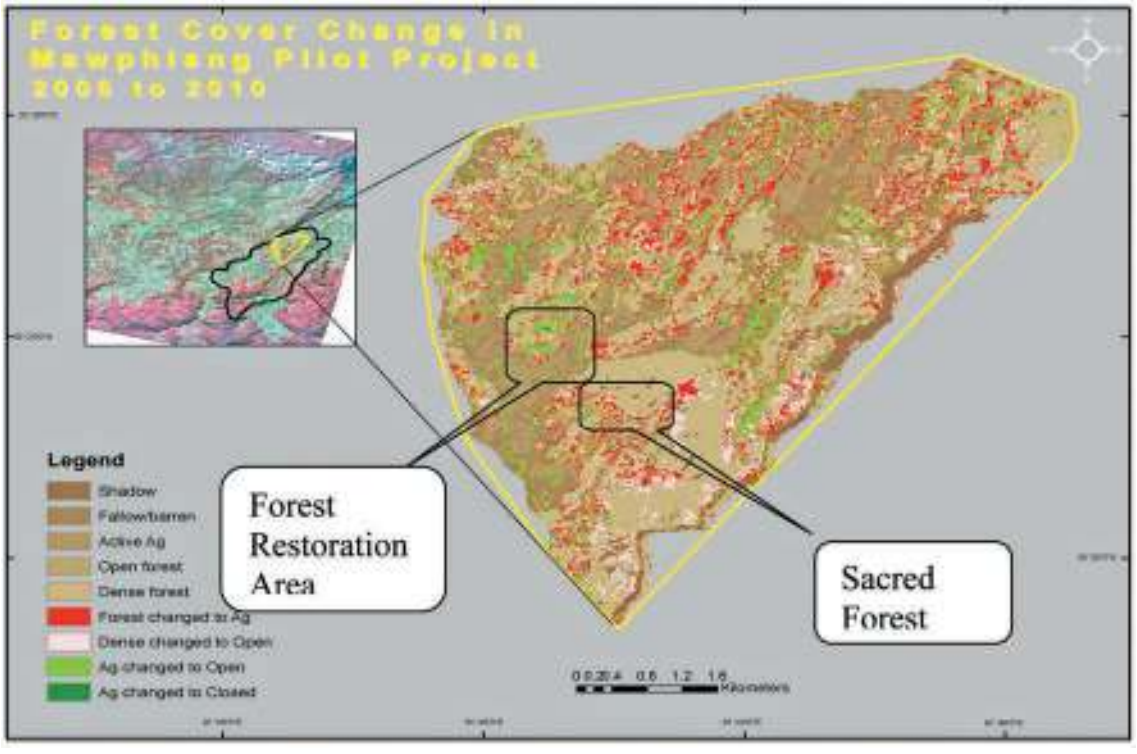

Figure II 13.2 Forest cover change in the Mawphlang Pilot Project areas.

and find mutually agreeable activities to generate alternative income to compensate for lost income.

- Performance-based conservation award money provided effective incentives for implementation of watershed restoration activities and funded a revolving community bank account that sustained the community resource-management system after the project ended (Poffenberger 2012).

At the beginning of the project, CFI was invited by the hima to improve traditional community forest-management systems. Discussions with community members and leaders, as well as the executive committee of the larger hima, identified a number of resource management problems, including stone quarrying, uncontrolled grazing, forest fires, illegal logging, and unsustainable fuelwood collection. These activities were widely recognised drivers of deforestation and forest degradation. Dry season ground fires, open grazing by low-value goats and cattle, and continuous hacking and felling of trees and shrubs was suppressing natural forest regeneration and supporting a gradual loss of biomass.

After a series of discussions between the project team, the indigenous governments, and village members, the participating communities agreed to pass a conservation resolution signed by all members to control fires, grazing, and illegal logging, while the hima cancelled all stone quarrying leases in the project area. Since that time, the quarries have been closed and soil and watershed restoration work undertaken, while incidence of forest fires has been dramatically reduced, with no outbreak in the project area \not quickly controlled by the community. A fuel-efficient stove program was initiated in the community to reduce fuel consumption, while lowering smoke levels in homes through the introduction of piped outlets. Initial stove models were tested by community women, with a number of problems identified in the design of the stoves. This led to a redesign and the improved stoves have been adopted by the majority of village households, with reductions in wood consumption of 25% to 30%.

Open grazing has been halted by transitioning animal husbandry systems to stall feeding, and fuelwood is now collected on a rotation basis, allowing harvest sites time to recover. As a result of community actions to control ground fires and reduce pressures from grazing and fuelwood gathering, forests have begun to regenerate rapidly, while loss of the dense forest has slowed. Both of these trends are creating forest carbon assets in terms of sequestration as well as improved storage that can be certified under emerging REDD+ protocols.

Satellite images from 2006 and 2010 indicate that during this period the Mawphlang sacred forest suffered no loss, while the community reforestation area experienced significant regeneration (see Figure II 13.2). Without the project, it is likely that the open forests in the pilot project area would not have regenerated to the extent shown in the time series

of satellite images – neighbouring open forests in "non-treatment" areas showed significant lack of regeneration. The Mawphlang sacred forest would likely have continued to be protected, as it retains high cultural value for local communities.

In the past, many Khasi communities have been reluctant to map their community forests for fear of encroachment on their forest lands by the state forest department. A process of consultation by the project team has reassured the communities that they can map the forests themselves and control their own maps. Based on these agreements, the project area was surveyed by community youth teams using GPS units under the guidance of the local project support team. The mapping process not only identified boundaries of forest areas but also the tenure status (community, clan, private, etc.) and biophysical conditions of each forest block. Using the maps, the communities and hima leadership worked with the project team to develop a micro-watershed management plan that identified priority areas for restoration and conservation. Management plan maps were printed on large-format plastic sheets and distributed to the participating communities and hima government. Micro-watershed maps reflecting longer-term management plans and goals are utilised as a focal point for community discussions in planning management activities that include assistance with natural regeneration work, fire line maintenance, biodiversity conservation, and watershed restoration.

Project funds support two related strategies: assisted natural regeneration (ANR) and payments for environmental services (PES). ANR funding is channelled through the village local working committee (LWC) and covers the costs of fire-line creation, forest watchers, silvicultural operations, and forest monitoring. These activities target degraded forests and have proven to be extremely effective in stimulating rapid natural restoration of forest cover as well as improving stream flows and the presence of biodiversity. This component also supports the conservation and protection of old growth forests and facilitates the linking of dense forest fragments with regenerating forest patches to create wildlife corridors.

To create incentives for successful implementation of new forest management activities, PES are given to the LWC and self-help groups (SHGs) at the end of each monsoon season. Payments to the LWC totalled approximately USD 1000 each year, while the SHGs Criteria for Evaluating Performance include the effectiveness of fire and grazing controls, successful conservation of old growth areas, and the observable regrowth of degraded forests. During the early demonstration period (2005–2008), forest monitoring was largely done through annual photos of a small number of forest plots and watershed landscapes, walk-through at the end of the fire season, and post-monsoon assessments of regrowth. While these activities indicated rapid regrowth, the changes in forest stock were difficult to quantify. In 2011, 40 forest inventory plots measuring 20 × 20 m were established to monitor forest conditions and carbon stocks during the REDD+ project. Spot and Landsat satellite images are also being used to assess historic trends in forest cover (1990–2010) as well as to provide a baseline moving forward.

Indigenous institutions in Northeast India have been largely bypassed by state and national governments, in effect disempowering them and marginalising them from government programs and projects. To address this, CFI sponsored a series of workshops for indigenous institutions and state technical agencies to review emerging forest management plans and how existing government projects can be linked. CFI has worked with indigenous leaders to seek formal recognition of the project from the Khasi Hills Autonomous District Council as well as from the Meghalaya state government and the government of India.

In addition to using funds for the protection and restoration of local forests and watersheds, the communities are utilising project financing to capitalise women-administered microfinance institutions to provide funds for small enterprise projects. Project funds were also provided to community families to build pens for raising pigs and chickens, allowing them to shift away from low-grade grazing animals such as cattle and goats, reducing grazing pressures on the watershed. It also allowed village households to collect manure for fertilising their fields and orchards.

13.3 The Khasi Hills Community REDD+ Project

Initiated by CFI in 2010, the project brought together 10 indigenous Khasi tribal kingdoms that possess legal control of the 27 000 hectare Umiam sub-watershed under the Sixth Schedule of the Indian Constitution. Together, the communities formed a sub-watershed federation to create one of India's first community-based REDD+ initiative. This project was designed to build the resource management capacity of the 10 indigenous Khasi kingdoms, which encompass 62 local communities. The pilot project sought to explore how indigenous governance institutions, coordinated through their own federation, can implement REDD+ initiatives that control drivers of deforestation by conserving and restoring forest cover and hydrological function, while at the same time facilitating transition to agricultural systems that are climate-resilient. The project has been approved by the Khasi Hills Autonomous District

Council, with support from the chief secretary of the state of Meghalaya.

Under the REDD+ project framework, the federation or *synjuk* plan and implement a 30-year climate adaptation strategy for their upper watershed. Each of the 62 villages prepares a community micro-watershed management and livelihood plan. CFI provides technical and financial support to this new community institution, providing training in resource management that involves designing, certification under Plan Vivo standards, and marketing carbon credits on private voluntary markets. The project is designed to establish a 30-year income stream to support the federation. Based on initial projections, an additional 20 000 to 50 000 tCO_2 will be generated each year through community-based mitigation activities, yielding a gross income of USD 100 000 to USD 200 000 annually to finance the synjuk management institution and livelihood activities for participating communities.

The project received REDD+ registration under Plan Vivo standards in March 2013, requiring a performance-based approach to project design and implementation. Key variables that must be monitored include carbon stocks, forest condition, and other environmental indicators, including changes in biodiversity and hydrology. Socio-economic performance indicators are also being monitored by the community including tracking changes in household income, microfinance account balances and repayment rates, participation in alternative income-generating activities, energy use, and activities of newly established farmers' clubs, such as adoption of sustainable farming practices. The project is one of the first REDD+ initiatives in Asia to be developed by indigenous tribal governments on communal and clan land. If successful, the project has potential for broad-based replication among Northeast India's 240 ethnolinguistic tribal communities. The federation has established agreements with companies that focus on brokering carbon credits generated by community forestry to corporate social responsibility (CSR) buyers in the private sector. Project brokers include C Level of London and U & We of Stockholm. The brokers seek to establish long relationships with companies that will buy a fixed quantity of credits each year over the next five to 10 years.

13.3.1 Institutional empowerment – the synjuk, a 10-kingdom federation

The project seeks to demonstrate how indigenous institutions coordinated by their own federation (synjuk) can implement REDD+ initiatives that lower CO_2 emissions and restore forest cover and hydrological function while facilitating transitions to agricultural systems that are climate-resilient. Since 2010, the synjuk has been actively working with participating communities to control drivers of deforestation and degradation operating in their area, involving reduced fuelwood consumption as communities shift to more efficient stoves and alternative sources of energy, removal of grazing pressures from upland watersheds, and reduced impact of forest fires and open pit quarrying. The synjuk is working with government agencies to integrate government of India projects into their work plans, creating a range of new partnerships. This project relies on five core strategies:

Create awareness regarding climate change and forest management. The synjuk is raising awareness among communities regarding the importance of forests and the opportunities to restore them. Since 2011, the synjuk has organised more than 80 meetings of Khasi communities to discuss resource management problems and strategies to regenerate degraded forests. It has also contacted youth groups to engage in natural resource management activities and is hiring and training male and female youth to act as community facilitators and extension workers within their communities and micro-watersheds under the guidance of the synjuk.

Strengthen indigenous community institutions. The synjuk is strengthening the authority of indigenous organisations by recognising them as legal representatives of their constituencies. By creating new partnerships with national and local government projects and representatives from non-governmental organisations, the synjuk is raising the profile of local hima and community dorbar institutions. Bringing indigenous leaders into the synjuk exposes these individuals to information about REDD+ and government development schemes that they communicate to their constituencies.

Map and demarcate boundaries of community forest lands. The project has trained community members in the use of GPS equipment and GIS software. The mapping process is coordinated by the federation and performed in a transparent process with broad-based community participation from local communities and indigenous governments.

Update community resource rules. The synjuk is working with local communities to discuss forest-use rules and how they may need to be modified and strengthened to address forest pressures.

Develop community-based landscape-level management plans. Since 2011, the synjuk team has been working with communities to review their land, forest, and water requirements to formulate forward-looking management strategies, or Plan Vivos. Building community resource planning capacity through training, field visits, cross visits, and workshops is allowing members to set management

Figure II 13.3 Megaliths overlooking the Mawphalang Sacred Forest. ©Mark Poffenberger

priorities and goals, and identify activities to mitigate drivers of deforestation and forest degradation. Each community is identifying degraded forest areas that it wishes to regenerate by closing it to use for a period of time, preventing fire, and carrying out enrichment planting. In each treatment area, 20×20-m forest monitoring plots are established and measured each year by community members.

13.3.2 Technical empowerment – controlling drivers of deforestation

A number of forces internal and external to the community drive deforestation and forest degradation in the East Khasi Hills. Approximately 39% of forest lands in the project area are severely degraded as a result of unsustainable fuelwood harvesting, grazing, and fire, as well as by quarrying and timber extraction. Many of these drivers can be controlled through community actions that include improved fuelwood harvesting rules based on rotation, adoption of fuel-efficient stoves, changes in animal husbandry systems, and fire control. Early pilot project experiences documented through a time series of forest plot photographs indicate rapid regeneration of degraded forest lands under updated community management systems. Forest restoration can be further accelerated through the use of ANR techniques, which include thinning, multiple shoot cutting, and weeding. Earlier pilot activities in the area found that establishing LWCs created an institution that allowed one to three hamlets to coordinate efforts to combat annual ground fires through the construction of fire lines and engaging village youth as fire watchers. LWCs also provide a mechanism to organise ANR activities and monitor forest re-growth.

Other drivers of deforestation include surface mining of coal, limestone, and gravel that have substantial impact in the Khasi Hills. These activities can be controlled and reduced through the action of hima governments that hold the authority to oversee leases on community lands in their jurisdiction under the Sixth Schedule of the Indian Constitution. Agreements to limit mining and quarrying leases by the 10 hima under the umbrella of the synjuk federation will ensure reduction of the impact of these drivers in the future. The synjuk is already working closely with the Khasi Hills Autonomous District Council and Meghalaya state government to coordinate development planning in the forest areas of the sub-watershed.

13.3.3 Financial empowerment – creating multi-sourced capital flows and building assets

Poverty is difficult to alleviate, in part due to the persistent dearth of capital in poor communities. Community resource-management institutions are also grossly underfunded. PES provide a potential mechanism to channel capital into low-income rural communities that are well-positioned to protect and restore critical ecosystems. REDD is one of the first PES strategies to be widely discussed and could establish capital flows into the East Khasi Hills, where financial inputs are badly needed. In 2008–2009, the East Khasi Hills District in Meghalaya had a rural per capita income of INR 21 000 (NEDFi Databank 2009); less than USD 1.50 per day.

This project is helping communities build capital through payments into the synjuk based on their demonstrated capacity to slow deforestation and facilitate natural regeneration. Since 2011, the project has supported the establishment of 39 SHGs made up of 10 to 15 members that can act as microfinance institutions within their villages. The SHGs are primarily organised and led by women, providing an opportunity to empower women and link them to resource management by building their role in supporting microenterprises. The synjuk, together with a local NGO (Bethany Society), is helping the SHGS establish bank accounts and register with the government of India rural banking program. Once carbon revenues begin to flow to the synjuk, it may be possible to contract with the SHGs to implement ANR activities. Paying a resource management subsidy to women's SHGs may create a win-win-win situation: the SHG receives a measure of non-loan finance; the finance pays for a tangible and measurable service (such as fire control in local forests); and the money is used to create a microenterprise, which in turn creates income, thus establishing a sustainable financing mechanism.

13.4 A vision for the future – indicators of success

Innovations being developed in this project include institutional strategies that build on indigenous institutions and forest management traditions, as well as carbon, environmental and socioeconomic measurement methods that communities can use to monitor changes in their environment. The project also seeks to create new approaches to sustainable financing of resource management systems and livelihood programs. The project has created the first community forestry federation in Northeast India composed of indigenous governments and communities that own much of the region's upland forest. Building local institutional capacity to adapt to climate change and create sustainable forest management systems while strengthening resource rights is a key to reversing forest loss.

In 2012, 57 villages have prepared initial natural-resource management maps and plans for their communities using GPS equipment, with five additional villages to be covered in 2013. While rural Khasi communities have been reluctant in the past to have outsiders map their community lands, by owning the mapping process, strengthening their community institutions, and adopting a unified approach to landscape-level management, they are better prepared to address the external pressures they currently confront. Parallel processes of participatory rural appraisals were also held in all communities to identify livelihood needs and set priorities for economic development. By linking resource management goals with income-generating strategies, the project recognises that the problems are interrelated and require a coordinated approach, relying in part on payments for environmental services. While the initial mapping and Participatory Rural Appraisal (PRA) provided important opportunities for community resource discussions, it became apparent that the planning process needs to be an ongoing exercise. The synjuk is still gaining capacity to manage community-based information and will need time to develop an adequate database management system that can be updated regularly. It is considering seeking assistance from the regional Northeast Hill University (NEHU) to assist with this task.

Awareness is being raised about climate change and forest restoration needs and is being discussed through a network of community facilitators and extension workers drawn from the 62 participating villages and 10 kingdoms. Federation members and community forest-management groups (LWCs) are being trained to establish environmental baseline indicators utilising cost-effective methodologies designed by the project. Carbon monitoring data being used follows international (Plan Vivo) standards to create a REDD+ project that will provide a long-term source of financing for community-based climate adaptation and resource management activities. These innovations will be developed and field tested for broad-based replication in Northeast India.

In India, there are more than 100 000 community-based resource management groups that could transition into PES/REDD projects of this type, provided tenure issues are addressed either under the Sixth Schedule in the Northeast or through the Forest Rights Act or other existing legal mechanisms. Early learning from the Umiam sub-watershed project would suggest that the following factors may be associated with the likelihood that the next genera-

tion of community-based PES projects can achieve improved resource management in terms of sustainable environmental and social benefit flows.

- Social capital – accrued through strong local leadership, broad-based community participation, and support from experienced NGOs
- Ecological capital – developed through the regeneration of currently degraded forest ecosystems and watersheds
- Secure land tenure/or user rights – provided through national laws and community forestry policies
- Lower transaction costs – achieved by using locally appropriate management, implementation, and project monitoring
- Gender and social balance – achieved by targeting women and the marginalised and landless as beneficiaries of project income through a process of community/elite buy-in
- Socio-cultural values – reinforced by empowerment of traditional institutions and cultural values that support environmental conservation
- Environmental restoration at a landscape level – achieved through regenerating forests, sustained biodiversity, improved hydrological functioning of watersheds, and more productive and sustainable farming systems
- Forest conservation – achieved by protection and conservation of scarce primary forest
- Enterprise development – achieved through proliferation of alternative income-generating activities
- Capital asset building – achieved by establishment of women's microfinance institutions with increased capital assets

The success of any community-based resource management system depends on the community itself and its commitment to sustaining the land, forest, and water it depends upon. The 10 kingdoms in the Umiam sub-Watershed have agreed to federate, protect, and restore their forests, not because of any financial incentive but because of their own sense of an urgent need to halt deforestation and restore important ecosystems that are central to their history and culture. REDD, PES, or any other project support will facilitate this process, but it is simply a means, not an end. What is perhaps more significant is that important socio-cultural institutions in Khasi society that have been largely bypassed by national and state government are now emerging as key elements in a grassroots attempt to protect and restore local forests that possess valuable biological and cultural diversity. Communal governance structures like the dorbar and hima that rely on democratic processes to enable consensus-based decision making are being re-empowered through this project. This process strengthens traditional land tenure rights by focusing attention on communal forest resources whose management has been neglected in recent decades.

Afterword: January 2014

The Khasi Hills Community REDD+ Project was certified under The Plan Vivo Standard in April 2013. For mitigation activities undertaken during 2012, 21 805 tons of carbon certificates were issued during 2013. By the end of 2013, 5193 tons were sold by brokers at prices ranging from USD 6 to USD 7 per ton. After the deduction of issuance fees, the federation managing the project received USD 25 947 in revenues. The federation is working with carbon brokerage firms in India, North America, and Europe to market the remaining 2012 vintage carbon certificates and is anticipating the issuance of another 22 000 tons of 2013 carbon certificates in the spring of 2014. If marketing is successful, the federation should receive USD 100 000 to USD 150 000 each year, allowing an increasing percentage of carbon revenues to flow to eco-restoration and economic development activities. The federation has proposed establishing an Umiam Watershed Trust Fund with additional carbon revenues to act as a long-term financing mechanism.

In 2013, carbon revenues supported project management and monitoring, public awareness raising, the establishment of 20 community nurseries, and support to women's micro-finance groups and farmers' clubs. Participating communities also initiated forest restoration activities on 505 ha of land, with plans to add 500 ha each year over the ten year project period in order to restore 5000 ha of degraded forest.

The environmental impact of the project is already visible, with the incidence and extent of dry season forest fires in 2013 substantially reduced through fire line construction, fire watchers, and community fire control groups. Community rules and regulations, patrolling, and other human actions to restrict access and unauthorised use of forests and pastures have supported natural regeneration in many parts of the project area. While it is premature to assess the socio-economic impact of this REDD+ project on community livelihoods in the Umiam sub-watershed, the project appears to have catalysed new cooperation among the ten participating indigenous governments and created a common vision based on forest conservation and sustainable development. Training and capacity building of 52 women-run micro-finance groups and 12 farmers' clubs, supported by a team of federation funded community facilitators is mobilising a local network of leaders and micro-institutions well-positioned to implement

development activities.

The empowerment of indigenous government institutions through the creation of the watershed federation is one of the most significant outcomes of the project to date. In contrast to Government of India sponsored schemes and projects being implemented by state-level agencies, this project is under the sole direction of the indigenous governments and the 62 participating villages. The federation committee comprised of community representatives makes all management decisions, including the budgeting of income from the REDD+ project. Recognition of the Federation by international technical advisory organisations such as Community Forestry International, Plan Vivo, brokering agents, foreign researchers, and carbon market registries has given indigenous government and traditional community institutions new confidence to interact with the state government and promote community watershed management and development priorities. The establishment of communication channels and co-operative action between communities that own and manage watershed resources and the state and central government that controls investment resources is an important achievement that could help address the environmental crisis and rural poverty that characterises Meghalaya's watersheds.

This project was designed as a learning activity to foster improved approaches to sustainable resource management and community development. The initiative is already informing larger projects funded by the Government of India, bi-lateral and multi-lateral agencies within Meghalaya, as well as in other parts of India and abroad. In 2013–2014, three graduate students conducted research on the project with support from the Federation and it is proposed that a community watershed research and training centre be established in the area in the future.

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Global forest governance to address illegal logging: The rise of timber legality verification to rescue Indonesia's forests

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Abstract: The extent of illegal logging in Indonesia is widely acknowledged to be one of the highest in the world, and it remains high despite a multitude of efforts that have been made by the international community to help Indonesia address the problem. However, recent efforts to deal with illegal logging in Indonesia, such as the enactment of a timber legality verification mechanism, have enjoyed widespread support from a variety of stakeholders on a scale previously unseen for efforts to combat global deforestation. This is because timber legality verification has gained traction in producer countries such as Indonesia by garnering support from a broad coalition of actors motivated by increased access to global timber markets and the promise of achieving environmental goals. We argue that the development of Indonesia's timber legality assurance system (SVLK) and the signing of the EU FLEGT Voluntary Partnership Agreement hold potential for development of durable and effective institutions for reducing illegal logging in Indonesia. If these developments are managed strategically, they can represent a positive development for improved forest governance in Indonesia.

Keywords: Governance, Indonesia, Legality Verification, pathways framework, illegal logging

14.1 Introduction

Indonesia historically has one of the highest rates of illegal logging in the world (Seneca Creek Associates 2004). Over the past 30 years, hundreds of millions of cubic meters of illegal timber in Indonesia have been rubber stamped as "legal" and taken out of the country to feed international trade networks (Obidzinski et al. 2007). While the extent of illegal logging has fallen from 80% in the early 2000s (EIA and Telapak 2002) to 40% in 2009 (Lawson and McFaul 2010), the illegal timber trade has been estimated to cost the Indonesian economy USD 1 billion to USD 5 billion per year (Seneca Creek Associates 2004, Tacconi et al. 2004, Human Rights Watch 2009). For estimates of the total extent of illegal logging in Indonesia see Table II 14.1.

Despite encouraging statistics demonstrating a decline in reported cases of illegal logging, the environmental, economic, and social impacts of the illegal timber trade are still far-reaching. Illegal logging is widely acknowledged to be one of most damaging and egregious cases of forest degradation and deforestation (Brown 2006, FAO & ITTO 2005, Kaimowitz 2005). It results in significant loss of national tax revenue and generates illicit wealth that serves as a source of social conflict and fuels widespread corruption (Obidzinski et al. 2007).

With 98.7 million ha of forest cover, [1] Indonesia has the third-largest expanse of tropical forests in the world, after Brazil and the Democratic Republic of Congo, and one of the highest extents of illegal log-

[1] Indonesian Ministry of Forestry 2012. Statistik Kehutanan Indonesia 2011. Jakarta, Indonesia, July 2011. More recent 2012 estimates from the World Bank suggest the figure is about 88.5 million ha.

Table II 14.1 Estimates of the total extent of illegal logging in Indonesia.

Source	Illegal logging from total harvest (%)	Annual loss in national tax revenues (USD)	Years covered
DFID 1999[1]	73		1990s
Center for International Forestry Research 2004[2]	64–83	1 billion	2000–2001
Seneca Creek Associates 2004	60	0.6–3 billion	2003
Human Rights Watch 2009	50	2 billion	2003–2006
Chatham House 2010[3]	40–61		1997–2009

[1)] DFID 1999. Roundwood supply and demand in the forest sector in Indonesia. Indonesia-UK Tropical Forest. Management Programme. December 1999.
[2)] Tacconi, L., K. Obidzinski, K. & Agunget, F. 2004. Learning Lessons to Promote Forest Certification and Control Illegal Logging in Indonesia. Center for International Forestry Research. Bogor, Indonesia
[3)] Lawson, S. & McFaul, L. 2010. Illegal logging and related trade: Indicators of the global response. Chatham House. London, UK. 154 p.

ging. Over the past decade, several tropical forested countries, such as Brazil, Ghana, and Cameroon, have actively engaged in open dialogue on ways to combat illegal logging. However, what is particularly unique about Indonesia is the marked transformation of the national government's position from denial to open acknowledgement that illegal logging is a severe problem. Despite the urgency of this issue, for many years the topic of illegal logging was a highly sensitive political issue that was tacitly understood to be taboo in discussion of sustainable forest management (SFM), especially in Indonesia. It was not until the early 2000s that Indonesia's national government and civil society began efforts to directly address illegal logging through timber legality verification, although domestic support was initially weak. More than a decade later, timber legality verification is enshrined in legislative commitments and is seen as one of the most promising mechanisms for addressing illegal logging in Indonesia and throughout the global forest product supply chain (Cashore and Stone 2013).

This presents the following puzzles: What explains the change from initial reluctance to overarching support? Have similar instigating factors wrought change in other countries where illegal logging is prevalent? What might these changes tell us about the future of legality verification and its potential to influence domestic and international forest governance? The goal of this chapter is to explore the evolution of domestic and international efforts to address illegal logging in Indonesia, in order to identify the enabling factors that led to widespread acceptance of timber legality verification as a new form of governance, and the implications of this for legality verification's direct and indirect future potential. The analysis is supplemented with on-the-ground examples of how these dynamics are playing out in Indonesia in the early stages of implementation of Indonesia's timber legality assurance system.

Section 14.2 puts forth a theoretical argument as to why timber legality verification represents a new form of governance that has the potential to create durable institutions that work towards the mutual goal of SFM. Section 14.3 presents the case of illegal logging in Indonesia and details the emergence of timber legality verification as a mechanism for addressing illegal logging that gradually gained acceptance and support. Two case studies illustrate how timber legality verification may or may not affect conditions on the ground. Section 14.4 analyses the enabling conditions that furthered this acceptance, as well as the constraining factors that were overcome. It highlights interactions between pathways of influence and the institutional and political arrangements in play. The section 14.5 offers thoughts on the future of legality verification and implications for SFM.

14.2 Theoretical framework

Timber legality verification is a simple concept. It removes illegal timber from the global supply chain by requiring verification of its legal origins and manner of production. It also puts tracking systems in place to monitor legal timber as it changes hands while moving through the global supply chain. Once all illegal timber is weeded out of the market, the overall timber supply decreases, which theoretically

Box II 14.1 Pros and cons of timber legality verification as a means of achieving SFM

What is meant by "legal timber" and what can reasonably be accomplished by timber legality verification towards achieving SFM? Critics have argued that legality verification is not ambitious enough to reach SFM because it focuses only on "legality," for example, whether or not any laws were broken during the harvesting of timber. Their main argument is that legality does not ensure sustainability – legal timber could be harvested from a licensed concession within high-conservation-value forest or from a concession with unsustainable management practices. The definition of "legality" can also vary. Does "legal" refer only to the origin of timber? Or does it also include related activities such as paying stumpage fees and traffic violations during transportation of forest products? The scope of what is covered by "legality" varies according to country but generally is designed to affect a relatively narrower set of problems compared with efforts that more broadly promote forest certification, good forest governance, and SFM (Cashore and Stone 2012).

On the other hand, supporters of legality verification argue that it is the first step toward sustainability because it has the potential to reinforce baseline governance in developing countries, for example, efforts to improve capacity and technology and to weed out corruption and other governance challenges that have exacerbated both development and environmental challenges (Cashore and Stone 2013). Unlike other mechanisms, such as forest certification, which are perceived as entrenching a global authority dominated by wealthy states such as the European Union (EU) and the United States (Drezner 2007), legality verification works to reinforce national sovereignty and empowers autonomy in local decision-making (Cashore and Stone 2013). In short, this mechanism has the potential to gain greater traction and support in timber-producing countries like Indonesia, where it serves to strengthen domestic efforts to reduce corruption rather than to set strong but unachievable standards.

leads to an increase in timber prices. In sum, unlike forest certification, which promises price premiums to producers (a promise that is not guaranteed to be fulfilled) legality verification harnesses the simple economic law of supply and demand to deliver increased revenue to producers because of greater market access (see Box II 14.1).

One of the key questions at hand is to what extent legality verification has the potential to ratchet up forest governance or to inadvertently trigger a race to the bottom in lowered standards. As a point of departure, we refer to the path-breaking work of political scientist David Vogel, who explored the dynamics that led to the formation of coalitions in the face of increased environmental regulation. Vogel found that in some cases when self-interested firms are confronted with higher environmental, safety, and social regulations than their competitors in other jurisdictions or countries, they often align with environmental groups or other social actors to champion increased regulations on their competitors (Vogel 1995, Vogel 2001). Certain types of interventions can actually cause various stakeholders driven by very different motivations to coalesce in support of the intervention, creating what Vogel refers to as a coalition of "Bootleggers and Baptists," i.e. an unlikely coalition of actors usually in competition with each other who join together to work towards the same mutually beneficial goal.

There is strong evidence that such a coalition has emerged to support the cause of legality verification in Indonesia and also on the global level. In this case, the unlikely group of actors includes environmental groups and industry representatives, which historically have been at odds over government regulation of the forest sector and other efforts to promote SFM. Environmental and social groups support legality verification because it furthers their goal of reducing deforestation and illegal logging and offers a means of empowering local civil society vis-à-vis local law-enforcement officials. These kinds of coalitions are durable because they appeal simultaneously to very different interests (Cashore and Stone 2012). Industry groups support legality verification because they have an economic self-interest in weeding illegal timber out of the global supply chain in order to realise higher revenues and preserve market access. In the Indonesia case, it also provides a mechanism for producer countries to gain access to lucrative markets in consumer countries such as the United States and European Union in ways that are easier to meet compared with demands for certified forest products or boycott campaigns. Despite the volume of timber going to markets in China, India, and the Middle East, imports to the European Union alone still reach an estimated average of USD1.2 billion per year (Yulisman 2012).

This widespread support not only holds promise for improving baseline governance but also for putting in place the infrastructure needed to track movement of timber throughout the supply chain. Legality verification requires reliable tracking systems for legally harvested wood to ensure that it is not mixed or switched with illegal sources on its journey through the supply chain. The effectiveness of tracking systems is largely based upon the num-

ber of actors contributing data and bringing it closer to a theorised point of perfect information; legality verification as a requirement versus certification as a voluntary system has greater potential to achieve this by drawing in a larger number of entities. Once these tracking systems are entrenched in business-as-usual practices, then legality standards can be increased in ways that reward, rather than punish, participating firms. While it can only be hypothesised that these tracking systems might put in place the conditions needed for widespread adoption of forest certification in tropical forests, such as has been seen in the case of Brazil (Bird and Thiel 2009), it is certain that without institutionalised supply chain tracking, it will be difficult for certification systems to move to the next stage of global market penetration.

In sum, legality verification represents a new form of governance with the potential to tip the scales towards good forest governance. It falls at the intersection of a suite of local, domestic, international, non-state, and market-based policy initiatives. It does not actually require any new action; it only creates incentives to comply with laws and regulations that already exist. In doing so, it treats all nations – producer, processing, and consuming countries – equally rather than imposing high standards. The next section explores how support for legality verification evolved in Indonesia, starting from a period of no support and eventually obtaining overarching support by a broad coalition of government, industry, and civil society actors.

14.3 The case of Indonesia

The shape of efforts to address illegal logging in Indonesia, through both domestic and international efforts, has evolved radically throughout the past 20 years. Indonesia itself has gone through transformational change in a transition to democracy over the same period.

14.3.1 No support: Illegal logging during the Suharto era and reformasi (1990s–2001)

When Suharto came to power, he enacted the 1967 Basic Forestry Law that expanded the central government's control over the 143 million ha forest estate, which was then exploited to drive economic development. During this period, timber concessions were frequently used as a tool for clientelism (McCarthy 2006), and many assert that this approach condoned widespread illegal activities. Illegal logging often took the form of overcutting concession boundaries, encroachment into protected areas sponsored by businesses or individuals, hit-and-run operations by groups posing as plantation companies, and other types of illegal activities (Casson and Obidzinski 2002).

During Indonesia's transition to democracy during the *reformasi* period (1999–2001), the shift in the balance of power served to create new forms of illegal logging rather than reduce illegal extraction altogether. The 1999 Regional Autonomy Law devolved authority over natural resource management to the district governments, which essentially divided power over forest resources between the district and central governments. The end result was that despite the transfer of ownership rights of natural resources to the regional authorities, technocratic forest management decisions all remained highly centralised. Districts gained the power to allocate concessions, while the Ministry of Forestry retained authority over delineation of the status of forest area (e.g. protection, production, limited production, or conversion forests), management of nature conservation parks, and determination of the criteria and standards for natural resource conservation (Dermawan and Resosudarmo 2002). This arrangement quickly gave rise to a fragmented tug of war between the central and regional governments (Purwanto 2005) that continues to this day.

The last years of the Suharto regime and the transition to a decentralised government led to a spike in the rate of illegal logging (Casson and Obidzinski 2002). To stem the rush towards exploitation during this transition, the Indonesian government enacted two new laws (Regulations no. 34/2002 and no. 32/2004), which granted the central government the authority to approve or deny a district's decisions about land-use and resource allocation (Singer 2009). In addition to these legal measures, the government instituted two export bans: a total roundwood export ban in 2001 and a sawn-wood export ban in 2004.

14.3.2 From no support to weak support: Efforts to address illegal logging (2001–2008)

Before 2001, combating illegal logging was not part of Indonesia's domestic policy agenda. The change began with a key ministerial meeting in 2001, and several factors furthered the transition from no support to weak support between the 1990s and 2001, including: international initiatives that sought to influence domestic policy (e.g. international memorandums of understanding, the FLEGT VPA process), reforms in public administration (e.g. decentralisation that catalysed the rise of civil society), and en-

actment of new regulations and policy instruments (e.g. Indonesia's log-export ban).

It was about the time of decentralisation that the international community began applying pressure on producer and consumer countries to address the challenge of illegal logging and associated trade. A ministerial summit took place in 2001 in Bali where a number of non-binding commitments were made to raise the profile of illegal logging, building upon the G8's major initiative to address various global forestry issues (Brack and Chatham House 2003). This summit is where Forest Law Enforcement and Governance (FLEG) efforts first began taking shape, until the European Union formally adopted the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan in 2003 as a new way of addressing illegal logging through supporting good forest-governance efforts while highlighting the need to promote responsible trade of forest products.

Indonesia was a key target of these pressures, given its place as a major supplier of forest products to consuming countries such as the United States, Japan, China, and Europe. According to some estimates, as much as 40% of wood entering the European Union from Southeast Asia, primarily from Indonesia, was illegal, largely transshipped through China and the country of origin mislabelled (WWF 2008). This resulted in the signing of several bilateral memorandums of understanding (MOU) between Indonesia and the United Kingdom, United States, and China as well as the beginning of a longer FLEG process with the European Union (Chrystanto 2004). Much of these early efforts were tied to helping Indonesia enforce its logging ban.

At first, these efforts received weak domestic support from Indonesian stakeholders. However, the rise of the FLEGT process served as a wake-up call to Indonesia's national association of timber concessionaires, *Asosiasi Pengusasha Hutan Indonesia* (APHI). It realised that continued resistance to these efforts might threaten Indonesia's access to the EU market and calculated that the reforms they would have to undertake were fairly modest.

In 2002, the government of Indonesia began its own efforts to domestically reduce illegal logging. It established the *Badan Revitalisasi Industri Kayu* (BRIK, Indonesian acronym for Institute for the Revitalization of the Timber Industry), which was charged with monitoring and verifying the legality of timber. This was the first instance where timber legality verification was formally recognised as an essential mechanism for addressing illegal logging. However, BRIK's approach met with criticism – the certificates of legality it issued were easily reproduced on the black market (Colchester 2006), there were little or no field visits, and BRIK's efforts were seen as little more than paper exercises that fostered little meaningful change (Tacconi 2008).

At about the same time, Indonesia began developing its Timber Legality Assurance System (TLAS), locally known as *Standar Verifikasi Legalitas Kayu* (SVLK). The development of the SVLK was a marked departure from previous efforts to address illegal logging for several reasons. First, it was developed through a multi-stakeholder process that included members from civil society, rather than being developed unilaterally by the Indonesian government. Second, the Indonesian government voluntarily gave up enforcement to outside parties, a significant departure from the way state actors would normally behave, e.g. maintaining full authority for creating and developing rules. This has been seen as an effort to raise the credibility of the mechanism in the eyes of the international community by circumventing potential opportunities for corruption and uncertainties about implementation (Cashore et al. 2010). The implications of these unique design factors are further detailed in Box II 14.2.

Although a draft of the SVLK mechanism was technically completed in 2003, it was not submitted to the Ministry of Forestry for approval until 2008. The delay was largely due to reluctance on the part of the Indonesian government as well as vigorous debates within the multi-stakeholder group. The next section outlines some of the factors that encouraged the government to take action in adopting the legality standard.

14.3.3 From weak to strong support: Fear of the closing door to international markets (2007–2013)

Several enabling factors helped overcome the Indonesian government's reluctance to move forward on timber legality verification and move from a stage of weak support to strong support, most of which were related to the passage of policies in consumer countries, such as the US's Lacey Act, the EU's Timber Regulation, and public procurement policies in Japan, Australia, and New Zealand. The negotiation process between Indonesia and the European Union over the FLEGT Voluntary Partnership Agreement also provides insight into the factors that affected Indonesia's move into a phase of strong, institutionalised support for timber legality verification.

The US government's Lacey Act amendments, 2008

Indonesia's response to the 2008 amendments to the United States (US) Lacey Act, a domestic US law that prohibits the import of illegally sourced wildlife

Box II 14.2 Unique design of the SVLK, Indonesia's timber legality assurance system

The dramatic changes in Indonesia's forestry sector, coupled with international pressure to address illegal logging, paved the way for the emergence of loose coalitions of industry and civil society that worked together to design a timber legality system that included several unique features.

Developed through a multi-stakeholder process

About 2008, an intensive public consultation began based on a Ministry of Forestry Ministerial Decree (SK) 70/Menhut–II/2006 that initiated a process of socialisation to revise national legality standards (Telapak 2007), building upon processes initiated by The Nature Conservancy (TNC) in the mid-2000s (Luttrell et al. 2011). This approach meant that the actual legality verification requirements were generated by a loose coalition of Indonesian government, civil society, and business interests (Cashore and Stone 2013). This mixture of competing interests all saw legality verification as part of their long-term interest, despite their different motivations. The business and industry groups were motivated by a desire to ensure market access, while the environmental and indigenous-rights NGOs saw legality verification as an opportunity to increase the enforcement of relevant Indonesian regulation. While these groups were not a coordinated coalition, they all participated in the multi-stakeholder dialogues to ensure that their key issues and concerns were incorporated into the final SVLK mechanism. This multi-stakeholder process was widely recognised as inclusive, transparent, and robust; which contributed to SVLK's reception domestically and internationally as a legitimate and credible mechanism.

Third-party auditing

The Ministry of Forestry is not involved in the accreditation of auditors who verify the legality of the operations of SVLK certificate holders or auditing activities for legal compliance. Instead, third parties accredited by BRIK or LEI perform all auditing duties (Luttrell et al. 2011), which means that SVLK is essentially a form of "privatised regulation" that is conducted and enforced entirely by non-governmental third parties. While examples of privatised regulation can be found in a multitude of industries, such as the automotive, chemical, and medical equipment sectors, timber legality verification represents one of the first major forays into the forest products sector.

As a result, many of the same non-governmental third parties who serve as auditors for forest certification schemes are now busily expanding their portfolio of services to include legality assurance. For example, the Rainforest Alliance's Smart-Wood program, which audits firms for compliance to FSC certification standards, has launched generic standards for Verification of Legal Origin (VLO) and Verification of Legal Compliance (VLC). One of the rationales for this approach is that third-party auditors can directly take part in the governance of forest resources, which the Rainforest Alliance suggests is essential for credibility given that mechanisms such as FLEGT are not free from conflicts of interest on the part of participating governments (Donovan 2010).

Independent monitoring

This mechanism empowers civil society to monitor SVLK's implementation by submitting objections when any irregularities are observed in order to track outcomes and progress. While at the time of writing there has not been enough activity to assess the impact of independent monitoring, several concerns have been voiced regarding how these activities will be funded, and how NGOs will address the safety concerns of sending staff to conduct on-the-ground monitoring in remote areas with potentially violent illegal activity*. These concerns represent real and potentially intractable problems that can limit the extent and effectiveness of independent monitoring as a means of assuring implementation.

Mandatory compliance

Licensed timber concessionaires and companies are obliged to obtain SVLK certificates by 2013. However, it has been recognised that SVLK should be made mandatory for all companies selling timber and forestry products domestically as well as internationally, especially given that 80% of wooden furniture produced in Indonesia is for domestic consumption (Arnaz 2013).

* Personal Interview, Official with Greenpeace International, February 29, 2012

and plant products into the United States, highlights several of the factors that led to increasing support for legality verification: reinforcement of domestic governance, access to international markets, and respect of national sovereignty. In Indonesia, the Lacey Act is seen as reinforcing baseline governance while affording equal treatment to all nations – developed and developing countries, suppliers, and processors. It also provides a mechanism for gaining access to US markets relatively easily compared with forest

certification, which is seen as imposing more costs than benefits, or boycott campaigns, which are seen as protectionist, blunt, and discriminatory. The Lacey Act approach also did not demand extensive negotiations with domestic and global stakeholders such as experienced through the VPA negotiations with the European Union. Such negotiations bear the risk of encountering unanticipated demands and costs and indirect challenges to national sovereignty (Cashore and Stone 2012).

EU-FLEGT Voluntary Partnership Agreement negotiations

The international pressure created by the enactment of public procurement policies in lucrative export markets spurred the Indonesian government to take concrete actions towards enacting a timber legality verification mechanism to address illegal logging. SVLK became law in 2009, while Indonesia was in the midst of negotiations with the European Union to develop a Voluntary Partnership Agreement (VPA) through the FLEGT process. A VPA is a trade agreement that provides timber producer countries with market access to the European Union in exchange for formal commitments to developing a timber legality assurance system that will ensure the legality of all forest products exported to the European Union. Formal negotiations began in March 2007 but halted only a few months later after several initial points of contention led Indonesia to stop the talks. One was the lack of a legal mechanism that would criminalise the importation of illegal forest products by EU citizens, creating a mutual adherence to legality for both Indonesia and the European Union. Another concern was that a VPA would not stop neighbouring countries, such as Malaysia and China, from laundering Indonesian timber and then exporting them as Malaysian or Chinese products. Both of these concerns were addressed through the creation of the EU Timber Regulation.

The EU's decision to enact the EU Timber Regulation

Following passage of the US Lacey Act in 2008, the European Union announced that it would launch its own version of the US law in the form of the European Union Timber Regulation (EUTR) (*Obligations of operators who place timber and timber products on the market*, 2010). Such a law had been requested by the Indonesian VPA negotiators, who saw that demand for legality verification from the European Union had the potential to ameliorate the pervasive corruption and weak enforcement plaguing current efforts to address illegal logging. The EUTR also served as an additional catalyst that led the Indonesian government to commit to certifying 100% of its industry in order to meet the requirements of EU and US trade legislation.

Public procurement policies in other countries

With the advent of the US Lacey Act and the EU Timber Regulation, increasing international pressure is being placed on other developed countries to enact similar public procurement policies that ban imports of illegally sourced and produced forest products. While Japan and New Zealand have had such policies since 2006, Australia passed the Illegal Logging Prohibition Act in 2012 and many other individual European countries have enacted their own public procurement policies independent of the EUTR, such as Belgium, Denmark, France, Germany, Norway, and the United Kingdom.

Following the advent of the procurement policies and trade agreements mentioned, one of the last potential roadblocks towards institutionalising legality verification in Indonesia was passed in January 2013 when the European Union officially recognised SVLK as a sign of "due diligence" on the part of exporters, meaning that all SVLK timber would automatically be considered to be compliant with the EUTR. If this had not occurred, Indonesian exports would have been required to undergo additional steps to be screened through the due-diligence system before being allowed to enter the European Union, which local businessmen were concerned would have created additional costs and financial burden (Osman 2013). This combination of dependence on EU markets and the EU efforts to encourage Indonesia to address illegal logging through a negotiated VPA were a key determining factor in understanding the specific choices Indonesia made to formalise its commitments to legality verification. The substance of the Indonesian-EU VPA was agreed upon in May 2011, and the agreement is slated for ratification in September 2013 (Yulisman 2013). In the meantime, the Indonesian national government has begun approaching timber-importing countries such as Japan, South Korea, Australia, and the United States regarding the development of similar bilateral trade agreements for legal timber (Lubis 2013a).

14.3.4 Summary

The signing of SVLK into law represents a clear change from no support in 1999 to weak support in 2001 to formal and legislated commitments in 2008. SVLK was formally enacted in January 2013, and the EU's Timber Regulation came online a few months

later, in March 2013. As of December 2012, approximately 7 million ha have been SVLK certified, covering 50% of the woodworking industry, 84% of the panel industry, and 80% of the pulp and paper industry (Ministry of Forestry 2013). Ten per cent of Indonesia's timber producers currently hold SVLK licenses. The next section discusses the early phase of implementation of timber legality verification in Indonesia, with particular attention to the extent to which the mechanism's inherent weaknesses may affect its ability to address illegal logging.

14.4 SVLK in practice: Two case studies

Despite its unique attributes, the SVLK legality verification mechanism is widely acknowledged to have several inherent weaknesses. It has a weak accreditation system, it is not designed for smallholder and community forests, and it does not directly address the problem of unclear or overlapping tenure. This means that illegal logging can still potentially threaten SVLK-certified areas. More importantly, the boundaries of forest areas cannot be gazetted in the absence of clear tenure, which may mean that the criteria for "legality" are not met. To what extent do these weaknesses hinder its implementation?

While it is too early to assess whether or not the initial phase of SVLK implementation has strengthened legality of the forest sector or reduced corruption, a geographic bias is already apparent regarding the regions where companies are obtaining SVLK certificates. The majority of the 600+ SVLK-licensed concession holders[(2)] are located in Java (70%) and Sumatra (14%), while the majority of the nearly 650 SVLK-licensed exporters are located in Java (71%) and Sumatra (15%), with minor representation in Kalimantan, Sulawesi, Bali, and eastern Indonesia. One source speculates this geographic bias is exacerbated by the fact that companies and exporters must pay SVLK auditors to travel to their sites, which lends itself to a geographic bias in Java since nearly all of the currently licensed auditors are based in Jakarta or West Java (Yulisman 2012).

Meanwhile, forest-rich areas known to be hotspots for illegal logging – such as Kalimantan, Papua, and the provinces of Riau and Jambi in Sumatra – remain relatively unrepresented in terms of number of certificate holders despite the fact that the illegal timber trade in these key forested regions are most often pointed out by Indonesia's industry associations as the cause of the forestry sector's struggles and of illegal logging as a whole (Obidzinski et al. 2007). In 2005, the illegal timber trade in West Kalimantan reached approximately 1.2 million m³ and is commonly blamed on agents and financiers from Malaysia (Obidzinski et al. 2007). Although the UK-Indonesia MOU initiated pilot efforts and legality verification and tracking in Kalimantan (Pribadi 2004), sources of legal timber remain few and far between in the region.

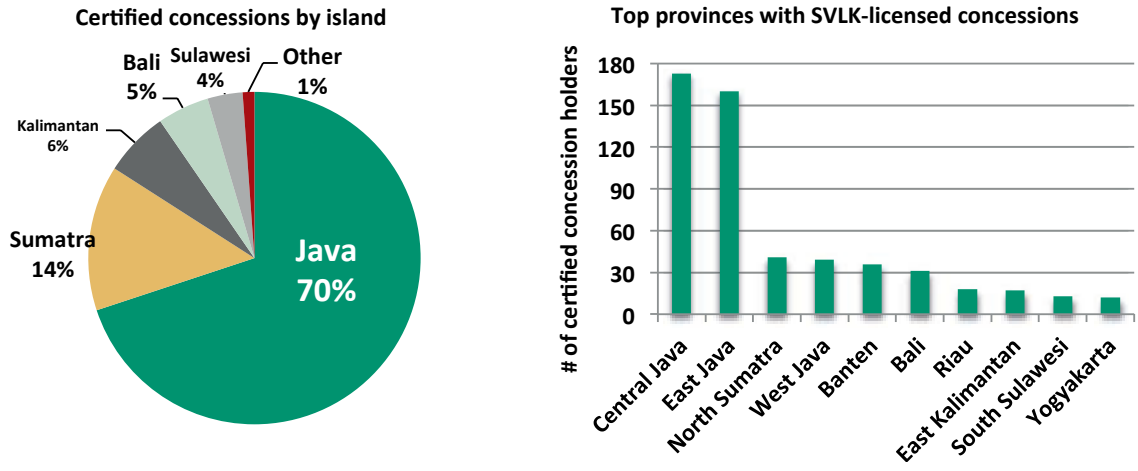
However, one of the most pressing issues is that the withdrawal of industrial timber concessions within these regions means that there are fewer sources of legal timber, augmenting pressure on existing forest resources. For example, withdrawal of industrial timber concessions operating in the buffer zone of Gunung Palung National Park in West Kalimantan led to the expansion of palm oil plantations, which in 2002 made up nearly 70% of the park's buffer zone (Curran et al. 2004). The ongoing expansion of palm oil places further pressure on the national park because it takes away land that could be used for reforestation or establishment of new timber concessions, as well as land for settlement and agriculture to support a growing population. This compels local communities to log inside the park to obtain timber for construction and other basic needs. The Kalimantan example demonstrates that a large portion of illegal-logging timber in Indonesia is consumed domestically, beyond the reach of international trade pressures. Due to a lack of available, legal timber sources that could be pursuing SVLK certification, locals have no choice but to accept illegal timber.

To better illustrate these different regional dynamics, two case-studies examine how SVLK implementation plays out in practice. One focuses on SVLK certification for community forests and smallholder teak growers in Central Java, while the other focuses on how SVLK has affected the operations of industrial concession holders. The former case illustrates potential barriers to SVLK implementation at the local level while the latter illustrates how SVLK has gained the support of large-scale companies as a means to boost credibility and awareness of their sustainability efforts.

14.4.1 Gunung Kidul District, DI Yogyakarta

Gunung Kidul District in Yogyakarta was one of the first places where smallholders successfully obtained SVLK certification. Nearly 28.5% of Gunung Kidul District is forested (42 000 ha), 69% (29 000 ha) of

(2) Referring to industry actors who hold *Izin Usaha Industri Primer Hasil Hutan* (IUIPHHK) permits that grant permission to cultivate roundwood within a legally allocated concession.



FigureII 14.1 Breakdown of SVLK-licensed concessions by province. Source: Sistem Informasi Legalitas Kayu, Ministry of Forestry. Data accurate as of September 2013.

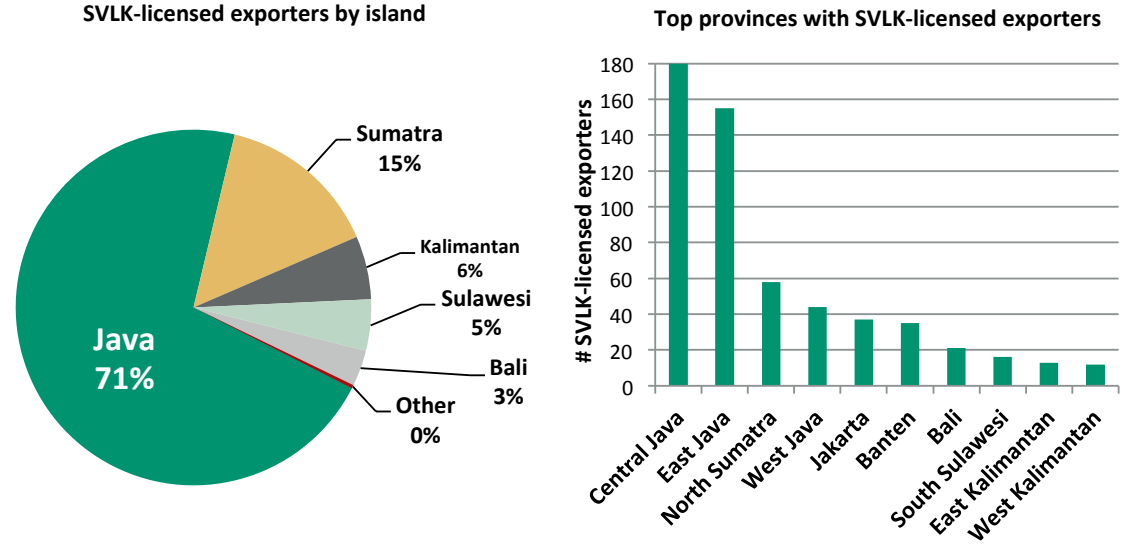


Figure II 14.2 Breakdown of SVLK-licensed exporters by province. Source: Sistem Informasi Legalitas Kayu, "Eksportir." Ministry of Forestry. Data accurate as of September 2013.

which are smallholder teak plantations. This district has a history of serving as pilot sites for other forestry initiatives, such as one form of community forestry: *Hutan Kemasyarakatan* (HKm), which was launched in 2001. HKm was seen as a way to revitalise forest management in Gunung Kidul, which had been severely deforested during the 1998 economic crisis (Djamhuri 2008). Gunung Kidul has also been targeted by the DFID-funded Multi-Stakeholder Forestry Programme's (MFP's) capacity-building efforts to socialise and provide training to diverse groups of stakeholders involved in the implementation of Indonesia's timber legality assurance system. The MFP program also focuses on technical training of SVLK auditors, independent monitors from civil society, and identifying capacity-building needs of local government institutions.

Gunung Kidul is an excellent pilot location for integrating smallholders and communities into the SVLK mechanism, given that smallholder teak producers face many barriers towards the realisation of economic benefits from their teak (Perdana et al. 2012). A study of competition among teak growers in Gunung Kidul found that most tree growers had difficulty obtaining fair market prices for their products due to lack of access to market information, high transaction costs associated with transportation, and a restrictive regulatory environment that discouraged smallholders from actively marketing their teak or investing significant time and resources in management of their systems. Many of the same government regulations designed for large-scale timber producers

were also applied to smallholders. As a result, the sale of harvested teak trees only contributed an average of 11.6% to total household income, largely because smallholders only harvested teak when faced with significant financial needs (Perdana et al. 2012).

During a field visit to a community considering SVLK certification, it was found that local awareness of SVLK was very low despite the fact that several neighbouring villages had already obtained SVLK certificates. One of the key discussion points was the cost of obtaining SVLK certification, which was estimated to be approximately USD 2600 to USD 3100[3] and posed a significant entry barrier. Village forest committee members discussed the possibility of obtaining a group certificate with neighbouring communities. The concept of group certification is one of the most promising options for integrating local producers into the SVLK system. For the most part, benefits to local actors are limited given the lack of local rights over forest resources. However, the idea of group certification met with some resistance from committee members due to concerns that involvement of more actors would overly complicate the matter, and that the village's negotiating power would be reduced. Several months later, after internal deliberations and discussions with advisors from a nearby university, they eventually decided to pursue group certification in order to lower transaction costs.

This case illustrates several points of interest. One is that the concept of group certification may not be readily accepted by communities, and significant time and outreach is needed to introduce and discuss its advantages and disadvantages with community members. Another significant point is that access to capital is a major issue for small and medium-sized enterprises and community forests, which will require significant capital in order to comply with the SVLK. However, formal efforts have been made to provide capital to these groups through government subsidies and donor funding. As of January 2013, the Indonesian government had allocated about USD 312 000 to help small-scale producers pursue SVLK certification (Osman 2013). The European Union is also cooperating with the Food and Agriculture Organization of the United Nations (FAO) to manage a small grants program to support FLEGT-related activities of applicants from VPA countries. For Indonesia, these grants provide support 1) to small producers in implementing SVLK and 2) to civil society for conducting independent monitoring and establishing provincial-level multi-stakeholder forums (EU and FAO 2013).

It was also observed that local knowledge of later stages of the teak supply chain was low, which should be a crucial factor in deciding whether to pursue SVLK certification. Similar to the situation described in Perdana et al. 2012, the local supply chain consisted of the tree growers (usually farmers who also grow crops such as upland rice, cassava, peanut, soybeans, bananas, and various vegetables) and local traders who trade timber among each other, with large-scale traders, or sell directly to processors. In this case, their teak was usually sold to processors, craftsmen, or furniture-manufacturing facilities in Jepara, a famed hub for the forest products and wood crafts industry on the northern coast of Central Java. Although much of the teak furniture manufactured in Jepara is exported abroad, local tree growers and traders had little knowledge whether or not their teak ever reached foreign markets or was consumed domestically.

However, smallholder teak producers in Gunung Kidul are not necessarily ideal targets for illegal logging interventions. The community described above has a long history of forest management, with clear land tenure over a 573 ha forest under the formal designation of *hutan rakyat*. Their forest was governed and managed by a 20-member village forest committee consisting of tree growers, traders, and village government officials. Although illegal logging is not a threat for these types of communities, this case illustrates the issues facing community forests in becoming part of the supply chain of legal timber that SVLK seeks to create. These dynamics also play out elsewhere in Indonesia; as of August 2013, only 7% of wood handicraft exporters in Bali were SVLK certified because they remain unconvinced of certification benefits (Winarti 2013).

14.4.2 Large-scale pulp producers

Two of Indonesia's largest pulp and paper producers, Asia Pulp and Paper (APP) and Asia Pacific Resources International Limited (APRIL), were some of the first major companies to pursue SVLK certification of timber for their pulp mills. Although certification is mandatory, expressed support is not; yet these two companies have publicly expressed support for the SVLK standard and continue to actively cultivate consumer confidence in the legality of Indonesian timber at the global level. The reasons and dynamics behind this support help to illustrate reasons why SVLK has garnered broad support from the private sector in Indonesia.

[3] The cost of the certification is not set by the government but negotiated between clients and accredited auditing companies. Recent newspaper articles cite the average fee as USD 2800 to USD 4100. Source: "Govt helps small timber product firms get SVLK certification." Yulisman, The Jakarta Post. August 3, 2012.

APP is one of the largest pulp and paper producers in the world, producing approximately 80 billion tons of pulp, paper, and packaging products in Indonesia each year. About 10% of this total enters Europe, and the remainder is either consumed domestically or exported to approximately 65 other countries, including the United States (Greenbury 2012). APP became fully compliant with SVLK following certification of all its nine Indonesia-based mills in November 2012 (Gyekye 2012). Among the reasons motivating their certification was the need to comply with the legal requirements of importing countries, such as the US Lacey Act and the EU Timber Regulation (Asia Pulp and Paper 2012), which suggests that market access rather than theoretical price premiums are a key driver behind support for the SVLK standard.

APRIL's subsidiary PT Riau Andalan Pulp & Paper (PT RAPP) also achieved SVLK certification of its Sumatra-based mills and plantations in November 2012 (APRIL 2012). These mills produce an estimated 2.8 million tons of pulp annually. Prior to the advent of SVLK, APRIL had taken its own measures to assure legality and sustainability of its operations; the company has had its own timber legality verification system in place since 2002, and its plantations have been certified by the Indonesian Ecolabel Institute (LEI, acronym for *Lembaga Ekolabel Indonesia*) since 2006. However, such systems lack recognition at the global level; for example, the LEI standard is recognised by Japan but not by the United States or Europe, which lends further support to the hypothesis that retaining market access to importing countries is one of the key factors driving support for widely accepted timber legality schemes in the private sector.

On the other hand, critics have argued that timber legality certification could follow in the footsteps of forest certification with respect to providing a form of greenwashing for large forest sector companies such as APP and APRIL. While both companies have gone to great efforts to communicate the sustainability of their operations, they have also made significant efforts to promote the credibility of Indonesian timber in the global marketplace, which could suggest that being perceived as sustainable remains subsidiary to being perceived as credible. While APP acknowledges that SVLK certification is a necessary step towards achieving the company's 2020 Sustainable Roadmap Vision of sourcing all raw materials from plantations rather than natural rainforest, they take care not to confuse "sustainability" with "legality." This illustrates the leading role that large-scale producing companies with international supply chains can play in furthering implementation of the SVLK standard in Indonesia. By increasing consumer confidence in the credibility of wood products sourced from Indonesia, they help keep the doors to consumer countries open for Indonesia's multitude of small-scale exporters and other small and medium-sized enterprises, thus boosting the domestic forest products industry.

14.4.3 Summary

These two case-studies demonstrate several key implementation challenges to legality verification in Indonesia, such as the difficulty in applying the standard to smallholders and community forests and the inability of timber legality verification to extend influence into traditional problem areas. At the same time, the progress that has been made should not be understated. Tens of thousands of legality documents have already helped to certify 2 million tons of forest products worth USD 1.41 billion (Fitriani 2013). SVLK may also become a key factor in enabling Indonesia to lift its current log export ban; the Ministry of Forestry is discussing the possibility of allowing only SVLK-certified companies to export raw logs, permitting them to obtain premium prices in the international market instead of the currently depressed domestic-market prices (Fauziah 2013, Lubis 2013b). An online information system, *Sistem Informasi Legalitas Kayu*, was launched in mid-2012, making a broad database of SVLK certificate holders publicly accessible, along with their audit documents. So, a decade after multi-stakeholder efforts began to craft a definition of legal timber in Indonesia, the system envisioned has become reality and its story will continue to unfold as it is put into practice.

14.5 How and why do new forms of governance emerge?

Bernstein and Cashore (2000) theorise that there are four distinct pathways through which influence on domestic policy-making processes occurs. For a full discussion of this framework, see Part II chapter 9. By applying the pathway framework to the case of illegal logging in Indonesia, we see that all four pathways were crucial in creating support for timber legality verification in Indonesia's domestic policy process (Table II 14.2).

What is interesting for the purposes of this analysis is the interaction between each of the four pathways. For example, the market pathway interacted with the norms pathway when forest certification – a non-state market-driven mechanism – failed to take hold in the tropics and led to the widespread embracing of timber legality as a more practical step towards achieving SFM. The widespread adoption

Table II 14.2 Application of the pathways framework to the case of timber legality verification in Indonesia.

Pathway	Indonesia
International Rules	US Lacey Act and EU Timber Regulation EU FLEGT VPA Process Public procurement policies of other countries (Japan, Australia, New Zealand)
Norms	Sustainable forest management Good forest governance Green public procurement
Market	Desire for market access Ability to take away market share from countries not pursuing legality verification Realisation of potential premium prices
Direct Access	Multi-stakeholder process in developing SVLK gave civil society and bilateral donors direct access in policy-making Third-party monitoring gives civil society direct access in implementation

set legality verification on its way to becoming a global norm, as more and more countries develop green public-procurement policies and public awareness about the impacts of consumption grows. The market pathway also interacted with the direct access pathway when NGO boycott campaigns in the early 2000s damaged Indonesia's reputation and thereby threatened market access of Indonesia's forest products to European markets. As a result, the Indonesian government and the multi-stakeholder group that developed the SVLK standard realised that there was a critical need for SVLK to be credible. The pursuit of credibility fundamentally altered the design of the mechanism to include components that government would normally interpret as impinging on national sovereignty, such as third-party auditing and independent monitoring of implementation. Lastly, there was interaction between different international rules within the international rules pathway when the US Lacey Act and stalled FLEGT VPA negotiations spurred development of the EU Timber Regulation, which was a prerequisite for Indonesia to agree to sign the VPA.

It should also be noted that the need to address illegal logging is high on the national agenda, as evidenced by the presence of presidential decrees, high-level international dialogues, widespread media coverage, and the fact that forestry issues comprise a significant component of the dockets of bilateral donors such as DFID, USAID, GIZ, Norway, etc. The media coverage of forestry issues, including illegal logging, is widespread in Indonesia. Stories on these topics are frequently featured on broadcast television news and in prominent Indonesian magazines and newspapers. An analysis of the volume of English-language media coverage of illegal logging in six countries (Indonesia, Malaysia, Brazil, China, Gabon, and Cameroon) found that coverage was the highest in Indonesia, with a peak of 1200+ articles in 2007 (Lawson and McFaul 2010). However, it is unclear to what extent media coverage has served as an enabling factor for garnering widespread acceptance for legality verification or whether it merely reflects the activities already occurring through the four pathways, such as pressure from international rules and policies, excitement over possible economic incentives through the market pathway, or the collective support of environmental and business interests that drove creation of the SVLK mechanism through the direct access pathway.

14.6 Conclusion

Widespread domestic and international changes over the past 20 years interacted with each other to give rise to new forms of forest governance in Indonesia, via timber legality verification mechanisms to address the problem of illegal logging. Whether timber legality verification eventually succeeds in rescuing forest governance and setting a course towards sustainable forest management in Indonesia depends upon whether the strategic choices made by practitioners can harness the new dynamics that it has created. The extent to which the Indonesian government is

committed to enforcing its timber legality standard and to enforce the Lacey Act and EUTR and the extent to which industrial timber producers realise a natural price premium from weeding out illegal timber from the market are certain to play crucial roles in determining how support for timber legality verification will continue to evolve. The perception of SVLK in the broader NGO community will also affect its potential impact, as boycott campaigns of SVLK timber have the potential to irreparably damage the system's credibility among European consumers.

One of the most interesting areas to watch in the coming years will be how timber legality verification is received by provincial and district governments in Indonesia and how their reaction reinforces or deviates from traditional tensions between the levels of government. Already, some NGOs have reported that certain provincial governments have refused to cooperate in sharing data to support independent monitoring (Solo Pos 2012), while other district governments actively help local enterprises in securing certificates (Antara News 2013). The outcome of Indonesia's 2014 presidential election may also shift national-level dynamics of support for timber legality verification. It will be of interest to academics and practitioners to observe how these fluctuations of support among and between the three levels of government continue to play out.

This chapter sought to illustrate the conditions in Indonesia that led to serious and concerted efforts to address illegal logging and thus foster meaningful progress towards SFM. It highlights a plausible course of evolution through which legality verification paves the way for widespread adoption of certification systems by putting in place enabling factors that forest certification currently cannot adequately incentivise, such as global supply-chain tracking systems. Although we cannot empirically measure how likely it is that this evolution towards SFM will occur, we can identify the processes through which this evolution might occur, as well as the enabling factors and constraints that exist along the way. It remains crucial that further research on these types of systems is conducted early in their development so that policy can be reshaped as the system's strengths and weaknesses are uncovered. Such inquiry can further theory building that will then support development of durable and effective interventions that have lasting impacts on global and domestic forest governance.

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Forest Stewardship Council certification of natural forest management in Indonesia: Required improvements, costs, incentives, and barriers

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Abstract: Voluntary, third-party, market-based forest certification has helped promote the transition from forest exploitation for timber to multiple-objective forest management in Indonesia. Here we describe the paths followed to Forestry Stewardship Council (FSC) certification of responsible management by five forestry concessions in Kalimantan, Indonesia. We found that while only modest improvements in forest management practices would be required for the concessions to comply with governmental regulations, much more substantial improvements were needed for FSC certification. Making these improvements was expensive mostly because the concessions lacked the required technical capacity and thus relied on support from outside institutions. We estimated that the direct costs of certification, half of which were paid by various donors, amounted to USD 300 000 to USD 700 000 per concession, with averages of USD 4.76/ha and USD 0.1/m^3. Due to the minimal financial benefits the concessionaires received from certification of their forest products, external funds for the required technical inputs and audits were essential, but the business and marketing strategies of companies linked to the concessions also favoured certification. Forest certification is expanding in Indonesia for a variety of reasons, mostly related to partnerships between the private sector and civil society as well as in response to emerging synergies with the newly enacted government regulations (e.g. verification of timber legality and mandatory certification) and concerns about corporate reputations. Despite these facilitating factors, many barriers to certification remain, including unclear forest land tenure, perverse government regulations, high costs, lack of technical capacity, and scarcity of "green premiums" for certified forest products.

Keywords: Tropical forestry, forest certification, forest concessions, improved forest management, reduced-impact logging, forest degradation

15.1 Introduction

Indonesia's approximately 131 million ha forest estate, all of which is owned by the national government, is designated for conservation (27 million ha), protection (29 million ha), and production (75 million ha, including about 10 million ha for plantations) (Ministry of Forestry 2011). Here we focus on the 25 million ha of production forest already allocated as natural forest concessions plus the additional 18 million ha for which new or extended concession licenses are being processed. The number of timber concessions in Indonesia decreased from 577 in 1990, covering 59 million ha, to 285 in 2011, covering 25 million ha (45% and 19% of total forest cover, respectively). There were many reasons for these reductions but prominent among them were prior mismanagement and resource depletion by uncontrolled logging and wildfires combined with widespread conversion of logged forests into oil palm

and non-native timber plantations. It is nevertheless noteworthy that up to 1996 the rate of deforestation in concessions was estimated at only 77 000–120 000 ha compared to 623 000–2.4 million ha/year for all forest categories combined (Sunderlin and Resosudarmo 1997). The more recent study of deforestation in Sumatra by Gaveau et al. (2012) validates this result: deforestation rates in forest concessions and protected areas were similar but much slower than in other forests. The big challenge to be confronted in forest concessions in Indonesia is forest degradation due to unsustainable timber exploitation practices, not outright deforestation.

Timber harvests from Indonesia's rich natural forests contributed substantially to the country's economic development during the initial post-colonial era (Gautam et al. 2000). Unfortunately, most logging was and remains unnecessarily destructive despite enactment of forestry regulations as far back as the early 1970s (Annex II 15.1). Later, partially in response to the Convention on Sustainable Development declared at the Rio Summit in 1992 as well as in response to the Target Year 2000 campaign of the International Tropical Timber Organization (ITTO), the government of Indonesia (GoI) enacted a number of additional forestry regulations intended to promote sustainable forest management (SFM). Despite these new regulations and financial and technical support from several donor countries and international non-governmental organisations (NGOs), destructive forestry practices remained common. Unclear land tenure, weak law enforcement, collusion, and corruption, as well as the conflicting and inconsistent governmental regulations, were and remain root causes of poor forest management in Indonesia (Barr et al. 2006, Muhtaman and Prasetyo 2006, Tacconi 2007).

In response to the widespread failures of governments to curb destructive forestry practices in Indonesia and elsewhere in the tropics, coupled with concerns about the unintended impacts of boycotts of tropical timber (e.g. reduced values of standing forests), voluntary third-party forest certification arose in the 1990s as a market-based strategy to improve forest management (e.g. Auld et al. 2008, Price 2010). Among several certification schemes, the Forest Stewardship Council (FSC) has received the most support from international civil society organisations and is the most widely applied in the tropics (Atyi and Simula 2002). In Indonesia, FSC is the only voluntary certification scheme with international traction and it dominates in terms of certified area (91% of certified natural production forests in Indonesia). For these reasons we here focus on FSC certification but recognise that other certification schemes operate in Indonesia (e.g. Lembaga Ekolabel Indonesia, LEI) and a new, government-run, mandatory certification program (Pengelolaan Hutan Produksi Lestari, PHPL).

Starting with the first certified natural forest concession in Indonesia in 2001, growth in the area certified has been steady but modest. At the time of this writing (early 2013), nine concessions, with a combined area of natural forest of 1 011 287 ha (4% of the area of active concessions), were certified by the FSC (TFF 2012) and two other concessions had lost their FSC certificates (464 770 ha). In addition, 26 concessions in natural forests, with a combined area of 2.8 million ha, were ostensibly working towards certification (TFF 2012). This underlying dynamism in certification needs to be considered when formally evaluating the impacts of certification in Indonesia and elsewhere; simple comparisons of the number or area of certified and uncertified forest management units are clearly susceptible to making spurious conclusions (Romero and Castrén 2013).

This chapter describes how, despite unfavourable conditions such as unclear land tenure and inconsistent forest regulations, the concerted efforts of the private sector and civil society, including NGOs, facilitated the adoption of improved management practices and advancement of some forest concessions towards forest management certification (hereafter certification). We refer to responsible forest management instead of sustainable forest management because sustainability can only be determined in retrospect with lots of data collected over long periods of time, whereas certification represents an effort to assure compliance with the best available standards for forest management. Given the spatial scales and pace of logging in Indonesia as well as continued and widespread use of unnecessarily destructive timber harvesting practices, we believe that promotion of responsible forest management by certification remains a major strategic objective for conservation and development (e.g. Ebeling and Yasue 2009). Unfortunately, formal, field-based assessments of the effectiveness of forest certification in general, and in Indonesia in particular, remain to be carried out (Romero and Castrén 2013). While the impact of certification as measured by changes in the area certified is easy to calculate, the effectiveness and costs of certification in improving forest management practices are much less easy to determine (Moore et al. 2012, but see Gullison 2003, Newsom and Hewitt 2005, WWF 2005, Newsom et al. 2006). Despite the lack of rigorous, field-based evaluations of the impacts of forest management certification, its beneficial impacts are claimed to be substantial (e.g. Gale 2006, Muhtaman and Prasetyo 2006).

Here we employ a case-study approach to describe the pathways to FSC certification followed by five recently certified concessions in Kalimantan, Indonesia. We illustrate what kinds of on-the-ground improvements were required for the concessions to receive FSC certification. We also compare the requirements of FSC with those of government to high-

light overlaps, conflicts, and potential synergies. The information we present was derived from interviews and observations during frequent field visits to each of the concessions as they worked towards certification. We also report the associated direct costs of certification that we could track, most of which were covered by external agencies. Finally, to inform efforts to increase the effectiveness of this conservation intervention, we explore some of the reasons why the forest management units (FMUs) worked towards certification and the barriers encountered.

We hope that this descriptive study advances analyses of the impacts of forest certification and hence improves forest management in Indonesia and elsewhere by providing governments, donors, certifiers, and forest auditors with information useful in revising their policies and practices. As such, it constitutes a step towards a more formal evaluation of the impacts of certification of natural forests.

15.2 The legal framework for natural forest management in Indonesia

Regulation of natural forest management for timber in Indonesia began with enactment of a basic forestry law in 1967 followed by issuance of the regulations needed for its implementation (Annex II 15.1). These laws and regulations were implemented by a central government that did not recognise the traditional tenure rights of indigenous people and disregarded many social considerations important to sustainable forest management (e.g. involvement of local communities in forest management and protection of their cultural identities) (Wiersum 1995, Gunter 2011). The total area under timber concessions in Indonesia has varied over time. At their peak extent in 1993/1994, concessions covering 61.7 million ha were granted to private sector or state-owned firms for 20- to 70-year periods subject to satisfactory periodic evaluations by the Ministry of Forestry (MoF). Concessionaires were expected to pay a one-time concession fee that varied with the size and duration of the license period. Later, regulations were enacted that required regular payments into a reforestation fund (DR, Dana Reboisasi) and the payment of royalties (PSDH, Provisi Sumber Daya Hutan), both based on extracted timber volumes.

To guide concession forest management, in 1971–1972, the MoF developed the Indonesian Selective Cutting System (Tebang Pilih Indonesia, TPI). TPI set the minimum felling cycle at 35 years and the minimum felling diameters at 50 cm for production forest and 60 cm for limited-production forest in which logging is permitted but has restrictions due, for example, to steep topography (e.g. 25%–45% slopes). When TPI was revised in 1989 to require enrichment planting where necessary due to poor stocking, it became known as the Indonesian Selective Cutting and Planting System (Tebang Pilih Tanam Indonesia, TPTI). TPTI also regulated logging-block demarcation, inventory, logging, and post-logging silvicultural treatments.

In 2009 TPTI was radically revised; minimum cutting diameters were reduced by 10 cm, the minimum cutting cycle was reduced by five years, and enrichment planting along cleared lines was required regardless of post-logging stocking. This approach to intensive silviculture is referred to by the Indonesian acronym SILIN. We note that the intensification of natural forest management required by SILIN completely contradicts the recommendations of dozens of Indonesian and other researchers over the past decades (e.g. Appanah 1998, Kuusipalo et al. 1997), and came as a surprise to many. Efforts are currently underway to understand why the MoF decided to disregard the recommendations of researchers to reduce harvest intensities (e.g. Sist et al. 1998, 2003b), to lengthen cutting cycles (Ruslandi 2002, Sist et al. 2003a, Van Gardingen et al. 2003), and to avoid the high environmental and economic costs of enrichment planting except where absolutely necessary (Ådjers et al. 1995, Appanah and Weinland 1993). The new regulations also fail to require what researchers and certifiers accept as critical to sustainable forest management: the protection of forest structure and soils through the use of reduced-impact logging (RIL) techniques (e.g. Putz et al. 2008).

According to Indonesian law, before concessions can begin to log, the MoF must approve their long-term (10-year) as well as more detailed annual work plans. Annual work plans are supposed to be based on 100% inventories of commercial species >20 cm dbh (stem diameter at 1.3 m or above buttresses) and must include road plans and tree position maps. Unfortunately, partially because detailed harvest plans are not required, typical logging is unnecessarily destructive. Furthermore, plan approval is a very political and idiosyncratic process with many unexplained delays and few apparent on-the-ground benefits. Once MoF approval is granted, trees are felled with chainsaws and logs are skidded by bulldozers (i.e. crawler tractors) to roadside log landings from where they are hauled by logging trucks to log ponds or other places where they are sold and shipped to various forest-product industries in Indonesia (log exports were banned in 1983). The logs are primarily used for plywood, but some go for other uses such as flooring and furniture from bangkirai (*Shorea leavis*) and merbau (*Intsia* spp.). In addition to regulations issued specifically for the forestry sector, concessions are expected to comply with other laws, such as those related to environmental impacts and worker rights.

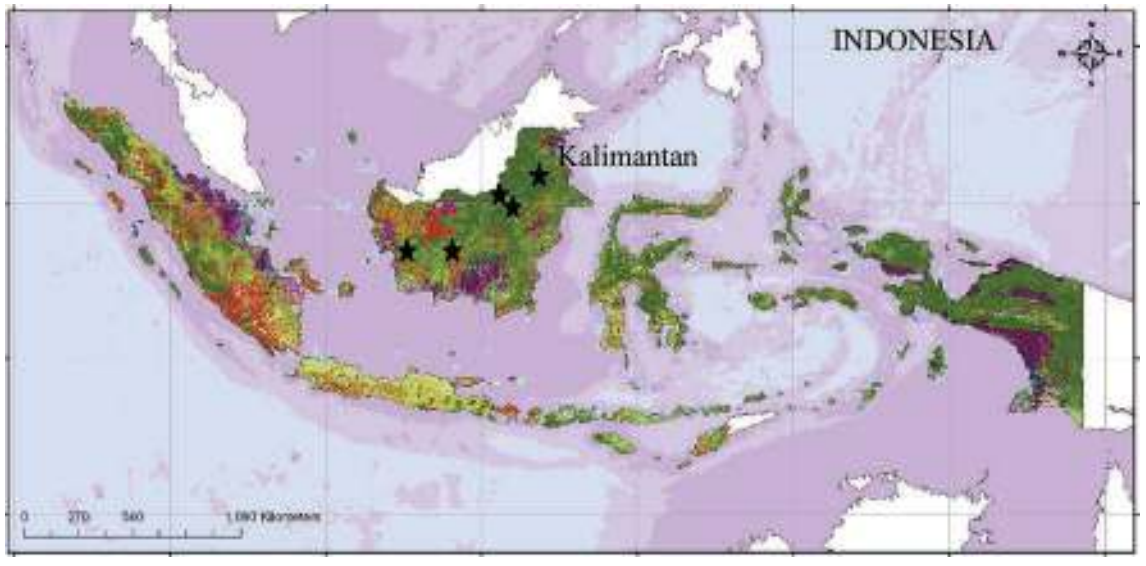

Figure II 15.1 The five concessions in this case study, (indicated by black stars on a 2005 land cover map from Ekadinata et al. 2011) are all in closed-canopy lowland dipterocarp forest in Kalimantan, Indonesia.

15.3 Methods

15.3.1 Study site

This study is based on the experience of the Tropical Forest Foundation (TFF) in five concessions in Kalimantan, Indonesia, that were eventually certified (Figure II 15.1). From the nine FSC-certified concessions in Indonesia, of which eight are in Kalimantan, we selected these five because they followed similar paths towards certification, which facilitates cost comparisons. The five concessions are managed by the four major forest company groups in Indonesia to which all certified concessions in Kalimantan belong. The four other FSC-certified concessions were either located in other forest types or received the kind of external support for which accounting is difficult. All five concessions studied (Table II 15.1) are in lowland forests dominated by tree species in the Dipterocarpaceae, with topographical conditions ranging from gently sloping to moderately hilly; only small areas have slopes > 45%, which is the legal limit for ground-based logging.

15.3.2 Focus on seven components of forest management

We endeavour to elucidate the likely impacts of FSC certification by describing the differences in management practices required by the government and for certification. Information was gathered from the concessions' certification preparation reports, audit reports, and field observations during repeated visits to each concession. We visited each logging operation at three- to four-month intervals during the three years leading up to their certification. Due to lack of quantitative data for on-the-ground forest management practices (i.e. a formal evaluation), we focus only on those practices that we observed. Although we made some use of formal corrective action requests (CARs) issued by auditors and reportedly addressed by the concessions (for an example of this approach to impact analysis, see Peña-Claros et al. 2009), we cross-checked this information during repeated site visits to avoid possible biases (Romero and Castrén 2013).

The analysis focuses on seven basic components of forest management derived from FSC principles (FSC 2012) that are used by TFF and the Forest Trust to assist concessions move towards certification (Table II 51.2). For each of these components, we later compare the relevant government regulations and FSC requirements (see Table II 15.4, section 15.4.2) and assess implementation success based on repeated field visits, audit reports, and analysis of CARs.

15.3.3 Partial accounting of the costs of certification

The reliable data on the costs of forest certification are those covered by external agencies for activities such as formal audits, training programs, and biodiversity surveys. Data on the direct costs borne by the concessions as they worked towards certification is more scarce and we have no data on the indirect costs (or benefits) of certification that result from

Table II 15.1 Characteristics of the five FSC-certified forest concessions in this case study.

Variables	Concession				
	RMT	BRT	SJM	SPT	NKR
Area	69 620 ha	97 500 ha	171 340 ha	216 580 ha	41 540 ha
First license	1973	1976	1982	1992	1989
Location	East Kalimantan	East Kalimantan	West Kalimantan	Central Kalimantan	East Kalimantan
Owner	Tirta Mahakam	Intertrend	Alas Kusuma	Kayu Lapis	Intertrend
Annual cutting area	1430 ha	2500 ha	3240 ha	5000 ha	1000 ha
Annual harvest	75 120 m^3	170 280 m^3	191 510 m^3	227 600 m^3	27 000 m^3
Harvest intensity	52.5 m^3/ha	68.1 m^3/ha	59.1 m^3/ha	45.5 m^3/ha	27 m^3/ha
Products and principal markets	Plywood and floor base. Japan with some sales to SE Asia and Europe	Local log sales (some export of finished products)	Plywood and molding to Japan, Korea, N. America, Australia	Plywood, flooring, and molding to Japan, Europe, N. America	Local log sales (some export of finished products)
Year Certified and Certifying Body	2012 Control Union	2011 Control Union	2010 Control Union	2011 SmartWood	2011 Control Union

Abbreviations: RMT = Roda Mas Timber, BRT = Belayan River Timber, SJM = Suka Jaya Makmur, SPT = Sarmiento Parakantja Timber, NKR = Narkata Rimba

Table II 15.2 Forest management components used in this study and their reference to FSC principles.

FM components used in this study	FSC principles
Compliance with laws and satisfaction of financial obligations	#1
Implementation of reduced-impact logging	#5, #6, #7, #8
Social impact assessment and community development programs	#3, #4
Environmental management and monitoring plans	#6, #8
Biodiversity conservation	#9
Worker rights, health, and safety	#2
Yield sustainability and silviculture	#7, #8, #10

changes in harvest volumes and schedules. Although these limitations result in underestimates of what it actually costs the concessions to achieve certification, the focus on the major steps they took and their costs nonetheless seem instructive. Obviously, more complete analyses of the financial costs and benefits of certification are needed if forestry firms and supporting agencies are to make informed decisions about their investments.

15.3.4 Identifying motivations for and barriers to certification

Semi-structured interviews with nine high-ranking representatives from the five concessions (i.e. forest managers, marketing personnel, and senior administrative field staff) were conducted in 2011–2012 during TFF field visits and meetings with staff members of the concessions. The interviews assessed the market benefits from certification (i.e. increased market share, price premiums) received by the concessions, other sources of motivation for FSC certification, and perceived barriers to certification.

15.4 Findings

15.4.1 Steps and time taken towards certification

The strategies used by the five concessions to obtain certification, as well as the rates of progress towards this goal, varied with their interests and capabilities. Although all five concessions received technical assistance from TFF and implemented TFF's step-wise approach to certification (Table II 15.3), some chose not to receive formal recognition for each level of achievement because the expected market benefits would not be sufficient to cover the required audit fees.

15.4.2 Forest management improvements to comply with FSC standards

For each of the seven forest management components (Table II 15.2), governmental and related FSC requirements are compared in Table II 15.4. We also make a first and admittedly incomplete attempt to assess compliance with both requirements based on audit reports and our repeated visits to each concession.

Due to lack of governmental control over logging operations, lack of trained staff, and ambiguities about what is required, forest management practices in most concessions do not even reach government standards.

The forest management practices employed in the five concessions before they formally started working towards FSC certification were quite similar and among the best in Indonesia. We base this claim on our own observations plus their having received high PHPL certification scores, which indicates that they were in compliance with most governmental regulations related to sustainable forest management. Despite their comparatively good forest management practices, these concessions still needed to make substantial improvements to comply with FSC standards. This finding implies that most other concessions in Indonesia would require even more adjustments in their management practices to achieve certification.

Attainment of FSC certification required concessionaires to make long-term business commitments that respect the ecological and social dimensions of forest management, instead of just maximising log production. Certification also required more stakeholder input and generally helped open concessions to public scrutiny. The forest management practices required by the FSC are more demanding than those required by the MoF (Table II 15.4). In particular, substantial investments in the social and ecological dimensions of forest management were required by FSC. For example, investments were required in environmental monitoring equipment, protective gear for workers, and capacity building for monitoring biodiversity and general environmental impacts. In addition, substantial changes in logging practices were often required. Some of the required improvements were beyond the capacities of the concessions to implement on their own, thus the need for external inputs. Based on the analysis of certification action plans and the CAR closures as well as field visits, the most evident implications of certification for forest management practices are summarised below.

1) Logging operations: Concessions changed their timber harvesting practices from "conventional" logging, which was unnecessarily destructive, to RIL, which requires substantial changes in planning and forest operations as well as major investments in human resources (e.g. training of fellers and tractor operators, upgrading of planning staffs and logging supervisors, and hiring of monitoring crews, Figure II 15.2). In addition to changes in logging techniques, required changes were made in operational arrangements and payment systems – for example, workers in certified operations receive bonuses for compliance with RIL guidelines rather than just volume-based pay-

Table II 15.3 Steps towards FSC certification taken by forestry concessions in Kalimantan.

Steps towards certification	**Concession**				
	RMT	BRT	SJM	SPT	NKR
Legality verified	2008	Not requested	2003	2008	Not requested
RIL verified	2011	Not requested	2004	2010	Not requested
Year certified and certifying body	2012 Control Union	2011 Control Union	2010 Control Union	2011 SmartWood	2011 Control Union
Time to certification	10 years	3 years	7 years	8 years	3 years
History of engagement					
RMT	Began formal RIL training in 2002; external inputs to deal with social dimensions of certification; external HCVF assessment (TNC); technical guidance through the certification process with TBI support.				
BRT	Initiated external engagement in 2009; RIL training and an overall technical review followed by inputs on social issues; university collaboration on research; technical guidance, including HCVF assessment under TBI.				
SJM	First engagement for RIL training began in 2003; subsequently received technical input on HCVF assessment (TNC and FFI), social baseline and impact assessment and training, wildlife surveys, conservation management plan preparation, and other technical guidance with TBI support.				
SPT	Started RIL training in 2003; external assistance on social impact studies and conflict resolution training; HCVF assessment (TNC and FFI); inputs from university researchers on silviculture technical guidance under TBI.				
NKR	Received technical inputs for defining the social dimension and conflict resolution training starting in 2009; HCVF assessment by TNC; technical guidance under TBI.				

See Table II 15.2 for company abbreviations; FFI = Flora Fauna International, TNC = the Nature Conservancy, TBI = the Borneo Initiative, TFF = the lead technical advisor for these concessions, RIL = reduced-impact logging, HCVF = high conservation value forests.

ments. RIL protocols and comprehensive monitoring systems for logging operations were also developed. To be in compliance with RIL standards, logging equipment in certified operations is typically better maintained. For example, tractors need to be equipped with winch cables long enough to allow them to remain on designated skid trails, thereby avoiding unnecessary soil compaction. Another requirement for FSC certification is that skid trails need to be well-planned, located outside of riparian buffer zones and off of steep slopes, and deactivated at the end of harvest operations to reduce soil erosion. Finally, safety requirements and training are also emphasised. In certified concessions, monitoring crews evaluate the implementation of logging operation for compliance with RIL protocols after the harvest in each logging block is completed. The results of this evaluation are used to determine the size of worker bonuses and also for approval for the logging crews to move to the next cutting block.

2) *Biodiversity conservation and environmental protection*: As a requirement for certification, extensive baseline biodiversity assessments were conducted in the five concessions. These surveys employed biodiversity experts from external agencies but also involved training of concession staff members. The results of the biodiversity surveys included lists of endangered species as well as maps of unique ecosystems found in the concession areas. With this data, the experts collaborated with concession staff members to develop conservation management plans. By focusing on training, the concessionaires hope that future conservation management plans and biodiversity surveys will be the responsibilities of their own staff members, which will reduce costs.

Another certification-motivated change was to

Table II 15.4 Comparisons of governmental and FSC requirements and their interactions.

FM components	Governmental regulations	Implementation
Compliance with regulations and satisfaction of financial obligations	Comply with TPTI rules. Comply with labour and environmental laws. Pay reforestation fees (DR) and forest royalties (PSDH). Compensate local communities (about USD 1/m^3 in Kalimantan and USD 10/m^3 in Papua). Issuance of annual cutting permits and license renewals conditional on legal compliance, as determined by external auditors (SVLK).	Lack of enforcement of governmental regulations, especially labour and environmental laws. The required financial compensation paid to local communities is less than what they requested.
Implement reduced-impact logging (RIL)	RIL is the MoF's principal proxy for SFM in their mandatory forest certification program (Pengelolaan Hutan Produksi Lestari −PHPL). Prepare tree position maps and plan logging roads, but these are only administrative requirements.	Insufficient governmental regulation to implement RIL. Government regulations can be satisfied with RIL training and installation of demonstration plots.
Environmental management and monitoring plan	Prepare environmental management and monitoring plans (Analisis Dampak Lingkungan − AMDAL) for reduction and monitoring of soil erosion, protection of flora and fauna, and community development programs. Prepare annual reports on plan implementation.	Little control on implementation of environmental plans. Documents are prepared, but the implementation reports are seldom if ever prepared; if prepared, there were no responses from the relevant governmental agencies.
Biodiversity conservation	No explicit regulations require biodiversity conservation at the concession level. Small portions of concessions should be set aside to protect genetic resources.	Set-asides are not always located in places that maximise their conservation value. Instead unloggable areas are over-represented.
Social impact assessment and community development programs	Concessions are required to develop social programs for local people (MoF Decree 691/Kpts-II/1991)	This regulation was not enforced and largely failed to improve company-community relations. The legal rights of local communities, including indigenous people, are not recognized. In many cases, unclear land tenure is a source of conflict between concessions and communities.
Worker rights, health, and safety	Concessions should follow the labour law (UU 13/2003) and regulations related to worker health and safety.	Government oversight of implementation of these regulations was generally weak or non-existent. No detailed guidelines to comply with safety procedures.
Yield sustainability and silviculture	Comply with TPTI (MoF Decree 485/Kpts/II/1989 and MoF Decree P.11/Menhut-II/2009)	Research indicates that sustainability is unlikely under TPTI, especially with SILIN.

Table II 15.4. Contitinued

FM components	FSC requirements	Comparisons
Compliance with regulations and satisfaction of financial obligations	In addition to complying with national and local laws, concessions should recognise and respect local community rules; negotiate and make an agreement on the compensation fee for the communities; deal with FSC rules that sometimes contradict national regulations (e.g. SILIN rules require unsustainable logging intensities); provide evidence of balanced attention to social, ecological, and production issues; and provide documentation for forest delineation and resolve any related conflicts.	FSC requirements complement and strengthen governmental regulations for several aspects (e.g. satisfying financial obligation to the state and communities and timber legality verification). Forest boundary delineation is the government's responsibility but concessions are required to document efforts to resolve boundary disputes. Governmental regulations and FSC requirements conflict in regard to silviculture.
Implement reduced-impact logging (RIL)	Preharvest timber inventories and contour mapping. Harvest plans reflect established standards for operations, environmental protection, and utilisation. Felling and bucking methods prioritise worker safety, ensure efficiency, and minimise logging waste. Efficient and low environmental impact skidding with planning and operational controls down to the individual tree level. Deactivation activities (e.g. post-logging road and skid trail closure) to reduce soil erosion and restrict illegal access. Construct and maintain logging roads so as to minimise soil erosion and facilitate log transport. Monitor compliance with RIL guidelines and ensure company-wide utilisation. RIL training and supervision.	FSC requires the change from timber exploitation to forest management, which means that long-term forest values should be considered. TFF judges RIL compliance with a weighted scoring system having 13 criteria and 33 indicators (>80% indicates success). Total compliance with MoF rules would be equivalent to a score of 23% (based on TFF's 2006 RIL Standard). TFF's RIL Standard, which was adopted by most certification bodies in Indonesia, requires concessions to implement RIL >80% of their logging blocks.
Environmental management and monitoring plan	Integration of monitoring protocols and results into forest management plans as well as making public the results of these monitoring activities. Infrastructure changes generally required for fuel handling, recycling, and general waste management.	FSC requirements reinforce governmental regulations.
Biodiversity conservation	Extensive training and substantial investments in external consultants are required for HCVF surveys and development of biodiversity management plans. Other required HCVF-related activities include stakeholder consultations and incorporation of habitat protection and monitoring into planning and operational procedures.	FSC introduced new concepts and practices. Most concessions lack the capacity to carry out the required HCVF assessments.
Social impact assessment and community development programs	Social baseline surveys and social impact assessments. Help with community development programs using participatory processes. Monitor social impacts and evaluate program effectiveness. Resolve land tenure and other rights issues on a case-by-case basis using procedures developed by the concession. All activities that affect communities need to be preceded by community consultations with broad stakeholder participation	FSC requires more accommodation of the needs and desires of local communities.
Worker rights, health, and safety	Comply with all national regulations and international conventions related to workers. Proper safety equipment provided and utilized. Adequate training and supervision provided and documented.	FSC strengthened the implementation of government regulations.
Yield sustainability and silviculture	Intensive growth and yield monitoring is required. Harvest levels should be revised based on monitoring results. Logging intensities should be reduced and logging cycles lengthened.	Governmental regulations include contradictory requirements intended to promote sustained yields. Both government regulations and FSC requirements do not have clear silvicultural requirements.

Figure II 15.2 Reduced impact logging training in a concession preparing for FSC certification.

prohibit hunting of endangered species by concession employees. In the certified concessions, this rule was formally and repeatedly issued by the forest managers to the workers. Judging from the frequency with which we encountered game species during our field visits, we believe that this prohibition was effective.

Certified concessions routinely monitored soil erosion and stream sediment loads and utilised this information to improve their environmental management plans. The management plans include protection of streamside buffer zones, rehabilitation of degraded land, and handling and disposal of lubricants, fuel, and other chemicals. Substantial investments in environmental management and monitoring systems were required to comply with FSC standards. In uncertified concessions, few of the government-required plans for environmental management or monitoring plans were properly implemented.

3) *Community relations*: Although the GoI issued a decree that required concessions to develop community development programs, this regulation was not enforced and largely failed to improve company-community relations. In contrast, to get FSC certification, social impact baseline assessments were carried out in communities neighbouring the concessions. These assessments employed participatory processes to identify community needs and design community development programs. The concessions funded these programs and also paid the government-stipulated timber fees to local communities. For example, the concessions assisted neighbouring communities in the development of village cooperatives and local businesses.

One of the certified concessions in this study provides another example of effective company-community partnerships. In this concession, industrial-scale trials are being carried out with an alternative timber-yarding system developed by local communities. Instead of relying only on bulldozers, logs in this system are yarded to roadsides or main skid trails with what are called "mono-cable winches." These relatively simple devices consist of a diesel engine, a truck transmission, and a spool with 100 m of cable mounted on a metal sled. Starting from a logging road, the sled is winched out to the felling area and back again with a log, thereby reducing the need for skid trails. Mono-cable winches are assembled locally and cost a small fraction of even a refurbished bulldozer. While they yard logs much more slowly than bulldozers and require twice as many work-

ers, the yarding costs are much lower due to low investments in equipment and fuel. In addition to employing local workers, the principal environmental benefits of mono-cable winches compared to skidding logs with bulldozers are that compaction and mineral soil exposure are minimal and collateral stand is nearly imperceptible.

FSC auditors also required certified concessions to develop and implement conflict resolution protocols to deal with disputes with communities. Land tenure conflicts, which are rooted in the lack of clarity about the tenure rights of local communities, were common but typically beyond the capacity of concessions to resolve. For example, several concessionaires were asked by communities to release the land occupied by those communities. As reasonable as this request seems, if the concessionaires were to agree, this sort of unilateral action would be illegal because forest lands in Indonesia are owned by the central government. Although it is not reasonable to expect forest certification to resolve fundamental land tenure conflicts, certified concessions occasionally did resolve conflicts related to forest utilisation rights. For example, the rights of local communities to collect non-timber forest products, including traditional medicines, were respected. Certified concessions also mapped and protected cultural sites of local communities located in their logging blocks.

4) *Worker safety and welfare*: Certified concessions provided workers with safety equipment (e.g. helmets, safety boots, and gloves) and, through monitoring and supervision, made sure that the equipment was used properly. Worker training on safety issues was also required, carried out, and reported. In addition to addressing safety issues, worker welfare in certified concessions was addressed through the provision of adequate housing, education, and health facilities.
5) *Transparency and stakeholder participation*: Certified concessions were required to consult with local communities about mutually relevant management activities. For example, the HCVF consultations and social impact assessment reports showed that the inputs from stakeholders were recorded and verified by the auditor for their incorporation into management plans. Local communities were informed about forest management activities and were invited to the traditional ceremonies conducted before the annual forest management activities began. Public summaries of forest management plans were also made available. Although all five case-study concessions fell short of the FSC's requirement of equality of communities and concessions in making decisions of relevance to both, we believe that the process of certification led them closer to this lofty goal. It is clear that by being certified, concessions are more open to scrutiny not only by the government but also by other stakeholders. While this increase in scrutiny might impede further certification, except for the concessions that are certified, it serves to increase the transparency of decision-making and fosters stakeholder input about concession activities that affect communities.

15.4.3 Some of the financial costs of FSC certification

Financial support and technical guidance by a range of international institutions were provided to all five concessions in this case study to cover the costs of training, planning, and auditing (Table II 15.5). NGOs that supported certification included TNC, WWF, Flora & Fauna International (FFI), and TFF. These NGOs received their funds mostly from bilateral and multilateral donors such as the United States Agency for International Development (USAID) and ITTO. TBI, a Dutch NGO, contributed USD 2/ha to cover the costs of certification audits and associated activities.

We have reliable data on the financial support for certification from outside agencies, but less data on the internal costs borne by the concessions. These internal costs assumed by the concessions include increased staffing of forest inventory and planning departments, the hiring of specialists in biodiversity and social/community relations, and infrastructure improvements required to comply with certification requirements on erosion control, pollution, and sanitation. Certified concessions may also incur indirect financial costs related to foregone timber in areas where harvests are prohibited on steep slopes and in other set-asides; we have no clear indications of such costs in the concessions we studied, but they may be possible. Also, at least some of the indirect costs associated with foregone timber are probably recovered by the improved efficiency of logging operations in certified concessions. What is clear is that all of the costs of certification – direct, indirect, compensated, and internally assumed – varied with the quality of forest management practiced when they first started on the path to certification. With all these caveats in mind, we estimate that the costs of certification borne by concessionaires are equal to those supplied by outside agencies. This estimate is supported by the 50–50 cost-sharing assumption on which contracts for support of certification between TBI and the concessions were made.

Certification costs covered by external agencies ranged from USD 151 339 to USD 354 371 per concession and USD 1.07 to USD 3.64/ha for an average

Table II 15.5 Costs of forest certification covered by outside agencies.

Direct costs	Concession name, amounts in USD				
	RMT	BRT	SJM	SPT	NKR
Certification workshops for all levels of concession staff and/or gap assessment/scoping by TFF (preparation for pre-assessments; funded by TFF)	0	10240	15500	0	
Preparation of certification action plans based on results of pre-assessments (provided by TFF and funded by TBI)	16206	15347	36901	14858	8930
RIL training (provided and funded by TFF)	45000	30000	45000	25000	0
Socio-economic baseline/impact and training (provided and funded by TNC)	16370	16165	22000	47000	20000
HCVF assessment and public consultation (TNC and TBI funded)	60000	54482	80000	50000	65350
Conservation plans; wildlife censuses/studies (funded by WWF)	0	0	80000	10916	0
Growth and yield synthesis (provided by consultants and funded by TBI)	0	0	3300	6410	0
Worker rights, health and safety training (funded by TBI)	5034	0	7500	0	0
Assessments by certification body: Pre-assessment (i.e. scoping visits)	13918	13164	8740	18500	14200
Full assessment	22474	27200	27700	29681	18548
Final verification audit (funded by TBI)	10488	6500	5400	0	7048
General technical guidance up to certification (provided by TFF and funded by TBI)	12967	16337	12330	4950	2904
Miscellaneous external costs covered by various external funding sources (e.g. ITTO and Flora & Fauna International Indonesia)	5850	20000	10000	25000	14359
Total covered costs of certification	208307	209435	354371	232315	151339
Covered certification costs per unit area (USD/ha)	2.99	2.15	2.07	1.07	3.64

of USD 2.38/ha (Table II 15.5). Generally, the larger the concession area, the lower the per-hectare costs because many cost elements are area-independent. It is more difficult to establish any meaningful relationships between certification costs and harvest rates because annually allocated harvest areas, volumetric yields, and concession size are only weakly related. Nevertheless, assuming an average yield of 50 m^3/ha (Table II 15.2) and an average cost of certification of USD 4.76/ha (externally provided funds plus the assumed costs paid by the concessions), the direct costs are only about USD 0.1/m^3 (USD 0.04–0.26/m^3). To put this estimate into perspective, the harvest costs up to the log landing for uncertified firms in Kalimantan averaged about USD 80/m^3 (Ruslandi et al. 2011). Unfortunately, due to insufficient data about the direct and indirect financial benefits of certification, we cannot yet calculate cost-benefit ratios.

15.4.4 Incentives for responsible forest management and certification

Given that the companies received few market benefits from certification (partially because their principal markets were in Asia), we need to look elsewhere for motivation. Based on interviews with concession managers, it appears that improved professionalism, interest in the company's reputation, and expected benefits from increased efficiency of logging operations were the most important factors motivating certification. That said, expectations of market benefits for specific timber products and other financial benefits also continued to provide motivation for seeking FSC certification.

According to the concession employees interviewed, previous experience working with international research organisations and projects (e.g. the Center for International Forestry Research, CIFOR; the Natural Resource Management Project of USAID, Indonesia-UK Tropical Forest Management Project, and the Sustainable Forest Management Project of the German Technical Cooperation, GTZ) and non-governmental organizations (e.g. TFF, WWF, FFI, and TNC) helped prepare their staffs to implement responsible forest management and to achieve certification. Overall, the following four broad sources of motivation for implementing responsible forest management and seeking certified were apparent:

1) *Expectations of market benefits and returns on investments in certification*: The strongest motives for pursuing certification were apparently related to the business strategies of the concessions and associated industries. In particular, concessions aimed to attract green investors and continued to hope that certification would lead to premium prices for their products and increased market access. The one concession that was part of a public-traded company on the Jakarta Stock Exchange enjoyed a stock-price benefit that they attributed to the credibility associated with certification.

   Although green premiums on certified products were neither large nor common and varied among products and markets, based on interviews with marketing managers, some concessions received green premiums on some of their products. For example, a premium of 10% to 15% was reportedly paid by markets in Europe for naturally durable lawn furniture made from bangkirai (*Shorea leavis*). In contrast, premiums on certified commodity products such as plywood were only 2% to 4% and only on specific grades and in certain markets. Certification also reportedly improved access to European and, increasingly, Japanese markets, particularly for high-quality panel products. Closure of some markets to non-certified goods in Europe increased the importance of the less-discerning markets of India and Middle Eastern countries.
2) *Increased professionalism and concerns about corporate reputations*: Three of the five certified case-study concessions received no market benefits from certification and, given their business strategies, are unlikely to do so in the future. For these concessions, commitments to responsible forest management and certification were reportedly based on desires for professional improvement and more efficient management. Certification also enhanced firm reputations, which improved relations with regulatory agencies as well as with environmental and social welfare advocacy groups.
3) *Availability of external funding and technical support*: As we documented, certification is an expensive, complicated, and long process that requires capacities that many concessions lack. For these reasons, external funding and technical support were critical for the move toward certification of the five concessions we studied. All five reported that technical assistance from NGOs on FSC requirements, such as HCVF management and monitoring, were especially critical because they lacked the required capacities among their own staffs.
4) *Government regulations and international agreements*: In 2009 the MoF enacted regulations designed to strengthen its technical oversight of forest concessions. In particular, MoF instituted a system for legality verification (Sistem Verifikasi Legalitas Kayu, SVLK) and made mandatory their own scheme for certification of logging operations (Pengelolaan Hutan Produksi Lestari, PHPL). These regulations were motivated in part by the Forest Law Enforcement and Trade (FLEGT) program and its Voluntary Partnership Agreements (VPAs) but were enacted before the VPA with the European Union was signed. These requirements provide additional pressure on companies to comply with MoF regulations, which in turn fosters achievement of FSC certification. Presidential decrees on combating illegal logging and timber trade also reduced market supplies of illegal logs, which should increase log prices and thereby help legal concessions avoid bankruptcy and foster forest management certification.

15.4.5 Barriers to improved forest management and certification

Challenges faced by concessions in achieving forest certification were not only technical and financial but also related to factors over which they had little control. Interviews with concession staff revealed noticeable increases in incentives for certification but persistent barriers, including the following six barriers.

1) *High costs of improving forest management practices and of certification*: The cost of improving management practices up to FSC standards is the main barrier to forest certification in Indonesia. To this cost should be added the indirect costs of profits foregone from timber left standing in set-asides.
2) *Lack of market incentives*: Although attainment and maintenance of forest certification increase the cost of forest management, market incentives (i.e. price premiums and increased market access) for certified Indonesian forest products are still mostly lacking. Indonesia's green market share for its forest products is particularly small and its products are disadvantaged by the higher shipping costs to Europe and North America compared to those of its traditional market in Japan and Korea. Moreover, the Japanese pay very competitively for Indonesian plywood. It is unlikely that the market share of certified Indonesian forest product in eco-sensitive markets will increase, unless there is a price premium sufficient to offset the higher shipping costs.

   Most concessions in Indonesia, including those we studied, are somewhat isolated from market pressures and signals because forest product sales are controlled by the industrial divisions of the concession company groups to which they are tightly linked. This also means that market incentives and disincentives (e.g. threatened boycotts) are probably not the most important drivers towards FSC certification in Indonesia, at least not at the concession level. Despite the limited benefits from the supposedly market-based program of forest certification, for integrated forest companies the strong pulls for certification came from the timber-processing and sale sections of each concession's company group; green-premium hopes apparently persisted.
3) *Lack of effective government incentives for responsible forest management*: The SLVK and PHPL regulations simultaneously promote and discourage independent, voluntary third-party certification. The disincentive is large if concessions are charged separately for SVLK, PHPL, and FSC audits. Official governmental recognition of FSC certification would clearly solve this redundancy problem. Another example of how a governmental regulation discourages responsible forest management is the new set of government-mandated silvicultural requirements referred to as SILIN. Although the required intensification of forest harvesting through decreased minimum-felling diameters and shortened felling cycles should increase short-term profits, the required enrichment planting along cleared lines is expensive and generally unnecessary given the abundance of natural regeneration of commercial species.

   Another example of governmental policies that discouraged responsible forest management and FSC certification is the 1999/2000 GoI decree that limited the size of concessions to 50 000 ha. Although enacted in the spirit of decentralisation and to attract more firms into the forest sector, it caused a number of forest industries to collapse due to raw material shortages. Also, many of the small concessions created by the break-up of several large concessions were incapable of responsible forest management due to financial and technical limitations. Furthermore, the way the decentralisation happened facilitated illegal logging and increased deforestation (Burgess et al. 2011).

   Even after the push towards decentralisation in Indonesia in the late 1990s, spatial planning and the setting of forest estate boundaries remained under the control of the central government. This meant that there were few real changes in land tenure regimes or community access to forests. Nevertheless, partially because decentralisation rhetoric changed community perceptions about their rights to forest land, conflicts between communities and forest concession holders increased (Barr et al. 2006). Unfortunately, the government left the responsibility for resolving these conflicts to the concessionaires, most of whom lacked the necessary capacity to do so. Despite the fundamental need for the GoI to address land tenure issues, the systems for dealing with communities that were required by the FSC and set up by the concessions did prove useful in resolving some local land-tenure disputes.
4) *Technical capacity constraints*: Reaching the standards of management required by the FSC typically exceeded the capacities of concession staffs. A prominent example of this deficiency relates to the requirements for HCVF assessments, management, and reporting. FSC requirements related to the social dimension of the forest concession also exceeded the capacities of many concessions. Another example is the need for trained tractor operators and fellers to implement RIL. One cause of these deficiencies in trained personnel is that concessions often lose trained employees to

other sectors such as mining and palm oil. Rapid turnover in trained staff makes the concessions reluctant to invest in training, which has to be a continuous process. One obvious option would be for the concessions to provide larger incentives to trained workers to encourage their retention, which would have the additional advantage of helping professionalise the workforce.

Limited availability of trained workers is a problem shared by certification bodies in Indonesia. Trained auditors with experience in Indonesian forests and knowledge of Indonesian forestry are particularly scarce. Among the consequences of this scarcity are high costs, inappropriate recommendations, and overall loss of credibility of voluntary third-party certification. Inclusion of auditor training in the forestry curricula of universities in the region would help fill this void.

5) *Irrelevant and unrealistic requirements for certification*: Several requirements for FSC certification in Indonesia are difficult to satisfy and seem inappropriate to both the forest managers interviewed and the authors. For example, the requirement for annual monitoring of reptiles, birds, and other faunal groups in all identified HCVFs far exceeds the capacities of all concessions; satisfying this requirement necessitates repeated hiring of expensive teams of external experts. Similarly, the requirement for concessions to manage non-timber forest products (NTFPs) is generally irrelevant, particularly the requirement to prepare management and marketing plans. Timber concessions in Indonesia are granted only for timber management and utilisation, which renders requirements related to NTFPs beyond their mandates (Annex II 15.1).
6) *Confusion over land tenure and forest access*: In response to changes in the rules governing forest access by local communities (Annex II 15.1) and the attraction of farming in newly accessible areas, local villagers often establish farms along main logging roads in both certified and uncertified concessions. Typically forest is cleared for the purposes of swidden and more permanent agriculture up to 250 m from main roads, especially close to camps established for concession employees. Such clearing is contrary to FSC rules but nearly impossible for concessionaires to control due to lack of government support for the actions that would be required as well as to the social and political friction that eviction would generate.

15.5. Discussion

15.5.1 Forest certification impacts

Lack of an empirical evaluation of the impacts of forest certification in Indonesia or elsewhere make it difficult to specify its impacts (Romero and Castrén 2013). Prominent among the reasons for the lack of a proper evaluation of this well-recognised and widely supported conservation intervention are high costs and technical difficulties (Moore et al. 2012). Evidence for the effectiveness of certification of natural forest management in the tropics that is available to date is from indirect assessments based on the evolution of CARs and on surveys of the opinions of people involved in the certification process (e.g. Rametsteiner and Simula 2003, Newsom and Hewitt 2005, WWF 2005, Newsom et al. 2006, Auld et al. 2008, Karmann and Smith 2009, Moore et al. 2012, Peña Claros et al. 2009). While useful, such studies are susceptible to several sorts of biases and oversights that our research helps clarify. For example, we document some of the improvements in forest management practices implemented as concessions moved towards certification but before their first official audit by a certifying body. These improvements are missed by evaluations based on CARs that necessarily commence only after certificates were granted.

Our study should facilitate the planned, on-the ground assessments of certification impacts by providing some of the information needed to construct a theory of change for the certification intervention (Romero et al. 2013). For example, attribution of an observed change in management practices (e.g. protection of riparian buffer zones) to the certification intervention requires the ability to distinguish the impacts of governmental interventions with the same objective, an issue that we discuss in some detail. Our findings also reinforce the importance of what Romero and Castrén (2013) portray as a "certification continuum" of forest management units (FMUs) that can include concessions, privately owned forests, and communities. This continuum runs from those with no interest in or experience with certification to those that have remained certified for many years. Between these two ends of the continuum are FMUs that are on the verge of being certified and others that have lost their certificates due to deterioration of their management practices or to unwillingness (or inability) to pay the continuing costs of annual audits. During the three to 10 years the five concessions we studied were working towards FSC certification, they would be placed towards the middle of this continuum.

15.5.2 Certification costs and other barriers

Comparison of the financial costs of certification reported in this study with those available in the literature is complicated by differences in what costs were included and how data was collected. In contrast to most of the published studies, we divided the costs of certification into those that were direct and paid by the concessionaire or supplied by a donor and those that were indirect and mostly not assessed. Direct costs are for audits and forest management improvements required to comply with FSC standards, while indirect costs are foregone profits due to implementation of stricter environmental standards. In contrast, in many studies of certification the direct and indirect costs are not clearly differentiated or only audit fees are included as direct costs, which makes comparisons with the current study problematic. With this caveat registered, we note that all studies reported to date concluded that certification costs are substantial. Our estimates of the costs of certification for the five concessions in Kalimantan fall between USD 50 000 and USD 575 000 reported by Simula et al. (2004) and at the low end of the per-unit volume costs reported by Kollert and Lagan (2007)–USD 0.50/m^3 to USD 2.50/m^3 – and de Camino and Alfaro (1998) – USD 0.26 to 4.00/m^3. As observed in Bolivia (Ebeling and Yasué 2009), certification costs in Indonesia generally declined with concession size due to size-independent fixed costs.

The high direct costs of certification, especially if expressed per concession, are at least partially due to the fact that much of the environmental and social monitoring and compliance checking was carried out by experts hired from national and international consulting companies. With daily rates of USD 250 to USD 650, the costs of hiring people to conduct biodiversity surveys and HCVF assessments mount up rapidly. These costs will decline when concession employees can conduct much of this work themselves, even though third-party verification will still be required. Training of local staff in the required disciplines should thus be a priority if certification is to thrive. Lack of trained staff is reportedly also a barrier to responsible forest management elsewhere in the tropics (e.g. Gullison 2003, Durst et al. 2006, Peña Claros et al. 2009).

A factor that promotes certification in Indonesia that is not reported elsewhere is related to forest industry structure, particularly with whether forest concessions are tightly linked to processing industries. Similarly, we expect that elsewhere in the tropics, as in Indonesia, governmental pressure and the availability of external financial support for certification are critical to the widespread adoption of certification (e.g. Bass et al. 2001, Durst et al. 2006, Ebeling and Yasue 2009).

While barriers to certification in Indonesia such as unclear land tenure (e.g. Barr et al. 2006, Muhtaman and Prasetyo 2006, Ebeling and Yasue 2009) remain substantial, increased external support in the forms of funding and technical expertise, the government's new mandatory certification program, and international efforts for legality verification have all helped spur progress towards voluntary, third-party certification in the five Indonesian concessions studied. Synergies between these incentives, if realised, could encourage even poorly performing concessions to improve their management.

15.6 Conclusions

In the five case study concessions, independent third-party certification promoted improvements in forest management practices. Certification also required increased transparency and involvement of a wide group of stakeholders in forest management decision-making. The requirements for FSC certification in Indonesia far exceed those set by governmental regulations but also exceeded the technical capacities of concession staffs. To some extent, certifiers expect concessions to solve problems that can only be solved by the government. Most prominently, in the pursuit of certification, concessionaires cannot be expected to address the need for fundamental land tenure reform.

The financial costs of certification, though not yet fully known, are clearly substantial. While market incentives from certification fall well below expectations and national policies do not favour responsible forest management, firms seeking certification will likely continue to require financial and technical support from donors. On the positive side, if the obvious synergies between the GoI's new mandatory forest certification (PHPL) program and the FSC are captured, progress towards improved forest management and certification will be enhanced.

Understanding the motives for and barriers to certification is important to develop strategies to increase the success of this important conservation intervention. Vertically integrated forest companies are interested in certification because they recognise its potential market advantages and the strategic business opportunities it opens. Unfortunately, isolation of forest managers from market signals and benefits makes it challenging to ensure that any market benefits from certification return to the forest. This isolation also means that market incentives and dis-incentives (e.g. threatened boycotts) are apparently not the most important drivers towards FSC certification in Indonesia, at least not at the concession level. Slowing the uptake of responsible forest

management and certification in Indonesia are high costs, lack of incentives, unrealistic requirements and expectations, and perverse governmental regulations.

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Annex II 15.1 Government of Indonesia (GoI) and Ministry of Forestry (MoF) regulations related to natural production forest management and administration. Before 1983, forestry was in the Forestry Directorate (FD) under the Ministry of Agriculture.

Regulation	Subject	Main content
Undang-Undang (UU) 5/1967	Basic forestry law	Basis for GoI control over forests
UU 41/1999	Amends the forestry law	Supersedes UU 5/1967 to comply with decentralisation regulations
Peraturan Pemerintah (PP) 21/1970	Regulates forest concessions and forest product utilisation	Concessions should be formally linked with a forest-product processing industry
PP 6/1999	Modifies regulations about forest concessions and forest product utilisation	Supersedes PP 21/1970 Limits concessions to 50 000 ha per license with a maximum of 100 000 ha per province and 400 000 ha for single firms Provincial and district governments can grant concessions up to 10 000 ha and 100 ha, respectively Concessions do not need to be formally linked to forest-product processing industries
PP 34/2002	Regulates forest administration and the formulation of management plans	Amends PP 6/1999 Revokes authority of provincial and district governments to grant forest concessions
PP 31/1971	Regulates forest planning	Specifies how to prepare forest management plans
FD 35/Kpts/DD/1972	Indonesian selective logging rules (Tebang Pilih Indonesia, TPI)	Describes the silvicultural system for natural production forest
MoF Decree 485/ Kpts/II/1989	Modification of TPI to include enrichment planting where needed	Modifications of the silvicultural system for natural production forest
MoF Decree P.11/ Menhut-II/2009	Revision of TPI to include more intensive harvests and mandatory enrichment planting TPTI (SILIN)	Intensification of silvicultural management of natural production forest
PP 35/2002	Establishes a reforestation fund (Dana Reboisasi)	Payment of harvest volume-based reforestation fees
PP 51/1998	Sets royalties (Provisi Sumberdya Hutan)	Payment of volume-based forest royalties
PP 27/1999	Requires environmental impact assessments (Analisis Mengenai Dampak Lingkungan)	Requires concessions to conduct environmental impact assessments and prepare environmental management and monitoring plans
UU 13/2002	Labor law	Regulates company-worker relationship (e.g. contracts, wages, and working hours)
P.38/Menhut-II/2009 Amended to P.11/Menhut-II/2011	Standards and guidelines for sustainable natural production forest management and timber legality verification	Employs independent auditors to assure compliance with forest management and administration regulations

Enabling forest users in Nepal to exercise their rights: Rethinking regulatory barriers to communities and smallholders earning their living from timber

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Abstract: Community forestry (CF) is seen as an important tool for facilitating sustainable forest management; however, barriers often greatly inhibit CF's ability to deliver on its full potential. The aim of this chapter is to examine one of the barriers to CF in Nepal. The barrier consists of regulations that greatly restrict a community's ability to make a living from timber in its forests. An analysis of existing policies was conducted to identify the regulatory requirements placed on communities. An expert workshop was held in Kathmandu, and fieldwork was conducted in two CF sites to examine the impact of the regulations on communities. The findings show that the regulations place a hefty burden not only on the communities but also on government officials tasked with enforcing them. Additionally, the regulations actually facilitate illegal behaviour by both deterring legal logging and encouraging payment of bribes. The findings highlight the need for revising the regulatory framework to further enable communities to sustainably manage their forests.

Keywords: Nepal, community forestry, regulations, regulatory barriers, livelihoods

16.1 Introduction

The history of Nepal's forest policy development can be categorised in three major phases – feudalised forestry (before 1957), centralised forestry (1957–1976), and decentralised forestry (1976–present) (e.g. Sinha 2011). The failure of centralised forestry to check forest degradation and deforestation and the high cost of protection and monitoring forced the government to move toward decentralised management. Decentralisation and community forestry (CF) in Nepal are founded on several policies and laws (e.g. National Forestry Plan 1976, the Decentralization Act 1982, the Master Plan for the Forestry Sector 1989, Forest Act 1993, Forest Regulation 1995, and CF Guidelines 2009). Along with these legal instruments, community forestry (CF) policies and practices are also shaped by regular National CF Workshops (1987, 1993, 1998, 2004, 2008), Nepal's five-year development plans, and the strategies of donor agencies.

Nepal is arguably one of the leading lights for CF in Asia. Currently more than 1.6 million ha of forest are managed by 17 685 groups, involving roughly 35% of the country's population (DoF 2012). However, questions still exist on the true impact of CF in the country. Some query its economic, environmental (e.g. improvement in forest quality), and social (e.g. poverty alleviation) impacts, as demonstrated by the recent discussions on reforming the 1993 Forest Act, which is at the core of CF. Others, however, feel that CF in Nepal is working in an environment that

greatly restricts its ability to address fundamental issues at its core, including poverty reduction. The proposed amendment to the Forest Act in 2012 threw a dark shadow on CF in the country, proposing increased restrictions on timber harvesting and trade (the belief in some quarters is that the underlying motivation is to reassert government control over forests). The proposed amendment also reflects a different understanding of the aim of CF in Nepal.

Until the 1970s, forest-related income was the largest source of government revenue in Nepal, but currently its share of the national revenue is significantly reduced (Banjade et al. 2011, Sinha 2011) [(1)]. Nevertheless, on a social level, the importance of timber and non-timber forest products (NTFPs) should not be understated: forests are an important component of livelihoods based on subsistence agriculture practiced by a large share of the Nepali population (Rayamaji et al. 2012). Forest resources are essential on many levels: as a source of fuel, livestock feed, construction material, agricultural implements, and raw material for wood-based industries (Gautam 2009). Furthermore, Pokharel (2009) found that timber plays a key role in the income of some community-forest user groups (CFUGs), with a huge opportunity for CFUGs to increase their income through the sale of timber. However, Chhetri et al. (2012a) and Kanel and Dahal (2008) found that income of CFUGs is greatly dependent on the size of CF and the volume of trees.

There has, however, been a lack of consistency with regard to priorities in forest management policies, which has influenced the commitment of communities and other stakeholders to CF (Sinha 2011). In addition, the policy framework has partly disregarded the timber economy and its potential. And while a number of foreign-aid supported projects are active in forestry, they do not work directly on the timber economy (Sinha 2011) but rather place emphasis on gender and social inclusion, non-timber forest products (NTFPs), and biodiversity (Banjade et al. 2011).

It is argued that Nepal's forests policies, laws, and institutions are largely protection-oriented (Hill 1999, Edmonds 2002, Bampton and Cammaert 2007). This is particularly the case when it comes to community forestry, where the regulatory and instrumental framework appears to deliberately discourage timber harvesting and trade (e.g. Bampton and Cammaert 2007, Paudel et al. 2010, Banjade et al. 2011), favouring forest protection over rural development. The subsistence and protection orientation of CF is reflected in government reluctance to hand over the Terai forest in the southern lowlands of Nepal, which has valuable timber resources, and its strict regulatory control over timber harvesting and high royalties on timber rent (Sinha 2011). This is against a backdrop of harvesting levels that are significantly lower than their potential (MFSC 2009).

This scenario leads to the hypothesis that is the basis of this chapter: numerous regulations act as a prohibitive barrier that prevents local people from making a living from the forests in their vicinity. This chapter's premise is that SFM is based on forests being in the hands of nearby communities and that an enabling environment needs to be created to facilitate this, ensuring that they can sustainably use these forests to enhance their livelihoods.

The aim of this chapter is the identification and in-depth analysis of regulatory barriers in Nepal that affect communities who obtain their livelihoods from the sale of timber and timber products. Specifically, the study identifies existing formal (e.g. regulations) and informal (e.g. corruption, rent seeking) constraints to local communities exercising their rights regarding the commercialisation of timber, with resulting implications on community forest management. The work is based on an analysis of existing policies related to harvesting of timber and NTFPs, an expert workshop, and field data collected from two sites.

16.2 Material and methods

A literature review and an analysis of relevant policies and regulations were conducted to identify the regulatory environment in which the local communities and government officials operate. The legal and regulatory provisions of timber harvesting cover all areas of forest management, from creating the management plan to the sale of timber.

Following the analysis of existing policies, an experts' workshop was held in Kathmandu with 13 experts from the Department of Forests, Federation of Community Forestry Users Nepal (FECOFUN), and the Association of Timber Traders. The principal aims of the workshop, as well as the fieldwork, were to explore the implications of the regulatory framework in which the communities operate with regard to management and sale of timber resources.

Focus group discussions (FGDs) and semi-structured interviews with key stakeholders were held in two CFUGs – Jhimjhimia (192.65 ha of CF, 560 households) and Rajapani (141.50 ha, 315 households). A total of 12 stakeholders were interviewed, including forest officers and guards (government em-

[(1)] Currently about 4500 wood-based enterprises have invested more than Nepali Rupee (NPR) 12 billion (about USD 130 million) in these industries, providing employment to more than 150 000 persons (personal communication with chairperson of Federation of Forest-Based Industry and Trade Nepal).

ployees), community leaders, traders, and contractors. In addition, five focus group discussions (FGDs) were organised, attended by 41 persons representing the executive committee of the CFUGs and members from both CFUGs.

16.3 Results

A brief examination of each step along the timber harvesting chain describes the regulatory requirements facing the communities, including implications in terms of cost and other resource requirements. The results presented below are based on the policy analysis, while the implications of barriers are based on the experts' workshop, FGDs, and semi-structured interviews.

16.3.1 Forest operation plan

With the intention of improving forest management, which is a common theme for all steps, the state requires each CFUG to prepare its own forest-management plan (community-forest operational plan – OP), in accordance with the Forest Act 1993 (Article 25) and Forest Regulations 1995 (Rule 28), to guide and regulate forest-management activities. While the CFUG is charged with preparing the OP, in practice it needs support from technicians, often from the District Forest Office (DFO).

The OP is the backbone of community forest management, which provides details of forest condition and suggests management interventions. The OP contains detailed information regarding 1) the forest itself, including history, area, map, type, aspects, species inventory, biodiversity, major forest products, growing stock, and annual growth rate; 2) management prescriptions, for example, management objectives, systems to be followed in areas such as selection, and improvement felling; and 3) annual harvesting schedule and level. To help communities prepare the OP, the government developed a community-forest inventory guideline (2004) that provides methodologically and statistically robust step-wise actions and procedural suggestions for CFUGs and relevant state officials such as forest technicians and rangers.

Implications: There is an acute shortage of resources (financial, human, and technical) to prepare the OP. An added challenge stems from insufficient scientific knowledge and ability of forest technicians to understand the dynamics of forest ecosystems and forest ecosystem-human interfaces needed to draft the OP. Therefore, in many cases the OP is incomplete. Additionally, the non-participatory nature of the process restricts stakeholder consultation, resulting in the exclusion of local people's knowledge and the perspectives of minority groups, including women, in the OP.

The estimated costs for a CFUG to draft the OP includes human resources equivalent to 100 person days and a monetary cost of roughly 30 000 Nepali Rupee (NPR) (318USD[(2)]) depending on the forest area. If there were no extra regulatory burdens, the normal time required would be 60 person days (considering a forest ranger, one forest guard and two assistants from the CFUG working together).

16.3.2 Harvesting regulations

The OP is fundamental to the community's ability to harvest timber. There is no specific governmental policy measure to regulate timber harvesting in the CF. However, Forest Regulation 1995 (Rule 32) states that the CFUG can harvest timber in the CF on the basis of an approved OP. Therefore, the CFUGs that plan to harvest and sell the timber include the procedures and technical requirements for harvesting in the OP with the support from forest technicians.

Implications: The interviews, FGDs, and expert workshop again highlighted the numerous challenges facing communities in meeting the requirements for harvesting (as stipulated in the OP). One of the key challenges is related to the capacity of government officials as well as the local communities. An additional major constraint, as expressed by CFUG members, is the cost and time needed to complete the paperwork and submit it to the DFO – the office is often far from the community forest and the necessary staff person is frequently unavailable.

The FGD discussion in the Jhimjhimia CFUG reported paying NPR 7850 (83.2USD[(2)]) for technical assistance from the DFO. Additionally, costs for meeting all obligations, as set out in the regulations in terms of time, were calculated at 24 trips, totalling 49 person days of CFUG members, and a cost of NPR 20 000 (212USD) (the DFO is roughly 50 km from the CF).

Another important observation reported from both case studies is that the CFUGs are often allowed to harvest only dead, dying, and diseased trees from the CF. As one CFUG member noted, "Acquiring permits from the DFO for timber collection and selling is not easy. On top of that, instruction is issued for the collection of only dried and moribund trees, most of which appear to be of very low economic value."

[(2)] Exchange rate of 1NPR to 0.01USD is used (June 2013)

The expert workshop also highlighted the uncertainty and unpredictability regarding timber harvesting. The government frequently changes its policies, usually through a ministerial-level decision, circulars, and orders. In line with the national policy discourses oriented towards promoting NTFPs, environmental services, and, more recently, forest carbon, several key decisions have been geared towards regulating timber extraction in the past two decades. For example, the government banned tree felling for five years in 1999; imposed it again in mid-2010 in the Terai after media reporting of cases of illegal logging, and declared it again in 2011 as the year of a "timber holiday" in reference to the International Year of Forests. Similarly the government's controversial declaration for the Chure forest region[3] as a limited-use zone in 2010 restricted timber extraction only to dead and fallen trees (Banjade et al. 2011).

16.3.3 Processing of timber

Legally, the CFUGs can convert the logs into sawn timber before selling (Figure II 16.1). However, the establishment and operation of a sawmill requires prior approval from the DFO. The law (Forest Regulation 1995, Rule 32) states that sawmills should be located outside the forest (5 km away in Terai and 3 km away in other areas of the country). The logic behind this distance-based provision is to facilitate both control of illegal activities at the sawmills and monitoring. There are also numerous regulations regarding timber storage. The timber storage depots must have prior approval from the DFO (Guidelines 2002, Guide 10). Additionally regulations about timber grading have been recently introduced, based on quality, primarily to do with log diameter and percentage of extractable timber (GoN 2011).

Implications: The regulations on location of timber processing can be costly. The result is that the CFUG either sells the logs directly or uses hand-saws, negatively affecting income, quality of end product, and efficiency. The provisions related to sawmill establishment have been heavily criticised because of the impracticality of finding such locations. The research found that most sawmills are located in and around district headquarters, at the end of the road, or in the far south (near the Indian border). This has not only increased transportation costs in the timber value chain but also limited the opportunity to provide employment to local people. Additionally, it has reduced the benefits to the CFUGs since they are severely limited in their ability to sell sawn timber.

The DFOs often restrict the CFUGs to only one depot, mainly to minimise the chances of fire hazards and thefts and the costs involved in managing more depots; the more depots the higher the protection costs, as well as the additional resources required for monitoring. A further justification is that it increases transparency among CFUG members, counteracting illegal sale of timber by CFUG committee members that had previously been claimed. However, it has created problems for the CFUGs in distributing and selling timber to users, largely due to high costs of transporting timber.

The grading system for timber is hampered by the lack of technology and tools for determining timber defects and size, with technicians using their observations to determine the quality and, therefore, the value. One of the timber traders stated that "the grading system…is not practical. It provides the space for manipulation by the technicians and delays the timber trading process." On the other hand, the forest technicians argued that "grading has increased the workload of the technician unnecessarily and in principle it is the job of the market [i.e. the buyer] rather than the forest technician." One of the forest officers justified the grading system as being in place to "regulate revenue and maximise the benefits from timber sale. However, it has added workload only."

16.3.4 Transportation of timber

The transport contractor has to follow the CFUG's OP, Forest Regulations 1995 (e.g. Rule 35 regarding seeking permission from the DFO) and Guideline 2002 (e.g. Guide 16 that requires a transport permit and stamp of approval from DFO) while transporting the timber from the CFUG depot to the market.

Implications: Transporting timber from the depot to sawmills has many hurdles and complexities. One of the most problematic issues was paying bribes to various formal and informal institutions and individuals. Local gangs (locally known as *chundre-mundre*) typically harass timber-laden vehicles, demanding pay-offs. Forest officials and other government staff may also do spot inspections along the route. Given the subjectivity and inaccuracies in grading timber quality, there is a high probability for discrepancy between the formal documentation and the actual timber load, causing the buyer to shoulder any associated costs/fines or be charged with attempting to circumvent the government timber tax. To avoid these hassles, many timber buyers resort to paying-off check post officials beforehand.

A timber entrepreneur provides an example of

[3] The highly fragile hill range of Nepal forming the northern border of the Terai, an area of plains stretching from the east to the west of Nepal.

Figure II 16.1 The Chaubas-Bhumlu sawmill is the first community operated timber processing unit in Nepal. It was established under the Nepal Australia Forestry Project and provides a good example of attempts to commercialise timber production from pine plantations which had been established by local communities since 1975. However, research on the value chain of this enterprise highlights the effects of regulatory barriers on operational difficulties and subsequent economic performance of this mill (Timsina 2005). ©Smriti Mallapaty

the frustration with the regulations regarding timber transportation and trading: "It is very difficult to gather all documents required to buy and transport the timber both from government-managed and community forests. It requires visiting the range post and district forest office more than 10 times for a single purchase….Also I was not sure whether forestry measurements are accurate or the forest technician manipulated the measurements. Each technician gives different results of measurements of the same quantity of timber. I need to pay them informally for their technical support, facilitation, and monitoring and measurement. In the last few years, there are more hurdles created by *chundre-mundre* as they stop the loaded vehicle and ask for money…donations. Traders also need to distribute money at each police and forest check post. My estimation is that we spend about 30% of the timber price on such informal malpractices. In my view, timber trade can only be carried out by those who have muscle and money."

16.3.5 Selling of timber

CFUGs are legally allowed to sell timber (quantity specified in the OP) both within and outside the CFUG in accordance with their OP. When selling timber, CFUGs must give first priority to the group members, then outside the CFUG (within the district), and then what remains can be sold outside the district.

Timber sold to members – For selling within the CFUG, once the timber is in the depot, the CFUG informs the DFO by submitting details of the harvested timber and gets consent to sell the timber to its members. Once the DFO gives its consent, the executive committee posts a notice in a public place or through other suitable means to inform users so they can place their orders.

In recent years, CFUGs have offered special or differentiated prices according to a well-being ranking of its members. For example, the Jhimjhimia CFUG has three categories of users, namely A (wealthier), B (medium), and C (poorer). The rate of timber has been fixed at NPR 250 (2.6USD), 200 (2.1USD) and 150 (1.6USD) per ft^3 ($1m^3 = 35.3ft^3/1ft^3 = 0.028m^3$)

for category A, B, and C respectively. Some CFUGs provide a quantity of timber to the extremely poor members free of cost (as stated in the OP of Jhimjhimia CFUG). This differentiation was introduced to address the issue that internal timber sales were mostly benefiting wealthier members of the CFUGs.

Once the timber is sold, a monitoring committee monitors whether the users have used timber for their own and stated purposes. The CFUGs also make provisions to control the misuse of timber. For instance, both of the CFUGs studied stipulated that users cannot take the timber to the sawmill for sawing, resell the timber, and transport it outside the group boundary.

Timber sold within the district – The CFUG should submit the record of distributed timber to CFUG members and get consent from the DFO to sell the remaining timber outside the group. FGD participants emphasised that it is not easy to get such permission. The CFUG is required to submit requests to the DFO for approval, with documents such as the CFUG executive committee decision, record of timber to be sold, and the recommendation of the appropriate office (Range Post and Ilaka Forest Office and then DFO). Once the CFUG gets permission, it publically posts seven days' notice with the description of timber to be sold. The Interested users from the same district can buy timber from the CFUG at the government rate. In such cases, CFUGs put conditions that prove the timber purchasers are citizens of the district and require a recommendation letter from the DFO and/or the Village Development Committee with the application. The fieldwork found that very few people from the district bought timber despite the huge timber demand in the district. For example, only seven people bought timber from Jhimjhimia CF in 2011. The reasons include, first, that the notice is too short and that most people do not know about it and second, that it is hard to prepare and submit the necessary documents in time.

Timber sale outside the district – If CFUGs have surplus timber after selling to members and within the district, they can sell outside the district through a tender process followed in accordance to the government's Financial Procedures Act 1999, which is elaborated in the Forest Product (timber/fuelwood) Collection and Sale/Distribution Guideline – 2002. For this, CFUGs need to submit a record of timber sold outside the group (within the district) and get consent from the DFO. CFUGs submit an application to DFO for such permission, including relevant documents (e.g. decision by the executive committee, description of the timber/logs to be sold, and the recommendation of the range post and Ilaka forest office). Once the CFUG gets permission from the DFO to sell the timber, it puts an announcement in local newspapers with a description of the timber to be sold (21 days after announcement). The firms (contractors, sawmills, furniture factories) who have a license can collect an auction form from the office of the respective CFUG. The firms are required to submit a copy of the license, proof of tax clearance, proof of deposit of an amount equivalent to 10% of total minimum tender price set by the CFUG, and the completed form mentioning the amount of timber the firm wishes to purchase.

Implications: The policy intent, legal framework, and institutional practice clearly favour subsistence use of forest products within the group. Despite these intents, the demand for exhaustive documents and detailed procedure has substantially increased the transaction cost of the communities even for household use of timber. However, the procedural hassles and demand for detailed documents have particularly discouraged CFUGs to sell timber outside of the group, from which they could to increase the CFUG fund size to be able to meet the demand for investment in community development activities, including road construction, support to education and health facilities, etc. in the village.

The sale of timber outside the district is a complex and difficult process. First, the CFUGs are compelled to sell the timber at a lower price because the contractors form informal syndicates in the tender process, with coercion sometimes being used. Second, there is uncertainty that the contractor will pay the tendered price of timber and collect timber on time. Often contractors do not collect timber and CFUGs have to go through a re-tendering process. Third, a representative of the local government and DFO office are required to be present during the time of tender in order to increase transparency and legitimacy. The CFUG has to pay for their participation. All of these processes increase CFUG transaction costs and make the timber-selling process tedious.

The cost to the CFUG for selling the timber is estimated at 18 person days and costs of NPR 12 000 (127USD). This includes payment to invitees during the tender process and to the local newspaper for publishing the notice.

Table II 16.1 presents a breakdown of the costs along the timber value for sal (*Shorea robusta*), a highly valued timber species, for the Jhimjhimia CFUG. In this case the community gets NPR 1200 (12.7USD) per cubic feet for the auction of their standing timber, which is sold in Kathmandu at a price of NPR 4300–4500 per cubic feet (sawn timber) (USD 1610.1–1683.8 per m^3). The difference in value reflects various costs, as well as the profit of the middlemen. The income from the sale of standing timber must cover the costs of forest management as well as fees and costs for meeting regulations prior to harvesting (e.g. approval of management plan). If the regulations were reformed, it would likely reduce the informal cost and costs along the value chain. The

Table II 16.1 Costs along timber value chain for sal (*Shorea robusta*) for the Jhimjhimia (CFUG).*

Different cost elements along timber value chain		Cost (NPR per ft³)	Cost (USD per m³)
Timber auction by CFUG		1200	448.31
Costs borne by middleman	Income tax	204	77.66
	Value added tax (VAT)	156	56.48
	Forest Development Fund	5	1.765
	Cost of harvesting, logging, and depot	165	61.775
	Transportation	100	38.83
	Load/unload	50	17.65
	'Informal' costs (payment to local gangs, officials)	250	91.78
	Conversion loss 40% (most of which is sold as firewood)	1134	423.60
	Total costs along value chain (total) borne by middleman	3264	1217.9
Price of sawn timber in Kathmandu		4300–4500	1610.1–1683.8
Profit of middleman		1036–1236	392.2–465.9

* Jhimjhimia is roughly 300 km from Kathmandu by highway.

high price is not only due to costs of meeting the legal requirements but also to rent-seeking behaviour of officials and local gangs and disproportionate profits sought by traders (induced by uncertainty of price and timber supply).

16.4 Discussion

The aim of this chapter is to identify the regulatory barriers to communities in Nepal who obtain their livelihoods from the sale of timber and timber products. This is in the context of the positive outcomes of community forestry in Nepal, such as rehabilitation of degraded forests (Yadav et al. 2003, Gautam et al. 2003), positive impacts on livelihoods (Kanel and Niraula 2004), and strengthened local institutions and democratic resources governance (Pokharel et al. 2007). Set against this a regulatory environment that hinders progress towards SFM.

The conclusions from the fieldwork and experts' workshop were that the costs are more discouraging than prohibitive. The relatively high cost of harvesting and sale has discouraged groups from selling timber in the market, and consequently, they are selling it within the group for a lower price. This has ultimately reduced CFUG timber revenue, with impacts on, for example, poverty alleviation. However, one must also consider the positive social implications of selling the timber within the community at a reduced price, including making it available for free to the poorest members of the community. Despite this discouragement, in 2009–2010 CF accounted for nearly 27% of timber sold within the country (outside CFUGs), with CFUGs paying USD 0.77 million in taxes and USD 0.94 million in VAT on the sales (DoF 2010). The feeling from the workshop and fieldwork was that this is only a small share of CF's potential on a national level and, more importantly, on a local level.

Generally speaking, forest regulations exist to ensure that forests and forest resources are managed in a sustainable manner. The following two quotes from the FGD highlight the different interpretations of this in the context of CF in Nepal.

A forest officer: "*If all the required procedures for timber harvesting and sale are not followed strictly by the CFUGs, there might be negligence on the part of CFUG in harvesting the timber and therefore overharvesting may occur. Similarly, there would be a higher chance of misuse of timber and the financial resources gained from timber sale by a few CFUG leaders. So it is necessary to follow the regulatory processes with strong monitoring.*"

Chairperson of one of the CFUGs studied: "*The lengthy and complex regulatory provisions and bureaucratic process, particularly related to the timber harvesting, are control-oriented and it has been too costly (financially and psychologically) for us. It should be revised to be supportive and facilitative and the processes also need to be shortened and simplified. Our demand is simply to allow us to work as per the approved OP with very minimal bureaucratic monitoring. Also, we should be allowed to get the required timber-related technical support from the private sector when we do not get these from DFO.*"

An example of the potential that forests in Nepal have is provided by the research of Chand and Ghimire (2007) in the Hile Jaljale CFUG (242 households, 118 ha of forests) where timber valued at approximately USD 200 000 can be sustainably harvested over a five-year period (an eightfold increase on the CFUG's earnings in the previous four years). Chand and Ghimire (2007) concluded that when CF has 1) supportive legal and policy framework, 2) clear forest management objectives, 3) appropriate capacity of local community and DFO, and 4) appropriate forest resources, then it is able to deliver on its potential, conclusions mirrored in the workshop and fieldwork. According to Oli (2003), the timber product market in Nepal is highly inefficient as a result of the low stumpage value, compounded by high transaction costs. Additional issues are related to capacity of the communities to take advantage of the resources at hand (Rai 2010). The CFUGs' lack financial resources, equipment/technology, and skills to meet regulations and access the market (Macqueen 2010). Therefore it is difficult for communities to meet legal requirements for formulating plans for management, harvesting, transporting, processing, and selling timber. The situation is further compounded by the poor capacity of government officials to implement the regulations, thus creating additional costs for the local communities to harvest timber.

The government's attempt to make revenue through taxation and fees poses additional constraints to CFUGs (Springate-Baginski and Blaikie 2003), with implications further down the supply chain, such as for sawmill owners (Kelly and Aryal 2007). In China, for example, the state has introduced various incentives and reduced the tax burden on farmers to facilitate an increase in their incomes, under the concept that the social and environmental benefits override the benefits from direct government income (Guangcui et al. 2012). A policy analysis by Banjade and colleagues (2011) found that forest policy discourses in Nepal have been dominated by (in descending order) issues of biodiversity, environmental services, NTFPs, soil conservation, protected areas, leasehold forestry, and governance (including gender mainstreaming), with little coverage dedicated to timber-related issues. This is reflected by the fact that forest management received only 3% of the Ministry of Forest and Soil Conservation's expenditures in the fiscal year 2009–2010 (Banjade et al. 2011). On the other hand, NTFPs have been presented as the main economic resource from the forests. Despite their relatively small economic contribution, NTFPs have been greatly emphasized in policy documents, development plans, political manifestos, and everyday public discourse as compared to timber (Banjade et al. 2011). A media analysis of news coverage in 2010 showed that timber-related issues have a high level of negative coverage in national news (Banjade et al. 2011, Khatri et al. 2012). This negative coverage has been used to rationalise even tighter regulatory and institutional requirements on communities for harvesting and selling timber.

Although CF is seen to play a key role in meeting Millennium Development Goals (e.g. Upadhyay 2005, Bampton and Cammaert 2007), this research shows that CF is not meeting its potential. It is ironic that despite the established evidence that timber is the primary forest product that can substantially contribute to CFUG income, the regulatory and institutional barriers around timber harvesting and sale largely discourage timber management and reinforce existing wealth and caste-based social inequities (Chhetri et al. 2012b). These barriers and the resulting high transaction costs limit the potential of timber in achieving Millennium Development Goals. The challenge grows with the informal barriers such as corruption and elite capture that are also a serious issue in CF in Nepal (e.g. Iversen et al. 2006, Thoms 2008), as well as low prioritisation given to poverty alleviation in some CFUGs. For example, in Rupandehi district, where the two CFUGs studied in this work are located, CFUGs spent 3.28% of their income on targeted poverty-alleviation programs (Bampton and Cammaert 2007), though indirect benefits such as funds allocated for community projects should be acknowledged. Nevertheless, research by Pandit (2012) found that timber's contribution to poverty reduction is less than that of NTFPs, with the benefit-sharing mechanisms in CFUGs tending to favour the richer over the poorer members of the community.

Nepal is a member of both the UN-REDD Programme (since October 2009) and the Forest Carbon Partnership Facility. The potential of receiving monetary compensation for carbon sequestration in community forests will increase the value of these forests. There is strong concern that the development of REDD+ (Reducing Emissions from Deforestation and Forest Degradation and conservation, sustainable management of forests, and enhancement of forest carbon stocks) will result in recentralisation of forest decision-making and may impose further regulations, limiting communities' options for timber harvesting (RECOFTC 2011, Patel et al. 2013).

FLEGT (Forest Law Enforcement, Governance, and Trade) elicits the same concern (Wiersum and Elands 2012).

16.5 Conclusions and recommendations

The actions of a state should benefit its citizens; however, too often the state's powers fail to achieve the beneficial policy objectives for the public and the outcomes that they seek to incentivize through regulations. A common problem with regulations is the tendency to assume that more detailed and prescriptive regulations lead to better outcomes than regulations that leave too much discretion in the hands of both the local regulators and those who are subject to regulation. However, experiences in the forestry sector have indicated that regulations often lead to opposite outcomes than those desired, and, conversely, significantly disadvantage those most dependent upon (and interested in) the sustainable management of forests. The costs in terms of time and money for communities and government officials to meet the regulations and the issue of capacity are significant problems that need to be addressed.

Recommendations

The starting point should be investment in the capacity of the communities as well as relevant government officials on the ground – for example, to make certain that the OPs are developed that ensure the sustainability of forest management, including appropriate business plans. This should be done regardless of whether the regulations are revised.

CF policies and legal provisions must more explicitly embrace the wider policy priority of the government of Nepal to reduce poverty through forest management. The keystone of SFM is that forests be utilised for the benefit of those living in and around them and not closed off. This must be based on ensuring that the policy formulation process is inclusive and transparent, thereby helping to develop regulations that are fit for purpose and are not cumbersome or prohibitively expensive. This includes revisiting regulations from the formulation of the OP (Forest Act 1993: Article 25; Forest Regulations 1995: Rule 28, and addressing the challenges for meeting the requirements set out in the regulations) all the way to the selling of timber (Forest Product Collection and Sale/Distribution Guideline, 2002, and the impacts this has economically and socially for the community). The revision of these regulations should be driven by the understanding that the regulatory provisions must be simplified, moving away from using regulations (i.e. prescriptive regulations) as a method to achieve SFM and focus more on appropriate incentives (i.e. outcome-based regulations) that encourage communities and smallholders to sustainably manage the forests.

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Transformative mediation, a tool for maximising the positives out of forest conflict: A case study from Kanchanaburi, Thailand

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Abstract: Transforming conflict is a key component of sustainable forest management. Transformative conflict mediation is an approach to transforming conflict that aims not only to resolve the conflict but also to foster long-term relationships and cooperation. This study explores how application of mediation contributed to conflict transformation. A case study from the village of Teen Tok in Kanchanaburi Province, Thailand, looks at the links and impact of mediation on 1) policies, institutions and governance; 2) livelihoods capacities and cultural and socio-economic aspects; and 3) the natural resource base. This chapter is based on two research projects conducted in 2009 and 2012. The data was collected through interviews, focus group discussions, an expert workshop, and literature review. Results show that third-party mediation played a crucial role in transforming prolonged conflict between national park officials and local people as well as in reconciling conservation and livelihood objectives. The study also found that the commitment and trust of the parties, the participatory nature of the process, and changes in forest-related policy and legislation have been critical factors in the success of the mediation and in management of national parks. Revisiting and improving the laws related to management of protected areas are important to ensure local people's participation and secure the rights of local communities living within and adjacent to national parks. To improve the capacity of mediators, this study also suggests investment in appropriate capacity-development activities.

Keywords: Forest conflict, conflict transformation, mediation, protected area, national park, joint management, capacity development

17.1 Introduction

Forest-related conflicts are a global phenomenon (e.g. de Koning et al. 2008, Mola-Yudego and Gritten 2010). The pervasive nature of these conflicts accentuates the need to find effective approaches for addressing them (Gritten et al. 2009). Conflict transformation is a key component of sustainable forest management that elicits positive impacts, including the encouragement of collective action (Yasmi et al. 2010, 2011). Conflict transformation, as an objective and conflict-management approach, sees conflict not as a negative situation that needs to be stopped but as an opportunity and catalyst for positive social change (Augsberger 1992, Reimann 2004).

Conflict transformation suggests that conflict as a social phenomenon is not only about people's struggle for their interests, rights, views, and power but also about crisis in peoples' interactions with each another. Hence, one of the primary focuses of conflict transformation is to address the negative interaction between conflicting parties and create a suitable en-

vironment for fostering long-term relationships and cooperation (Bush and Folger 2005).

A number of approaches are used by actors to transform conflict, including negotiation, mediation, arbitration, adjudication, and coercion (Engel and Korf 2005, Yasmi et al. 2010). Among others, the focus of this work is on the use of mediation and its potential for conflict transformation. It is based on the premise that mediation, as a process in which a third party helps the conflicting parties in resolving the conflict without imposing a solution (Engel and Korf 2005), is considered an effective tool not only for resolving conflict (e.g. Bercovitch and Gartner 2006, Yasmi et al. 2010) but also for transforming social relationships and building peace (Porter and Bagshaw 2009).

Mediation becomes important especially when the negotiations among conflicting parties have failed and/or one of the parties has refused to take part in the negotiation process (Yasmi et al. 2010). The failure of negotiation is understandable because a protracted destructive conflict often generates mistrust, fear, hostility, and other emotions that deter actors from taking part. A mediator, as the third party, is tasked with helping transform this hostile relationship and find new, attractive options for both parties that seem attainable. Consequently, a reality-grounded transformation, where the positives are emphasised, becomes more viable (Kriesberg 2011).

There are different views in the literature about what the most important goal in the mediation process is. For example, Bush and Folger (2005) contrast transformative mediation with problem-solving mediation. While the latter aims mainly to end the conflict and come up with a mutually acceptable agreement, transformative mediation aims deeper, including long-term changes in people and the quality of their relationships, emphasising empowerment and recognition (i.e. mutual understanding, respect) in the mediation process (Augsberger 1992, Bush and Folger 2005):

1. Transforming attitudes. The focus on a change in perceptions of the conflict parties would be based on a commitment to view each other in a spirit of goodwill and mutual respect.
2. Transforming behaviour. Parties would focus on collaborative behaviour – including the area of communication – and commitment to mutually beneficial actions.
3. Transforming conflict. Parties, by attempting to remove incompatibilities, would be able to pursue mutual gains.

This case study is based on a research project conducted in 2009 (Thaworn et al. 2010, Yasmi et al. 2010) and follow-up research in 2012. The 2009 study found that mediation was a key component in successfully resolving forest conflicts, underlining its great potential as a powerful conflict-transformation tool. The authors returned to the same case study site in 2012 to further explore how the mediation was applied and how it transformed the conflict. The 2009 research focused on the analysis of the conflict with respect to the causes, impact, and management, while the 2012 research focused on the process of mediation, including the aims, the role of the mediator, the process of mediation, the method, and the outcome of the mediation with regard to conflict transformation.

This case study examines transformative mediation as a tool in conflict transformation in Thailand. It looks at the issues that contributed to the success of the mediation: from the transformative mediation point of view, evidence of the success is in the interactional shift of the parties from destructive and demonising to positive and humanising (Bush and Folger 2005). Furthermore, it looks at the impact of mediation on 1) policies, institutions, and governance; 2) livelihoods, capacities, and cultural and socio-economic aspects; and 3) the natural resource base, illustrating the impact of mediation in terms of conflict transformation. The study also identifies conditions that enable transformation to take place.

17.2 Conflict in the village of Teen Tok, Kanchanaburi

17.2.1 Roots of the conflict

In Thailand, as with many countries in South-Eastern Asia, forest policy and governance is based on the premise that the state knows best, as reflected in the top-down nature of decision-making and the role and methods of the state forest institutions (Lebel et al. 2004). Since the early 1960s, forest policy in Thailand has focused on forest conservation, mainly in response to widespread deforestation (ICEM 2003, Thaworn et al. 2010). Legislation regarding protected forest areas originates from that time and manifests increasing state control over the country's peripheral areas.

Key forestry legislation, in this context, is the National Park Act (1961) that aims to protect forest areas within a park's boundary by keeping them in natural conditions. This act strictly forbids anyone to settle, extract, or have any economic activity in a national park, including subsistence and land-based livelihood activities (Government of Thailand 1961, Thaworn et al. 2010). Following the enactment of the National Park Act, official designation and demarcation of protected areas began to increase rapidly, especially in the 1980s, by which time the nation's forests had already substantially degraded and frag-

mented (ICEM 2003). The establishment of national parks and the logging ban in natural forests (in 1988) were mainly responses to domestic pressures to halt deforestation. The government of Thailand, however, defined and classified forest areas into various categories such as reserved forests, national parks (NPs), and wildlife sanctuaries, often without prior consultation with local communities and surveys in the field (Delang 2002, Santasombat 2004). This led to a great deal of mismanagement (Delang 2002) and a large number of conflicts in the nation's increasingly pressurised forests (Thaworn et al. 2010).

The case of the village of Teen Tok in Kanchanaburi Province, is an example of these conflicts. One of the indirect causes of the conflict there is that the village falls geographically within two protected areas: Chalerm Rattanakosin National Park and Sri Nakarin Dam National Park, established in 1980 and 1981 respectively. Following the establishment of these NPs, any extraction of forest resources (such as wood, bamboo shoots, animals, fruits, and flowers), possession of land, and any subsistence and land-based livelihoods within the NPs are strictly prohibited. Consequently, livelihood activities such as farming, and hunting and settlements of local villagers who have been living in the area for more than 250 years are considered illegal.

The NP officials strictly enforce this exclusionary law by prohibiting any livelihood activities in the area. The NP officers also have authority to arrest and press charges against non-compliant villagers. The result has been increased frustration and a sense of pressure among the villagers, as well as tension between the parties. From 1981 to2005, NP officers arrested many villagers, mainly because of their agricultural activities and extraction of forest resources in the area overlapping the NPs. In line with Karen[1] tradition, the villagers practice rotational farming, sometimes cutting down trees to use the land for growing crops. As punishment, "violators" were fined, brought to trial, or had their lands confiscated.

This created an environment of fear, anxiety, and resistance in the community. Similar emotions were felt by the NP officials, who were obliged to enforce the law. The villagers were often hostile towards the NP officers, who felt insecure while passing through the village in performance of their work (patrolling). The conflict inevitably escalated during this period, peaking in 1998–1999 when NP officers arrested people for levelling land to build a house. A number of villagers reacted by surrounding the officers and detaining them for half a day without food and water.

17.2.2 Legal change creates space for local participation

The new Thai constitution (1997) includes a clause requiring a more comprehensive approach to park establishment, stipulating that local communities shall be consulted and have the right to participate in the management and sustainable use of natural resources. In addition, in 1998 the government passed a cabinet resolution that allows local communities who lived in the area before the establishment of the NP to remain in the area but prohibits further expansion. These two provisions have changed the rights of local communities, enabling them to stay on the land that they have been living on for generations and to participate in forest management, which had been inhibited by the 1961 act.

Responding to the new legal provisions (i.e. 1997 Constitution, 1998 Cabinet Resolution) and driven by the frequent incidents of conflict and aspiration for more local community participation, the government undertook projects to encourage participation of local communities. In 2001, the government initiated a project called Community Participation in National Park Management (CPNPM) Pilot Project in six protected areas in Thailand, including the Chalerm Rattanakosin NP. During this project, NP authorities tried to clarify the boundaries and draw up rules and regulations for the allocation and use of land. Because this was done by NP officials without active participation of local communities and due to the prevailing conflict, the NP boundaries, rules, and regulations were poorly known and poorly accepted by local communities. In 2005, Chalerm Rattanakosin NP ran another participation project called the Sustainable National Park Management through Participatory Process (SNPMPP).

In terms of conflict transformation, these participatory approaches were not fully successful until a national NGO, Seub Nakhasathien Foundation (SNF), as a third party, helped to mediate the conflict and open a path for reconciliation and co-management of the NP. The SNF started working in the area in 2004 under Joint Management of Protected Area (JoMPA) in the Western Forest Complex project funded by Danida, Denmark's development cooperation agency. The overall aim of the project is to con-

[1] Karen, often categorised as "hill tribe" or "upland people," is an ethnic minority group who settle in the forests of the highland area from the north down to the west of Thailand. Karen farm households have traditionally relied on swidden agriculture. Their traditional farming system has been described as subsistence-oriented, with households growing rice for their own consumption and to feed their livestock (e.g. Walker 2001, Hares 2009, Tripaqsa 2009).

serve biodiversity and ecosystems of protected areas through joint management between NPs and local communities. Additionally, the project assists communities to live in harmony with the forest, clarify boundaries, and agree about land use. The JoMPA project has been aligned with the SNPMPP project in terms of conducting joint activities and working with almost the same committees of local people.

17.3 Material and methods

17.3.1 Description of the site

The village of Teen Tok is located in Srisawat District, Kanchanaburi Province, Thailand. The village is approximately 140 kilometers from the city of Kanchanaburi and is inhabited by 1161 people (353 households). Karen Pwo is the largest ethnic group in this area, but only a small percentage of the population, mostly migrants from other parts of Thailand, belongs to a Thai ethnic group. The village encompasses five sub-villages: Teen Tok, Baeng Cha Ko, Ban Klang, Sa Waeng Ba, and Pu Klong.

Most of the villagers are farmers who principally use rotational farming to cultivate rain-fed rice for their daily consumption. Many also practice permanent monocrop farming of vegetables and fruit crops, mainly to generate income through sales in the market.

17.3.2 Data collection and analysis

Different methods were employed to understand the perceptions and experiences of the conflict and mediation process at the case study site. The data was primarily collected in 2012 through 51 semi-structured interviews, three focus group discussions (FGD) involving 26 people, an expert workshop, field observations, and review of relevant documents and literature. As mentioned earlier, the data gathered during the earlier research conducted in 2009 was incorporated to strengthen the study.

The case study employed a qualitative research approach, which provides flexibility and gives more attention to detail and richness of the data. The interviews and FGD participants were selected using non-probability sampling. This allows the researcher to choose specific key informants who can provide and explore particular needed and relevant information for the research. This method was also used because the aim was not to achieve statistical generalisation but rather to gain deeper understanding of the social processes related to the study (Robson 2002). To ensure representativeness, as much as possible, participants were selected to represent a diversity of conflict stakeholders in terms of social status, gender, and livelihoods, as well as their linkage to the conflict in question. They included the head of village of Teen Tok, representatives of local villagers from each of five sub-villages, the sub-district headman, Tambon Administration Organization (TAO) officials, officers from both Chalerm Rattanakoshin and Sri Nakarin NPs, SNF officers (the mediator), members of the Park Advisory Committee (PAC) and some officers of the local unit of the Department of National Parks, Wildlife, and Plant Conservation (DNP), and members of the women's weaving group. The interviews and FGDs were recorded both electronically and manually (notes) and transcribed for further analysis.

To facilitate data analysis, researchers prepared key themes (codes) prior to going to the field, which was based on the literature review and researchers' previous works on conflict management (which also provided good understanding about the context of the case), as well as taking into account the analytical framework provided in the Part I of this book. These themes served as a template for analysing the data. Intensive reflections and discussions among researchers were conducted during and after fieldwork to provide more understanding of the findings, including the patterns, timeline, relationships, and similarities and differences among stakeholder groups.

17.4 Results

17.4.1 The mediation

During the JoMPA project, which started in 2004, the SNF facilitated mediation between the NPs and local communities as a part of the project. SNF considered the conflict as a barrier for the communities and NPs to work together to conserve the forest. Most community members also felt that conflict had affected their livelihoods negatively.

The mediation process has been long and complex (Figure II 17.1). For simplicity, the process can be categorised into eight steps:

Social preparation

It took about a year for the SNF field officer to do the social preparation for the JoMPA project. The objective was to get to know the parties, build relations, and understand the culture and issues that might arise. Part of the process was for SNF to enter the conflict site and to make direct contact with villagers and NP officials. Approaching the leaders, particularly the formal and informal leaders in the village and sub-villages, was considered a critical step for facilitating SNF's work. The

leaders also helped disseminate information about the project to village members.

One of the SNF's strategies to build relations with the community was to conduct activities that promoted alternative livelihoods, including organising study tours for village representatives to see examples of alternative livelihoods activities of communities in other provinces.

Analysis of conflict

The conflict analysis was conducted concurrently with social preparation, which included preliminary identification of main actors, history of the conflict, and the issues, positions, and interests of both parties.

Clarification of issues and generation of options for solution

An SNF staff member who resided in the village was invited to a villagers' monthly meeting to introduce and talk about the JoMPA project. About 100 villagers and some NP officials attended. In this meeting, the conflicting parties also shared their concerns, issues, problems, and opinions. To ensure understanding, this meeting was held mostly in the Karen language.

SNF also facilitated several dialogues (such as separate and joint negotiations, "shuttle diplomacy") between parties, to discuss and clarify their interests and the needs, and problems facing the parties as well as to identify and build consensus on the most important issues to be addressed in the mediation process.

Some of the options agreed upon during several meetings included conducting boundary demarcation, setting rules and regulations related to forest use and management, and improving livelihoods. These results were synthesised and discussed within SNF to develop strategies and the work plan.

Information to stakeholders about strategies and the work plan

In coordination with the NPs, the SNF organised a formal meeting to re-introduce the objective, the action plan, and target of the JoMPA project, presented by the SNF director. Villagers and representatives from the two NPs attended the meeting. SNF attempted to highlight the areas in which the conflicting parties have similarities, including the willingness to resolve the conflict and work together in conserving the forest.

Land-use classification survey and boundary demarcation

As one of the ways to resolve the contested boundary and land-use, the mediator facilitated discussion on the land-use survey, zoning (e.g. conservation area, agricultural area, and settlement area), and boundary demarcation. The mediator first helped the parties establish land demarcation committees (LDCs) in each sub-village (comprised of sub-village leaders and members working together with NP officials) to demarcate the lands.

To support this process, the SNF provided a one-day training on GPS and mapping. One of the aims of the training was to empower villagers to talk the same language as the officials, especially regarding mapping. Training also enabled the parties to meet, talk, and discuss the problem together.

During the process of boundary demarcation, the LDCs walked with village leaders, representatives of both NPs, and the mediator to define the boundaries. Discussions and negotiations on boundaries sometimes occurred in this process between the villagers and NP officials.

The results from the land-use survey and land demarcation were then discussed and preliminarily approved among the committees and NP representatives. The mediator then processed these results to make a computerised map and present it to the parties for review. These maps were also posted in front of the house of the head of the Teen Tok village so villagers could see and check the maps. Concurrently with the data collection process, the SNF lobbied the director general of DNP to approve the results of the survey and boundary demarcation.

Establishment of rules and regulations on land and forest utilisation

While in the process of finalising the map, the dialogue on rules and regulations (R&R) on use of land and forest resources was conducted. The mediator invited the community and facilitated a dialogue to discuss and set the R&R, which were built on the old R&R developed during the participatory promotion projects by the NPs in previous years. The R&R were finally agreed upon through voting mechanisms in a village meeting.

Promotion of alternative livelihoods

The promotion of livelihood activities (such as organic farming, poultry, traditional fabric weaving, plant nursery, natural product processing) were conducted to improve the economic conditions and reduce dependency of local people on forest resources. These activities indirectly reduced the tensions between local communities and NPs as the local communities gradually reduced their reliance on forest resources as the main source of their livelihoods.

Implementation and monitoring

At this stage, the results (agreements) from the facilitated dialogue were implemented, particularly the implementation of R&R about forest utilisation, land use, and boundaries.

The Chalerm Rattanakosin NP also established

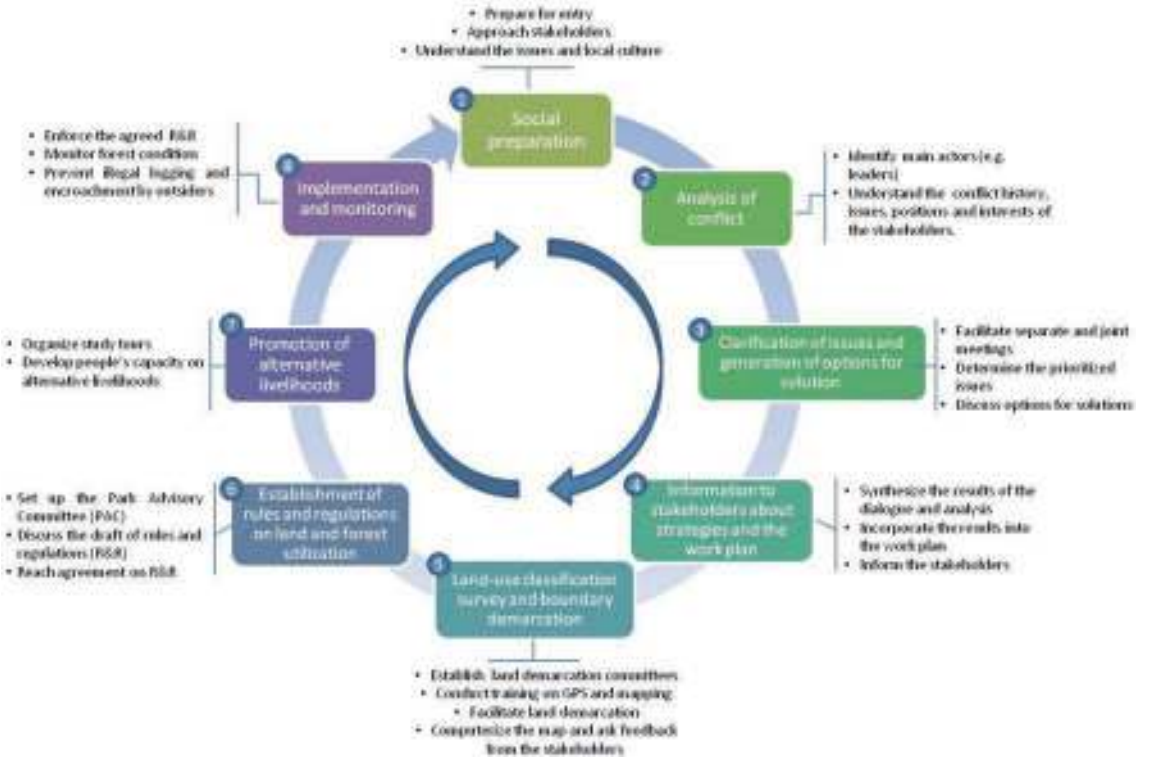

Figure II 17.1 The process of mediation in the village of Teen Tok. Source: Fieldwork.

a Park Advisory Committee (PAC) to represent the multiple stakeholders and promote participatory NP management. The PAC consists of 26 members representing local government, community leaders, and local committees.

To ensure compliance with R&R, all conflicting parties, the mediator, and the PAC took part in the monitoring process. The PAC was also consulted if there were disputes in the field, such as, for example, on issues related to boundaries.

The mediators strived to get legal recognition and support of the agreements made by the parties (e.g. boundaries, land use) to ensure sustainability of the agreement and implementation. This has become the challenge for the mediator and the parties. Sometimes the parties still rely on the mediator to resolve conflict issues and problems between a local community and the NPs, which might become an issue if the mediator has to leave the area (for example, when the project ends).

17.4.2 Changes in policies, institutions, and governance

An indicator of policy changes as well as an important step in the mediation process is the implementation of a land-use survey, boundary demarcation, and mapping that were conducted in a participatory manner. The demarcation and mapping of the NPs, villagers' settlements, and agricultural areas imply change in the NP policy (i.e. NP authorities recognise the existence of local people in the NP area), and it is possible partly because of the promulgation of 1998 cabinet resolutions. This boundary demarcation was considered by both parties as one of the solutions to the contested boundaries causing the conflict.

Moreover, after the mediation, local communities' participation in forest conservation and management increased. In 2008, the villagers created a forest protection volunteer network that consists of more than 150 villagers and works together with NP officials for forest protection, forest-fire watch, and management.

Despite the success of the mediation, some problems still exist and could lead to future conflict if not addressed:

First, some boundaries are still contested by NPs and the local communities. For example, as a result of the boundary demarcation process, some villagers now have less land than before.

Second, the agreements have no legal standing in clarifying land rights. This is because the content of the agreement would contradict the law (NP Act 1961 strictly prohibit any settlement in NPs). In other words, there are still no legal provisions to secure tenure and legal rights to the land, although community settlement and livelihood activities are allowed based on 1998 cabinet resolution and unofficial agreement between communities and NPs. The

Table II 17.1 Changes in policies, institutions, and governance. Source: Interviews and FGDs.

Condition	Condition prior to conflict	Condition during conflict	Condition after conflict
Land tenure and rights to forests and trees	◆ The state owned the land and forest. ◆ The villagers were able to settle and use the land.	◆ The local people's rights were limited because of the establishment of NPs (NP Act 1961). ◆ Conflict ensued between statutory rights and customary rights.	◆ Based on the new legal provisions and agreements during mediation, local communities' rights to settle, use, and manage their lands were recognised, but not the right to own the lands.
Participation and stakeholder cooperation	◆ Local communities managed forests based on their own tradition and culture, but there was no cooperation among stakeholders.	◆ Top-down decision-making prevailed regarding forest management (i.e. establishment of NPs). ◆ Participation in forest management was disturbed by the conflict.	◆ Participation of local communities was strengthened through the mediation process and CPNPM pilot project.
Power and representation	◆ The state dominated in forest management. ◆ The state had absolute ownership and control of the land and forest. ◆ There was no representation of local communities in NP management.	◆ Local communities had less power after the establishment of NPs and were not consulted during establishment of NPs. Arrests were made.	◆ Communities' lack of power was addressed through empowerment and capacity development. ◆ Local communities were more involved in decision-making about land boundaries and rules and regulations in forest management. ◆ Representation of local communities and local government was established in the PAC.
Enforcement of laws and regulations	◆ Law was enforced in the area only partly (e.g. for combating illegal logging).	◆ After the establishment of NPs, the law was enforced strictly in the area. ◆ Conflict and resistance arose in response to enforcement of exclusionary laws, arrests, and related anxiety.	◆ The community and NP officers together set the rules and regulations, facilitated by the mediator. ◆ Compromises were agreed upon about enforcement of the law. ◆ Customary and statutory rules and regulation were reconciled.
Reconciliation of different land uses	◆ Different land uses were managed by local communities using traditional rules and regulations.	◆ Establishment of NPs resulted in exclusive land use for conservation purposes; other land uses were strictly prohibited.	◆ Zoning, mapping, and setting up the rules and regulations and institutions for land use were defined through a participatory process facilitated by the mediator.
Long-term societal commitment to sustainable forest management (SFM)	◆ View of SFM by government was apparently oblique. ◆ The local community was committed to protect/utilise the forest according to its tradition and culture.	◆ There were conflicting perceptions about the way local communities manage the forest, with some perceiving it as destructive to forests.	◆ After mediation, NPs and local communities had mutual understanding and were more committed to cooperation to achieve SFM.
Influences of regional/global processes	◆ Disastrous floods and mudslides hit Thailand (1988), with deforestation considered to be the cause. ◆ Logging ban and establishment of NPs were mainly responses to domestic pressures to halt deforestation.	◆ The hill tribes, particularly because of their rotational farming practices, were often blamed for deforestation. ◆ Attention to human rights increased.	◆ Donors and NGOs urged active participation of local communities in forest management, including in protected areas.

Figure II 17.2 As a result of conflict mediation villagers can obtain more benefits from the forest by collecting NTFPs, e.g. Bamboo shoots, for their own use or for sale. © Ahmad Dhiaulhaq

villagers are concerned and realise that this process is not enough to secure their rights and tenure; they have urged the government to approve the outcomes of the process.

Third, both parties are concerned about changes in the NP leadership because any such changes could cause policy changes, and the new officials could have a different understanding of and attitude towards the problems and agreements made.

The main impacts of the mediation process on the policies, institutions, and governance at the local level are presented in Table II 17.1.

17.4.3 Changes in livelihoods, capacities, and cultural and socio-economic aspects

In the past, the people in the village of Teen Tok relied heavily on forest resources for sustaining their lives, mainly collection of forest products (timber and non-timber forest products – NTFPs) and the use of mountain water for agriculture. Forest management was based on local culture and nature-related beliefs (the Karen culture), including different rituals and traditional rules and regulations related to the use of forest, land, and water. Livelihoods were traditionally based on rotation farming, involving slash-and-burn practices.

After the establishment of NPs, villagers' access to forest resources and their forest based-livelihoods as well as agriculture were prohibited, affecting their economic situation and food security. As a result, conflict arose between NP officials and local communities.

As a result of mediation, conflict has been significantly reduced and the relationship between the parties improved. The village leaders can also communicate directly with the NP superintendent to discuss any issues. This improved relationship, coupled with clarification of NP boundaries and rules and regulations, has reduced villagers' insecurity regarding agricultural and other livelihood activities.

In general, most of the interviewed villagers said that since de-escalation of the conflict, their quality of life has improved, especially their economic situation, because of their ability to use the land for agriculture and other income-generating activities without disruption. Villagers are now more confident in investing in agricultural activities, so that they can, for example, grow crops throughout the year, resulting in a more stable and secure income. Moreover, based on the agreements during mediation, villagers can get more benefits from the forest by collecting NTFPs for their daily needs (Figure II 17.2.).

The positive developments are also felt by the NP officials, particularly the increased feeling of security when performing their work to conserve the forest and improved relations with local villagers. For example, the rangers now can patrol and go through the village without fear. They not only visit the village but also talk and stop for lunch in a villager's house. The improved atmosphere is illustrated by the fact that some NP rangers have married villagers.

Table II 17.2 Changes in livelihoods, capacities, and cultural and socio-economic aspects. Source: Interviews and FGDs

Condition	Conditions prior to conflict	Condition during the conflict	Condition after the conflict
Contribution of forests and forest resources and services to livelihoods	◆ Local people were strongly dependent on forest resources for food, fodder and other uses.	◆ Access to and extraction of forest resources was restricted by the law.	◆ People were less dependent on forest resources. ◆ Subsistence use of forest resources, such as collection of NTFPs, was allowed ◆ Agriculture has become the main source of income, and alternative options have increased resilience.
Commercial opportunities, linkages to markets – value chains	◆ Agriculture and forest-resource extraction were only to fulfil daily consumption. ◆ Local people did not produce a large variety of products for sale.	◆ With development and due to increasing economic needs, local people tended to grow cash crops for sale, to generate more income. ◆ Establishment of NPs restricted their agricultural activities.	◆ Agricultural activities were more secure and stable. ◆ People had a variety of products. ◆ Transportation and access to and from the village was recently improved by the government, making it easier to access the market.
Technical, managerial, leadership	◆ Capacity development activities were provided, mostly for protected area staff. ◆ Local people inherited knowledge from their ancestors. ◆ There was no formal capacity development for local people.	◆ NPs provide capacity development on forest conservation. ◆ The mediator provided capacity development about alternative livelihoods, mapping, and GPS.	◆ The capacity of both the local community and NP officers was improved. ◆ Trainings, meetings, and study tours resulted in continuous learning and knowledge exchange.
Access to capital	◆ The local communities relied mostly on natural capital.	◆ More recently, there was an increased need for financial capital for developing agriculture and for children's education. ◆ Conflict caused problems affecting people's socio-economic situation.	◆ The mediator provided some support for alternative livelihood activities. ◆ The local community now had small-scale savings groups. ◆ There were more funds from the government and increased trust from the bank with regard to getting credit.
Security and conflict	◆ The level of competition for land and resources was low among local communities.	◆ Conflict increased, especially between NP officers and villagers.	◆ The conflict was reduced and was under the control of the parties.
Landscape or ecosystem management	◆ The landscape and ecosystem were managed traditionally, using local knowledge and customs.	◆ After the establishment of NP, the ecosystem approach was based on statutory law (i.e. NP Act 1961).	◆ The mediator empowered people relative to ecosystem and forest management. ◆ The landscape was managed with participation from the NP and local communities. ◆ Local and scientific knowledge were combined for landscape and ecosystem management.

The JoMPA project also provided alternative livelihood programs intended to reduce the reliance and pressure on forest resources. As a result, villagers have a greater variety of livelihood options. According to SNF, there are other unexpected, positive outcomes from these alternative livelihoods activities, such as the creation of a model that can be implemented in other places, showing how people can live sustainably and/or in harmony in the forest.

The SNF also supports the efforts of some local communities to practice agroforestry around their houses. The intention is to demonstrate that local communities can live and integrate with nature (i.e. the forest) and meet their needs locally, without put-

ting more pressure on the national park.

The main impacts of the mediation process on the livelihoods, capacities, and socio-economic aspects at the local level are presented in Table II 17.2.

17.4.4 Changes in the natural resource base

Thailand had lost almost half of its forest cover by the late 1960s, and by 1980 only 32% of the forest cover remained (ICEM 2003). While many factors were responsible for the deforestation, the government and the press often blamed the hill tribes, especially their rotational agriculture system (Delang 2002). During the interviews, some local people said that government and NP officials often misunderstood their traditional practices of rotational farming and their way of protecting the forest.

In this case, one of the roles taken by the mediator was to provide a platform for dialogue between the NP and local communities to promote mutual understanding about how they managed the forest as well as the needs and concerns of the two parties. After the mediation, local people are more aware about forest conservation and more involved in protecting and monitoring the condition of forest (e.g. through regular forest patrols to prevent illegal logging and forest encroachment), together with NP officials. The patrols by the local community, coordinated by the village head, have been conducted with or without NP officers.

As a result, both villagers and NP officers perceived that there were some improvements in forest quality, in terms of forest density and biodiversity (indicated by the increased number of wild animals such as tigers, birds, and elephants found in the forest). These perceived improvements have been mainly attributed to the compliance of R&R on forest utilisation: significant reduction of illegal logging (by both local villagers and outsiders), forest use, and hunting, which has been achieved through cooperation between NP officials and villagers.

Additionally, local people were less dependent on forest resources because they got more income from agriculture and other livelihood activities. Moreover, there were efforts to practice agroforestry and organic farming around villagers' houses, with the intention of demonstrating that it is possible to fulfil daily needs without putting more pressure on the NP.

The main impacts of the mediation process on the natural resource base at the local level are presented in Table II 17.3.

17.5 Discussion

The aim of this case study article was to examine conflict mediation as a tool for conflict transformation and to examine the issues that contributed to the success of the mediation as well as its impact on 1) policies, institutions, and governance; 2) livelihoods, capacities, and cultural and socio-economic aspects; and 3) the natural resource base. The case study has shown that third-party mediation played a crucial role in transforming prolonged conflict between NP officials and local people in the village of Teen Tok as well as in reconciling the conservation and livelihood objectives.

According to Augsberger (1992), there are at least three indicators of when a conflict is transformed, including positive changes in attitudes (e.g. mutual respect), behaviour (e.g. mutually beneficial actions), and conflict (e.g. pursuit of mutual gains). These changes have been observed as some of the outcomes of conflict mediation at the case study site. The mediation has changed the mistrust and hostile attitude and behaviour of both parties towards an atmosphere of mutual understanding and respect, as well as mutual commitment for long-term cooperation on forest conservation. In other words, the case study has shown that the outcome of mediation was more than ending the conflict and gaining mutual agreement. Additionally, the mediation has contributed significantly to improving the social, economic, and environmental conditions in the area.

The paper presents a unique case of the role of the mediators who are also project managers. One of the important roles of the mediators in this case was that they provided a platform for initiating a dialogue between the conflicting parties. In the past, attempts at negotiation had been unsuccessful and there were no channels for self-initiated dialogue between the parties. The mediation has opened the door for discussing many issues and problems and finding solutions together. This mediators' role was strengthened by their providing and managing other activities, such as alternative livelihoods and capacity development, as a part of the project. The alternative livelihood programs, for example, can be seen as an innovative approach for "expanding the pie" (creating more values and options) for the parties (Abramson 2004).

However, mediation is not the only reason the conflict at the case study site has been de-escalated and transformed. There are many factors, internal and external, that bolstered the success of the mediation process, such as changes in forest-related policy and legislation, commitment and trust of both parties to the mediation process, and the participatory nature of the mediation process. Without these, mediation might not have been a success.

The case study shows that both the mediation and

Table II 17.3 Changes to natural resource base. Source: Interviews and FGDs.

Condition	Condition prior to conflict	Condition during the conflict	Condition after the conflict
Extent and condition of forest resources	◆ Forest degradation was mainly because of legal and illegal logging and agricultural expansion.	◆ There were encroachments and illegal logging, mainly by outsiders.	◆ Condition of the forest was improved. People did not rely heavily on forest resources.
Trees outside forests, including agroforestry	◆ Local people traditionally grew a variety of trees around their houses (garden).	◆ Local people traditionally grew a variety of trees around their houses (garden).	◆ There was improvement and promotion of agroforestry and organic farming around houses, promoted by the mediator.

external conditions (e.g. forest policy, governance, rights, and tenure) affect each other. In particular, the study highlights the important link between the macro level (policy, governance at the national level) and micro level (implementation at the local level). For example, the agreement about whether local people can remain in the area would not have been possible without changes in the legal provisions (e.g. 1998 Cabinet Resolution) that allow local people to stay in the protected area. On the other hand, the mediation also helped with implementation of the new legal provisions at the local level by clarifying and reconciling the boundary of the NPs and community land and drawing up the mutually accepted rules and regulations. In other words, the case study shows that mediation has played an important role in ensuring that the forest-related policy made a real difference on the ground.

Our findings show that in addition to the intervention from the third-party mediator, another critical factor that led to the conflict's being successfully transformed was the participatory nature of the mediation process. The participatory process built the sense of belonging, trust, and commitment of the parties to the mediation process and outcomes. Some of the processes facilitated by the mediator, such as the boundary demarcation and drawing the R&R were before conducted by NP officials, but due to the lack of participation by the local communities, the results were not accepted or widely known by local villagers. Participatory and collaborative processes facilitated by the mediator produced different results. Both local people and NP officers can now accept the boundary demarcation because both parties were involved in each step of the process. This finding is in line with Engel (2011), who states that participatory and collaborative process in conflict management can help to develop trust and ensure inclusive solutions that are accommodated and accepted by all conflict stakeholders.

One of the key factors responsible for conflict in the village of Teen Tok was the lack of prior consultation, participation, and cooperation between NP officials and local people. Exclusionary and strict protection of protected areas has been increasing the competition over land and natural resources, which can increase conflicts (Hares 2009). In many cases, local communities who have lived in the area for generations regard the NP area as their rightful property and view the establishment of the NP as land grabbing and intrusion on their land; as such, they would struggle to defend their heritage. The involvement of local communities in the management of NPs has been proven to result in reduced incidences of conflicts (Andrew-Essien and Bisong 2009).

To prevent and transform conflicts within protected areas in the future, there is first a need to ensure that local people are consulted prior to the establishment of the NP (Yasmi et al. 2010) and to ensure that the surrounding communities are actively involved in the management and administration of their environment (Andrew-Essien and Bisong 2009). Third, clear tenure and rights of local people to land and forest resources should be secured (Yasmi et al. 2010). As long as government policies and regulations about rights and tenure of the local and forest-dependent people are unclear, the roots of conflict may not fully be withdrawn.

The case study also shows that the alternative livelihoods program promoted by the foundation, involving training for organic farming and traditional fabric weaving, can create new sources of livelihood and subsequently reduce local people's reliance on forest resources. In this regard, it is recommended that the government, especially NP managers, develop programs that can improve the economic situation of local communities by promoting and supporting alternative livelihood programs, which theoretically reduce pressures leading to conflict.

Flexibility in the mediation approach allows its

combination with participatory forest management/ conservation projects, and it does not have to be a single project conducted by a particular mediation organization (i.e. SNF is a conservation NGO, not a mediation organization). However, Yasmi et al. (2010) have found that mediation capacity and skills in Asia are weak and need to be strengthened through capacity-development activities (training) aimed at NGOs, the government, and community leaders to improve their capacity on mediation and conflict transformation, as well as community participation management.

Although the case study aims to be comprehensive, it has a number of limitations. First, the assessment of mediation impacts in conflict transformation has relied on qualitative data primarily gathered through interviews and FGD. Although it is scientifically valid and reliable, this study could be improved by conducting quantitative assessments of the economic and environmental impacts of mediation, for example, household income and the extent of forest area before and after the mediation. In addition, future research should also cover cases where mediation attempts have failed, looking for the reasons behind the failures.

17.6 Conclusions

The study shows that third-party mediation has the potential to play a crucial role in transforming forest conflict and reconciling conservation and livelihood objectives. The study highlights the vertical and horizontal interaction between forest policies, institutions, and governance, which can affect the process and results of conflict mediation in protected areas. The study also shows that mediation can be a medium for ensuring that these policies are implemented on the ground.

To ensure the sustainability of the results of the mediation, there is a strong aspiration from local communities for recognition and clarification of their rights and tenure. It is thus important that the government design a policy to address these aspirations. Revisiting and improving the laws related to the management of protected areas are important to ensure that they are compatible with the reality in the field and to make sure that there are no contradictions between different government provisions.

As expectations towards the roles and functions of forests in Thailand change and new actors emerge, it can be expected that mediation, and broader participatory approaches to forest management, such as community forestry, will gain in importance. One example of this is the renewed debate over the role of local people in improved forest management for protection from flooding. This is especially important in light of a changing climate and the challenges of resilience and adaptive capacity of the most vulnerable.

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Rehabilitation of degraded forest and woodland ecosystems in Ethiopia for sustenance of livelihoods and ecosystem services

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Abstract: Deforestation in the northern part of Ethiopia has occurred for the past three millennia, while deforestation in the southern part is a relatively recent phenomenon. Hence, the rehabilitation of the vast denuded forestlands and woodlands, which are a source of ecosystem services and livelihoods to local communities, is crucial and timely. Two case studies are presented: the use of exclosures in the Alaba District and the rehabilitation of areas invaded by the alien *Prosopis* species in the Afar region. The establishment of exclosures has brought dramatic biophysical changes within few years, resulting in a substantial increase in diversity of flora and fauna, reduced soil erosion, and soil amelioration. The rehabilitation intervention has also had a positive impact on the livelihoods of local people; providing access to fodder, construction materials, and income from cattle fattening and sale of wood and grass. However, there are policy ambiguities and institutional gaps in the administration of rehabilitated lands in the country. To sustain the rehabilitation endeavour at Alaba, quintessential elements are the establishment of clearly defined land-tenure and user-right systems, the enforcement of by-laws, equitable benefit sharing, and transfer of management power to local communities. In the case of extensive areas invaded by *Prosopis* in the Afar region, adverse impacts on dryland ecosystems and on socio-economic conditions of the pastoral communities are serious concerns. The restoration intervention approach − management through utilisation − has not only hindered the spread of *Prosopis* but also provided possibilities to generate substantial income for local people by their use of the existing *Prosopis* stands. However, the lack of a clear policy direction and institutional mandate coupled with technical and financial difficulties have constrained successful management of the *Prosopis* invasion in the Afar region. Decentralisation of *Prosopis* invasion management could be a promising means of institutionalising and scaling up popular participation.

Keywords: Deforestation, degradation, rehabilitation, exclosures, livelihoods, invasive alien species, *Prosopis*, Ethiopia

18.1 Introduction

18.1.1 Deforestation and forest degradation in Ethiopia

Deforestation and forest degradation in Ethiopia have a long history with a significant spatial variation. The northern half of the country has experienced cyclic deforestation and revegetation over the past three millennia, while deforestation in the southern half is a relatively recent phenomenon (Darbyshire et al. 2003, Nyssen et al. 2004, Dessie 2007). This spatial variability has been conditioned by factors such as population growth, emergence of intensive agriculture, expansion of urban areas, and trade (Darbyshire et al. 2003, Nyssen et al. 2004). Deforestation has intensified, including the major

southward expansion, since the 1950s (Dessie 2007, Bekele 2008). Estimates of deforestation rates range from 140 000–200 000 ha per year (Reusing 1998, FAO 2010), and at present only about 12.3 million ha (11% of the land area) of forest cover remains (FAO 2010).

Agricultural land expansion and high dependence on biomass energy are the two most important direct drivers of deforestation and forest degradation in Ethiopia (Reusing 1998, WBISP 2004, EDRI 2010). With the geometric increase in population, from 12 million in 1900 to 85 million in 2010, the proportional impact of agricultural land expansion on forest cover in the country has been obvious and significant (Dessie 2007, Lemenih et al. 2008). Unlike in many other parts of the world, the shift from area expansion towards agricultural intensification has not happened in Ethiopia, making deforestation not only a past process but also a likely phenomenon into the future. Between 2000 and 2008 alone, agricultural lands expanded by about 4 million ha, and 80% of these new agricultural lands came from conversion of forestlands, woodlands, and shrublands (Federal Democratic Republic of Ethiopia2010, Brown et al. 2010). In a business-as-usual growth path, demand for agricultural land is expected to increase from 15 million ha in 2008 to 34 million ha by 2030, most of which is expected to come from forested landscapes (EDRI 2010).

New threats for the forests of Ethiopia have also emerged, including land-grabbing, biological invasion, and climate change. Large-scale land leases (land-grabbing) to foreign and domestic investors in the agricultural sector are being promoted, particularly for the production of export crops and biofuels. Several recent policy frameworks, such as the Growth and Transformation Plan (MoFED 2010), strongly advocate large-scale intensification and commercialisation of agriculture (Lavers 2012). The total amount of land leased to investors between 2004 and 2008 was about 1.2 million ha, and it will likely increase to nearly 7 million ha by 2015 (Stebek 2011). The massive land acquisition in Ethiopia is causing the clearance of thousands of hectares of natural forests and woodlands in the western and southwestern part of the country (Lavers 2012). Various types of natural forests and woodlands, ranging from moist evergreen Afromontane forest in the southwest to wooded grasslands in the western part of the country, are being cleared and replaced by commercial agriculture (cf. Stebek 2011, Gobena 2010).

Invasive alien species are another major threat to the forests of Ethiopia. Some of the plant species introduced to the country have become invasive, taking over large areas of woodlands. *Prosopis juliflora* (Sw.) DC. (hereafter referred to as *Prosopis*) is prominent among these invasive species in Ethiopia. Climate change is the third emerging threat; it affects stability and productivity of forests and woodland dynamics in Ethiopia (Dale et al. 2001), the livelihoods of forest-dependent communities, and increased forest susceptibility to fires, pests, and diseases. Climate change may also increase the spread of invasive species (McNeely 2004) and can exacerbate degradation of forest/woodland ecosystems and the people depending on these ecosystems.

The large-scale deforestation and degradation of woodlands have had significant social, economic, and environmental consequences both at local and national levels. As a consequence of deforestation, there is an acute shortage of fuelwood, construction timber, and non-timber forest products (NTFPs) in addition to disrupted ecosystem functions (soil erosion, hydrological imbalance, loss of biodiversity, etc.). Moreover, deforestation coupled with poor forest-sector development has resulted in severe industrial wood shortages, causing the country to rely mostly on imported wood and wood products. At the same time, the invasion of alien species has resulted in the decline of agricultural and livestock productivity, increasing incidence of health problems for both livestock and humans (Zeraye 2008), and exacerbated biodiversity loss (Berhanu and Tesfaye 2006, Kebede 2009).

18.1.2 Forest and woodland rehabilitation in Ethiopia

Public recognition of the need for forest conservation and management in Ethiopia dates back to AD 14th and 15th centuries (Eshetu 2000). The historic forest development pathway in Ethiopia encompasses three main phases: deforestation phase, substitution phase (use of alternative materials such as dung and crop residue for energy and stone for construction), and restoration phase. Today, Ethiopia has entered a new period of restoration practices where large areas of degraded forestlands are put under rehabilitation, although deforestation has not been abated. Both deforestation and forest-restoration processes are juxtaposed, with strong spatial segregation. The lowlands and southwestern regions of the country that host large parts of the remaining forests are still subjected to deforestation (WBIS 2004, Tadesse 2007), while the northern half of the country where forests were lost long ago is experiencing significant level of recovery (Ritler 1997, Nyssen et al. 2009). Most northern highlands of Ethiopia now have more trees and woody biomass than 100 years ago, and this positive trend has also been observed in other parts of the country during the past three decades (Ritler 1997, Jagger et al. 2005, Lemenih 2010).

Forest rehabilitation in Ethiopia includes different types of strategies and actors. Various forms of agroforestry, reforestation/afforestation, area exclosure, and woodlot development are popular strategies of restoration observed today (Teketay et al. 2010). The main actors include governmental and non-governmental agencies and the private sector. Interestingly, the forest-management approaches have evolved for the better over time. Earlier approaches focused more on reforestation/afforestation and conservation through state-centred coercive and top-down approaches, whereas more recent approaches attempt to combine participatory and decentralised approaches that include engagement of NGOs and the private sector. The management approach has also shifted in recent decades from large block industrial plantations of the 1960s and 1970s to small-scale forest plantations in the form of woodlots integrated into agricultural landscapes (Lemenih 2010).

This chapter focuses on two case studies of local-level rehabilitation endeavours: rehabilitation of degraded lands using area exclosures and the management of an area invaded by an alien tree species. The aims were to evaluate the processes and impacts of forest rehabilitation on livelihoods and ecosystem services as well as to shed light on policies and institutional arrangements that enhance and/or hinder the success and sustainability of forest rehabilitation activities in Ethiopia. For this purpose, an extensive literature survey, brief field visits to the study areas and personal experiences of the authors were used to compile the relevant data.

18.2 Policies, institutions, and governance

The major policy related to rehabilitation of degraded forest ecosystems in the country includes the issuance of the Forestry Conservation, Development, and Utilization Proclamation No. 94/1994 and the subsequent development of the country's comprehensive forest policy called Forest Development, Conservation, and Utilization Policy in 2007. The main objective of this forest policy is "to meet the forest product demands of the society and increase the contribution of forest resources to the national economy through appropriate management." Other supportive policies, strategies, and programs include: the National Action Program to Combat Desertification (NAP 1997); the Rural and Agricultural Development Policy Strategies (2002); Productive Safety Net Program (PSNP) (2003); Ethiopian Program of Adaptation on Climate Change (EPACC); Sustainable Land Management Program (SLMP) (2008–2015); Climate-Resilient Green Economy, Phase 1 (CRGE) (2011–2030).

An important policy shift in the governance of forests in general and rehabilitated forest areas in particular have also taken place by shifting from the state-centred and coercive approach (Rahmato 1994) to a more participatory and community centred approach. Except in the management of natural forests, which is predominantly managed in the form of a participatory forest-management scheme, most forest rehabilitation projects are managed by communities that are organised into various forms of community-based organisations (CBOs). CBOs develop their own by-laws (community laws) that govern their participation in the management as well as benefit sharing from the proceeds of rehabilitation activities.

Furthermore, the decentralisation policy since 1991 has transferred the responsibilities for the forestland rehabilitation and management from the federal state to the regional states. However, at the regional level, different institutional arrangements have emerged over the past 10 years. In most regional states, the respective bureaus of agriculture are responsible for forestland rehabilitation. At the federal-level, the Ministry of Agriculture and Rural Development, under its Natural Resources Directorate, is responsible for guiding and coordinating overall forest rehabilitation operations in the country. However, there still remain significant institutional gaps in the administration of rehabilitated lands in the country. These can be seen at two levels: first is the general institutional (policy and organisational) gaps at the level of national and regional states, and second is at the community level, notably related to the enforcement of community by-laws. The fact that state policies do not offer provisions for the community's power of decision-making on the management and utilisation of the rehabilitated forest resources is recognised as a major hindrance for sustainability as well as scaling up of rehabilitation efforts. Despite the active engagement of the community in establishment and successful protection of rehabilitation areas, there is persistent interference from government agencies with their protection-oriented mentality.

Generally, land belongs to the state under the Ethiopian constitution. Ownership of rehabilitated forest areas still remains ambiguous. There is no legal transfer of land management and user rights to the community other than the de facto understanding that the community owns the land. In most cases, there is no clear definition of community, i.e. there is no well-defined community boundary, and it is not clear in all cases who are the persons responsible for managing forest rehabilitation areas. Moreover, there is ambiguity on whether the trees within rehabilitation areas belong to the community managing the area or to the government, and the community is uncertain whether and when the trees can be harvested for use and, if so, by whom (Nedesa et al. 2005). There is

also stringent restriction on movement and trade of forest products, particularly when the products are from native species.

There are no clear national policies and strategies for the management of invasive alien species in general and *Prosopis* invasion in particular in Ethiopia (Anagae et al. 2004). Prosopis invasion was, however, mainstreamed as a major ecosystem threat in the Afar National Regional State (ANRS) Forestry Action Plan in 1998, where proposals have been made for concerted efforts to halt its invasion and for the need for evidence-based knowledge to guide appropriate management decisions (Tigabu and Teketay 1998). Subsequently, *Prosopis* invasion has been recognised as an emerging threat to plant biodiversity in the Forest Resource Strategy, and Draft Ethiopian National Biodiversity Strategy and Action Plan (Anagae et al. 2004). Now, *Prosopis* is declared as one of the three major invasive plant species in the country (Mwangi and Swallow 2005). However, planting *Prosopis* is still recommended for combating desertification in the National Action Plan (Anagae et al. 2004), reflecting a lack of consistent policy directions, which is attributable to the dilemma about the merits of this species and its management. There is also no clear institutional mandate for the management of alien invasive plant species, which has resulted in a lack of proactive and successful restoration interventions (Anagae et al. 2004). In recent years, the draft regulation on *Prosopis* management was prepared with the assistance of NGOs active in the area – it is awaiting ratification by the ANRS Council. The regulation outlines strategies to prevent the further spread of *Prosopis* and the rehabilitation of invaded areas; it identifies institutions mandated to lead *Prosopis* management at different levels (Getachew 2008).

Control of invasive alien species is a concern for all citizens; thus several stakeholders, both governmental and non-governmental, are involved in the concerted efforts. Research institutes provide empirical evidence supporting management interventions while governmental and non-governmental organisations provide both technical and financial supports to boost the effort to control *Prosopis* invasions, at least in a pilot phase.

Global processes, such as the World Bank carbon financing scheme, Clean Development Mechanism (CDM), REDD+, Convention on Biological Diversity (CBD), Pastoralist Livelihood Initiative (PLI), and the Millennium Development Goals are instrumental in promoting policies and programs towards forest landscape restoration in the country. In addition, national policy, such as restoring post-civil-war areas and domestic environmental and development societies are driving forest-landscape restoration in Ethiopia, particularly in the northern parts of the country.

18.3 Case studies

18.3.1 Rehabilitation of degraded lands with area exclosure

Area exclosure refers to the practice of land management whereby livestock and humans are excluded from openly accessing an area that is characterised by severe degradation (Aerts et al. 2009). The purposes of exclusion of animals and humans are to prevent further degradation of the ecosystems, advance revegetation/forest regeneration, and restore the overall ecological conditions of the areas. Area exclosure is a passive form of restoration/rehabilitation, i.e. it is primarily a natural process and human inputs are limited to offering protection against interference. For this reason, some call it a zero-management strategy for rehabilitation. The zero management makes it also the cheapest method for rehabilitation of degraded areas. Nonetheless, in a few cases, exclosures are supplemented with enrichment plantings of native and/or exotic species as well as soil and water conservation measures to speed up the recovery processes (Birhane et al. 2004, 2006, Mengistu et al. 2005a, 2005b).

Site description

For this case study, the exclosure at Alaba District (AD) is used to illustrate the rehabilitation of degraded lands in Ethiopia. AD is situated within the Great Rift Valley of Ethiopia, about 310 km south of Addis Ababa and is located at N 7°17' and E 38°06' at altitudes ranging from 1554 to 2149 m (Figure II 18.1). The AD is located within the Bilate River watershed. The annual rainfall varies from 857 to 1085 mm, and the annual mean temperature varies from 17° to 20°C. The most dominant soil of the area is andosol (Orthic) (IPMS 2007).

Considering the prevailing climate, topography, and remnant vegetation, it is highly likely that much of AD was once covered with closed dry evergreen Afromontane forests (Friis et al. 2010). Moreover, it is thought that there was abundant wildlife in the area. The conversion of forests to crop fields and pasturelands has been carried out for a long period of time in the AD and this has reduced the present forest cover to about 7% (IPMS 2005). The extensive deforestation in the area coupled with the easily erodible nature of the soil has resulted in severe land degradation, and the site is dominated by numerous gullies dissecting the landscape.

The district is inhabited by 210 243 people, distributed among 73 peasant associations. Crop cultivation, livestock rearing, and apiculture are the main

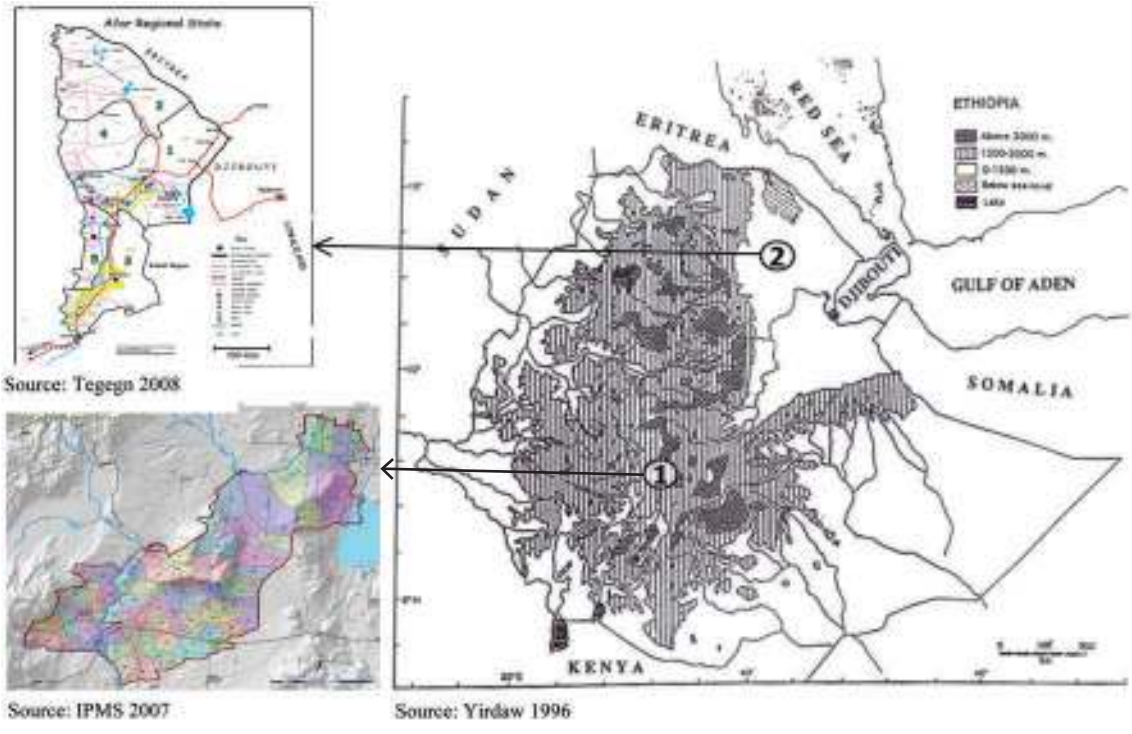

Figure II 18.1 Map of Ethiopia (right), Alaba District with 73 peasant associations (left bottom) and Afar Regional State (left top). The numbers indicate the case study sites: 1 = Alaba District, 2 = Afar Regional State. The yellow colour in the Afar Regional State map indicates areas invaded by *Prosopis*.

sources of livelihood. Maize, teff, wheat, pepper, haricot bean, sorghum, and millet are the principal agricultural crops produced in AD. In addition, livestock husbandry contributes substantially to the cash income of farm households. The forests, woodlands, and planted trees augment the livelihoods of local people by serving as a source of fuelwood, timber, and NTFPs. The livelihood sources in AD are reflected in the land-use patterns, i.e. about 76% of the land area is used for agriculture; of this, 69% is used for crop cultivation and 7% for grazing land (IPMS 2005).

Rehabilitation interventions

The initial step in the rehabilitation of denuded and degraded lands in AD was the establishment in 2009 of area exclosures on communal land by the Managing Environmental Resources to Enable Transitions (MERET) project funded by the World Food Program (WFP) and the District Office of Agriculture (DOA). The main objective of the exclosures was initially to rehabilitate/restore degraded lands previously covered by woodlands or forests for the purpose of obtaining carbon credits. WFP promised to support the endeavour financially but later withdrew from the project.

Nevertheless, the DOA pursued the task in collaboration with the district administration, surrounding Peasant Associations (PAs), local associations, particularly Energy Saving Stove Women's Association (ESWA), MERET, and some other NGOs (e.g. People in Needs, Live Voluntary International, LVI; Food for the Hungry International, FHI; and the Government Safety Net Project funded by WFP). The District Administration coordinated and mobilised the community through awareness-raising campaigns and discussions with elders and PA representatives, and it also identified households immediately surrounding the degraded sites. The DOA provided tree seedlings and grass tufts, technical advice, supervision, and networking, and it facilitated activities in the exclosures. MERET provided some incentives, for instance, wheat, as part of the food-for-work program for constructing soil and water conservation structures to reduce run-off (e.g. stone bunds, micro catchments, and tied ridges), and tree planting.

The exclosure sites were first selected by the DOA based on criteria such as extent and severity of land degradation and interest of local communities around the degraded sites. The degree of degradation was assessed on the basis of soil depth, past history of productivity, presence or absence of rock outcrops, and sensitivity to natural hazards (erosion and landslides). After site selection, rehabilitation measures at Alaba encompassed various activities, including reforestation, planting of grass tufts, building of soil erosion control structures, construction of micro catchments, and enrichment planting of

Figure II 18.2 Alaba site at the first year (left) and after four years of rehabilitation (right).
©Alaba Agricultural office

degraded areas with valuable species. These types of activities are described as major restoration interventions on degraded lands (Bongers and Tennigkeit 2010), with active involvement of various actors. The tree species planted include *Acacia saligna* (Labill.) H. L. Wendl., *Grevillea robusta* A. Cunn. ex R. Br., *Eucalyptus globulus* Labill., *Cordia africana* Lam., and *Casuarina equistifolia*. R. and G. Forster. Naturally regenerated native tree species include *Croton macrostachyus* Hochst. ex Delile, *C. africana*, *Olea europaea* L. subsp. *cuspidata* (Wall. ex G. Don) Cif., *Dodonaea anguistifolia* L.F., and different species of *Acacia*. *Pennistum purpureum* Schumach. (elephant grass), which is a perennial fast-growing species, and *Agave sisalana* Perrine ex Engelm. were also planted for soil stabilisation and reduction of soil erosion. The survival rate of the planted trees was about 60% (Alaba MoRAD 2012). Although, the national policy strongly supports the planting of native species in exclosures (Teketay et al. 2010), exotic trees and shrubs dominated in AD as they were considered fast growing and were expected to establish well on harsh sites.

The women's association, which was organised as ESWA, was responsible for the day-to-day management of the exclosure, while the PA is responsible for overall management. The women's association is accountable to the PA. ESWA has a total of 281 members, whose homes are located around the degraded land at Chorko village in AD. The association elected its executive committee, composed of 10 persons, which is mandated to set rules and regulations on management and exit and entry, impose penalty on offenders, and resolve conflicts that may arise in the protection and management of the exclosures. The association pays salary to a guard, who is accountable to the PA and ESWA and follows up on illegal tree cutting and encroachments. Initially, a total of 281 energy-saving stoves were distributed free of charge to members of this association as part of efforts to reduce fuelwood harvest from the remnant degraded woodlands. The association members residing close to the exclosures are allowed to harvest grass through the cut-and-carry system for their own livestock and to sell to local people at lower prices. Priority is given to members of the association to buy grass for livestock fodder at a lower price than the market price.

The women (ESWA members) participated in construction and maintenance of soil and water structures, tree planting, and tending of trees and grasses planted in the exclosure (Figure II 18.2). In total, the women worked 27 days per month on the exclosure site – for 17 days they were paid through food-for-work (3 kg wheat grain/day) and the remaining 10 days they worked for free. Their contributions included collecting stones and transporting soil and grasses from other areas for construction of soil-conservation structures. The contribution of local people was 30%, while 70% was from DOA, MERET, and NGOs (Figure II 18.2). To date, a total of 7600 ha of degraded areas were restored under participatory management of exclosures in AD within 17 PAs, of which Choroko exclosure accounted for 105 ha. At Choroko alone, a total of 28 km of long bunds and trenches and 78 000 micro catchments were constructed (Alaba MoRAD 2012).

Biophysical changes of post-rehabilitation interventions

The rehabilitation interventions have resulted in dramatic biophysical changes within few years. Tree planting, coupled with the natural regeneration of native woody species from the soil seed bank and seed rain, has resulted in the formation of a young secondary forest (Figure II 18.3). The open ground is fully covered by grasses and forbs. The wild fauna, such as warthog, rabbit, hyena, and various species of birds, have been observed in the enclosed area. In general, the diversity of flora and fauna has increased substantially compared to pre-rehabilitation intervention conditions. However, although the diversity

Figure II 18.3 Local people constructing physical soil conservation structures and planting trees and grasses on degraded land at Choroko, Alaba, southern Ethiopia. ©Alaba Agricultural office

of flora has increased significantly, it is still substantially lower in diversity vis-à-vis the natural forest that once thrived in the area. Water runoff and soil erosion have been reduced significantly, due mainly to increased vegetative cover and the physical soil conservation structures, while the soil nutrient status and soil physical properties are expected to be ameliorated, primarily, as a result of the increase in soil organic matter (cf. Mekuria et al. 2007). The micro-catchments as well as the stone and soil bunds capture water from the surface flow and increase soil water infiltration and the moisture available to the vegetation (Descheemaeker et al. 2006).

By and large, the local people expressed the opinion that the exclosures had increased grass cover, decreased soil erosion, and increased rainfall frequency following the regeneration of vegetation on the degraded lands. They particularly emphasised the benefits gained from reduced soil erosion on the lower slopes of the watersheds. Most of the observations of local people concerning the biophysical changes are in line with the scientific evidence.

Prior to the rehabilitation intervention at AD, the vegetation was very scanty or nearly absent; however, the above-ground biomass (particularly carbon sequestered by trees) and the soil carbon are expected to increase substantially after the intervention. According to Silver et al. (2000), tropical secondary forest succession sequesters a significant amount of carbon over a relatively short period of time. If the area exclosure is maintained for a longer period of time, secondary succession will advance to a mature forest with a closed canopy, which, in turn, will sequester more carbon in both above-ground biomass and in the soil. However, the lack of sufficient amount of propagules of the native woody species and highly degraded soils (by water erosion) may retard or arrest the succession process.

Socio-economic effects of the rehabilitation intervention

The rehabilitation intervention at AD has brought a positive change in the perception of the local people; from a pessimistic position at the beginning of the intervention to a more optimistic position at a later phase of implementation. At the start of the project, 20% of the local people agreed with the establishment of exclosures since degraded lands had no value, 20% agreed to establish exclosures on half of the degraded land and leave the other half for

Figure II 18.4 Exclosure as source of fodder, naturally grown grass (left) and planted elephant grass (right). Grass is harvested via cut-and-carry system for animal fattening scheme at Choroko, Alaba, southern Ethiopia. ©Alaba Agricultural office

free grazing, 20% accepted exclosures due to peer influence or just to respect the decision of local authorities, while the remaining 40% did not accept the idea due to restriction of free grazing in exclosures or fear of unforeseen situations (Office of Agriculture 2008). Later on, 95% of the local communities have developed a positive attitude towards establishment of exclosures after they benefited from collecting thatching grass, fodder for livestock, and construction wood either at low cost or free of charge (Office of Agriculture 2008).

The rehabilitation intervention has also had a positive impact on the livelihoods of local people. Several direct and indirect benefits from the exclosures were mentioned by the local community in AD. First, ESWA members were able to generate considerable income from selling of grass and fattened cattle and deposit savings in the association's bank account (ETB 30 000 or USD 1764). Some of the deposited money was used to buy oxen for fattening and for fodder harvested from the exclosure (Figure II 18.4). Second, the women were also obliged to save Ethiopian Birr (ETB) 20 (USD 1.1) per month from their monthly income earned through the food-for-work program. Third, priority was given to ESWA members to collect construction materials, thatching grass, and grass for livestock – after obtaining permission from the association committee and approval of the PA. But, free grazing was not allowed in order to avoid mortality of naturally regenerating indigenous woody species due to browsing and trampling (Teketay et al. 2010). Fourth, the community benefited from harvesting of planted eucalypt trees, with wood used for construction of schools, a health post and *kebele* (local administrative office). However, the collection of fuelwood has not yet materialised. Other studies in northern Ethiopia showed that farmers also value aesthetic and wildlife revival in exclosures (Birhane 2002).

Sustainability of area exclosures

The success of rehabilitation of degraded lands mainly depends on clear land tenure – well-defined and secure property rights for land and trees (Muys et al. 2006). The form of land-tenure arrangement that better suits a community to manage the exclosures and maintain equitable benefit-sharing among members is not clearly defined in Ethiopia (Nedessa et al. 2005). For example, studies in northern Ethiopia showed that the community strongly favoured private over communal or state ownership and divided the exclosure areas among private individuals. On the other hand, another study in the same region reported that farmers prefer community-(village-) level management system over private ownership (Mengistu et al. 2005a, 2005b). In AD, the preferences of the local people were not clear, but currently, exclosures are managed communally. To overcome problems of tenure insecurity, the AD Land Administration Department, together with the DOA, have already planned to offer a certificate of land-use rights for members of ESWA. Above all, the sense of ownership and equitable benefit sharing are keys to the sustainability of exclosures (Birhane 2002, Mengistu et al. 2005a, 2005b, Birhane et al. 2006).

Some of the factors that enhance sustainable use and conservation of the exclosures in AD include the growing sense of ownership, management by a local association, benefits generated from animal fattening, provisioning of thatch grass, improvements in community infrastructure, women's empowerment, growing tradition of saving money, and increasing respect of local by-laws. In general, the benefits people derive from exclosures are incentives that help to strengthen their support for rehabilitation of degraded forests and woodlands. A community's sense of ownership in AD may increase as it gains authority over direct use, participates in decision-

making, and establishes its own by-laws (Mengistu et al. 2005b). However, there are several factors that may challenge the sustainability of exclosures in AD, such as emergence of wild animal pests (e.g. warthogs and baboons) that destroy agricultural crops, absence of management plans, insecurity of land tenure, increase in youth unemployment and landlessness, inequity in benefit sharing (the bulk of direct benefits go to ESWA members) and encroachment of livestock (Office of Agriculture 2008).

By having the authority to penalise by-law offenders, local institutions, such as *sera* (a traditional institution that organises mutual help against a crisis or for work) in AD, can enforce the by-laws that regulate the use of exclosures. Similarly, in northern Ethiopia, local by-laws, such as *serit*, have been used to regulate and protect exclosures from trespassers (Birhane 2002). However, by-laws can be ineffective when they lack clear guidelines for their monitoring and focus on fining trespassers rather than improving productivity (Birhane et al. 2006). Moreover, there must be an institution that is mandated to enforce rules and regulations and implement by-laws. In AD, the protection of exclosures is mainly conducted by hired guards. Effective protection and sustainability of exclosures requires that the community take over the responsibility, either by sharing the responsibility among members, who take turns in guarding the exclosures, or by hiring guards.

Another important factor that may compromise the sustainability of exclosures is the lack of clear exit strategies for NGOs actively assisting the rehabilitation interventions and the associated risk of an aid-dependency syndrome. Moreover, there is weak linkage and partnership between the governmental institutions and NGOs with respect to information exchange and coordination of activities. Therefore, NGO interventions should provide adequate training for local people to help themselves and promote strong collaboration with governmental institutions and communities.

Precautionary measures are also essential in order to reduce the overdependence of local people on food-for-work programs and to ensure sustainable management of exclosures. This requires building capacity via training on, among other topics, entrepreneur skills of the locals to add value to products from exclosures – while maintaining the viability of biological resources. Moreover, there is also a need to create off-farm income-generation activities, in particular for youths and the landless section of the community to avert the threats of encroachment on exclosures. It is also essential to address cross-cutting issues such as improving health services, family planning, and education to directly or indirectly reduce the pressure on rehabilitated sites.

18.3.2 Management of areas invaded by alien species

Site description

This case study concerns management of the *Prosopis* invasion in the Afar National Regional State (ANRS), which is a large lowland expanse in the northeastern part of Ethiopia located between N 8°51'–14°34' and E 39°47'–42°24'. The altitude ranges from 144 m below sea level to 2870 m above sea level. The area receives 27 to 110 mm average monthly rainfall during the main rainy season in July–August and about 70 mm monthly mean rainfall from February to April. The mean annual temperature varies between 34°C and 40–47°C (National meteorological service agency 2002). The soil is poorly developed and varies, depending on topography and climate, from alluvial fans and salt marshes to valley incisions caused by the Awash River and its tributaries (Mohr 1971). The region is unique in terms of its ecology – as it supports a variety of endemic flora and fauna – and socio-economic and cultural values (Ensermu et al. 1992, Berihun 2001, Hailu et al. 2004). It hosts several wildlife reserves (such as Yangudi-Rasa National Park and Awash National Park) and is a globally recognised site of the cradle of humankind, where the oldest human ancestors were unearthed. The area supports the livelihoods of pastoralists, with a relatively high livestock population, and provides agricultural lands for conventional and mechanised agriculture, salt mining, and ecotourism.

Prosopis, which is native to South America and the Caribbean, is the major alien invasive species in the ANRS. Available evidence suggests that *Prosopis* was introduced to Ethiopia in the late 1970s from India by the Ministry of Agriculture as a promising multipurpose species for use in land rehabilitation programs (Hailu et al. 2004). The species was planted over large areas in southeastern and southern Ethiopia, particularly during the period from 1986 to 1988. However, soon after its introduction, *Prosopis* proliferated and emerged as an aggressive and invasive species. Today, the total area invaded by *Prosopis* is estimated at 700 000 ha in the ANRS alone (Ryan 2011); severe invasions have been observed in Dubti, Mile, Gewane, Buremoditu, and Amibara; moderate invasions in Logya, Hadar, Dulecha, and Awash; and recent invasions in Yallo and Dalifagae Districts (Dubale 2008). Invasion of *Prosopis* is viewed both as a menace and an opportunity in Ethiopia (Yibekale 2012, Zeraye 2008) and elsewhere in the Horn of Africa (Mwangi and Swallow 2005, Laxén 2007). The invasion has resulted in a decline in agricultural and livestock productivity as well as an increase in incidence of health problems for both livestock and humans (Zeraye 2008), exacerbated biodiversity

loss caused by displacement of indigenous flora, loss of habitat for wild fauna, and blockage of water sources and walking trails (Berhanu and Tesfaye 2006, Kebede 2009). On the other hand, the local communities have already started benefitting from the use of *Prosopis* thickets for various purposes (Zareye 2008).

Management interventions

Several attempts to reclaim land invaded by *Prosopis* have been made. The first pilot management interventions were initiated in 2004 by FARM Africa, an international NGO in collaboration with the local communities and ANRS. The salient features of the restoration interventions were 1) establishment of cooperatives to clear invaded areas and their conversion into crop and pasturelands; 2) processing of *Prosopis* pods and seeds for livestock feed, thereby reducing the propagule load and its subsequent regeneration; 3) introduction of efficient production and processing techniques and access to sustainable markets for charcoal and fuelwood obtained from *Prosopis*; and 4) community mobilisation to uproot seedlings emerging in newly invaded areas (Getachew 2008). To test the pilot management interventions, four cooperatives, made up of 179 members, were established in Amibara (Serkamo and Sedhafagae) and Gewane (Gelaladura and Beida) Districts that have experienced severe invasion.

In the case study area, the main actors are ANRS, the local administration bodies, traditional community leaders, cooperatives, and technical support groups (NGOs). ANRS controls all decision-making power concerning the management of the *Prosopis* invasion, including licensing of cooperatives, regulation of cooperatives' activities, and taxation. All cooperatives have their own by-laws, which outline their activities, including cutting trees at least 10 cm belowground (Hailu et al. 2004), controlling coppicing, marking the boundaries of the operational areas of each cooperative, protecting indigenous tree species, prioritising pasturelands and croplands for clearing, and restoring cleared land.

Biophysical changes after rehabilitation interventions

Prosopis thickets create an oasis within the arid environment through amelioration of the microclimate, improving soil fertility through nitrogen fixation, combating desertification, and restoring denuded and salinity-affected areas (Wakie et al. 2012). But its rampant spread warrants control measures. The management intervention has brought considerable change in the landscape and the semi-arid ecosystem functions. The four cooperatives managed to clear 406 ha of invaded land and convert it into other land-use types. In these areas, cooperatives cleared *Prosopis* and cultivated forage, food crops, and cash crops. Additional benefits from the rehabilitation interventions include reduced chance of secondary invasion of lands cleared and cultivated; reduction in illegal charcoal production, since people involved in illegal charcoal making work under the cooperatives' supervision; and recovery of indigenous trees, shrubs, and grasses in *Prosopis*-cleared lands.

Socio-economic effects of the interventions

The management interventions have also brought considerable livelihood benefits (Dubale 2006). For instance, the four cooperatives managed to clear 406 ha of invaded land and generated a net profit of USD 300 075 from the sale of 195 949 sacks of charcoal within a year. The intervention had also created 233 509 man-days per year of labour opportunities for daily labourers, equivalent to USD 218 221 of income. Similarly, cooperatives involved in processing and marketing of *Prosopis* pods and seeds generated considerable income. For instance, the Sedhafagae Cooperative alone generated a net profit of USD 5850 from processing and marketing crushed pods and seeds as supplementary animal feed in 2007 (Getachew 2008). In areas where Pastoral Livelihood Initiative (PLI) projects have been launched, cooperatives generated income amounting to USD 675 to USD 1270 from the sale of vegetables and sesame grown on reclaimed land in one cropping season. There is good market opportunity for cooperatives involved in processing of animal feed and producing charcoal from *Prosopis*. The cooperatives are linked to animal-feed processing factories as major market outlets for crushed and milled pods and seeds. Local markets have also emerged where cooperatives buy pods from local people, process them, and sell them back to local livestock keepers. One of the active cooperatives engaged in pod crushing (Sedhafagae) processed and sold 10 000 kg of pods to local and government institutes (Getachew 2008). Similarly, cooperatives engaged in charcoal production are linked with wholesalers in major cities along the Addis Ababa-Djibouti highway. Generally, the favourable market opportunities are an incentive for popular participation in managing the *Prosopis* invasion since financial incentives are a key factor for the success of proactive restoration measures.

Sustainability of managing alien species invasion

Although the pilot interventions to manage the invasion of alien species provide empirical evidence about the importance of managing *Prosopis* invasion through its use (Hailu et al. 2004) to improve the livelihoods of the Afar pastoral community and recover indigenous species, the approach is not free from limitations (Dubale 2006, Getachew 2008). Some of the major limitations include the failure to abide by the by-laws and the inability to enforce them; lack of communication and coordination among different government bodies (e.g. forest guards) and traditional leaders, as well as among cooperatives engaged in charcoal marketing; low level of participation of cooperative members in decision-making; lack of transparency in the marketing and accounting systems; and the propensity of the regional government, through its Pastoral, Agricultural, and Rural Development Bureau, to control the activities of the cooperatives.

Despite the lack of clear policies for managing invasive alien species, positive developments have been observed both in research and restoration interventions. On the research front, biological properties that promote the species invasiveness and control measures and its ecological and socioeconomic impacts (both positive and negative) have been documented (Hailu et al. 2004, Berhanu and Tesfaye 2006, Zeraye 2008). The policy barrier for the management of the *Prosopis* invasion can be addressed through decentralised management. Decentralisation, a process through which powers, responsibilities, and resources are 'transferred by the central state to lower territorial entities and locally elected bodies, enhances use and management efficiency and equity and reduces conflicts over natural resources (Ribot 2009). It also contributes to poverty reduction through improving access to forest products for consumption and trading (Cavendish 2000, Larson 2005) and fosters good governance at the local level (Ribot 2004).

The challenges for decentralisation of the management of the *Prosopis* invasion in Afar region are analysed below in terms of resource sharing, empowerment, transparency, and accountability, which are the main tenets of decentralisation. Here, decentralisation of management is conceived as the transfer of authority and management functions related to the existing *Prosopis* stands from ANRS (the highest administrative body) to local pastoral communities. The first step in any decentralisation process is sufficient knowledge of the resource base, since the key aim of decentralisation is to transfer resources to the local administrative entities. Setting clear boundaries in common-pool resource management schemes is also essential to minimise conflicts over limited resources (Wily 2002). The case study in ANRS clearly shows lack of clear demarcation of the operational areas of the different cooperatives, and some cooperatives even moved outside their districts, thus, creating conflicts between cooperatives and residents. Furthermore, a realistic land-use plan detailing areas to be cleared off *Prosopis* invasion and subsequent management of cleared lands is lacking. Lack of clearly defined land-tenure rights also adds complexity into the transfer of resources, particularly the management of lands reclaimed from *Prosopis* invasion.

To meaningfully transfer power, first the power relation between the different actors should be mapped out and their responsibilities defined. In the case study area, ANRS retained all decision-making power over *Prosopis* management. The decision of ANRS to ban all cooperatives and individuals from producing and marketing charcoal is a particular example of the disenfranchisement of the poor rural populations from benefitting from the use of *Prosopis* stands to support their livelihoods, on one hand, and the efforts to control the spread of the *Prosopis* invasion on the other. The cooperatives simply attend meetings and assist in decision-making without influencing the decisions – the so-called passive participation. The technical support groups have provided sufficient technical support and creation of awareness. Another important aspect of decentralisation is the level to which power and responsibility for resources are transferred. In principle, the cooperatives are the ones to whom the real decision-making power should be given. But, in reality, some degree of power over the management of the *Prosopis* invasion has been passed only to district and local administration entities, reflecting the reluctance of ANRS to transfer significant jurisdiction to cooperatives over resources. Another striking feature of the piloted cooperatives is the disenfranchisement of women from participating in charcoal production and marketing as well as their involvement in decision-making, as virtually very few women are included in the management committee.

Transparency and accountability are key elements in the decentralisation process, as communication has a positive impact on establishing trust and mutual agreement on rules regarding the management and use of a resource (Walker and Ostrom 2007). Lack of transparency with the case-study cooperatives has resulted in a low level of participation of cooperative members in decision-making and mistrust between management committees and members since major decisions are made by few management elites. These are commonplace and serious problems in many common-pool resource management schemes (e.g. Coulibaly-Lingani et al. 2011). There is also evidence of poor accountability within the case-study cooperatives, the lack of a proper accounting and auditing system, which is further complicated

by the involvement of some local leaders in charcoal marketing. Thus, nepotism is a major concern and has an adverse effect on the decentraliaation of management, as also reported elsewhere (Tacconi 2007, Coulibaly-Lingani et al. 2011). It is generally believed that institutions that fail to reflect local accountability systems in resource management fail to achieve successful socio-economic and ecological outcomes of common property resource management (Brown and Lassoie 2010).

18.4 Conclusions and recommendations

18.4.1 Area exclosures

The forest rehabilitation activities in Alaba District are implemented at a site level. These rehabilitation sites are integral parts of the existing land-use mosaic within the landscape, and the different land uses have biophysical and socioeconomic linkages. The on-site activities have an off-site impact: a case in point is the connection between the upper and lower catchments, such as in the Bilate watershed. Hence, landscape-level planning is recommended for the rehabilitation of degraded forestlands, where the multiple functions of the different land uses are taken into account. Furthermore, it is easier to make the trade-off between rehabilitation (such as area exclosures) and livelihoods requirements at a landscape-level than at the site-level (Lamb et al. 2005).

The establishment of ecological corridors will facilitate the movement of organisms (gene flow) and increase the viability and persistence of isolated populations. Furthermore, corridors may enable the re-colonisation of a site that has suffered local extinctions (Hess and Fischer 2001). Corridors are also important for wildlife, allowing periodic movements among different habitat types used for different purposes. The establishment of corridors, particularly, based on existing natural corridors, such as riparian forests, should be considered when designing and implementing forest rehabilitation projects in Ethiopia. Riparian corridors are cheaper to establish and can connect highland and lowland habitats, thereby facilitating migration across different elevations (Douglas 1997). Whenever possible, considerations need to be given to the establishment of corridors that connect forest rehabilitation sites with remnant natural forest patches, including sacred groves.

In AD, some of the planted exotic woody species, such as *A. saligna*, may turn out to be invasive and thus monitoring of their spread is required. In general, native fast-growing and sturdy early-successional woody species should be considered first before resorting to planting non-native species. In addition, there is a need to broaden the pool of potential woody and herbaceous species (particularly native species) that are suitable for rehabilitating degraded lands and forests in Ethiopia. Although there is an increase in the diversity of flora and fauna in the rehabilitated areas, expediting the secondary succession process through enrichment planting of rare and endangered species is recommended, particularly late-successional species. Also, enrichment planting using nitrogen-fixing fodder trees and shrubs will contribute to the amelioration of soil fertility and cater to the pressing need for cattle fodder. Enrichment planting of woody species with fleshy fruits is also desirable to attract seed dispersers and enhance the seed rain at the rehabilitation site. The soil seed bank in Ethiopia is generally poor (Teketay 1996, Lemenih and Teketay 2004) once the standing vegetation is cleared, thus it plays little role in the natural regeneration of woody species.

Experiences in AD and other parts of Ethiopia have shown that in the beginning people are sceptical about the effectiveness of area exclosures as a rehabilitation intervention, benefits sharing, and use rights regarding exclosures (Birhane 2002, Birhane et al. 2004, 2006, Mengistu et al. 2005b, Nedessa et al. 2005, Office of Agriculture 2008). But the interventions have led to more positive perceptions about rehabilitation. However, several policy, administrative, and organisational hurdles and shortcomings severely hamper the realisation of the full potential of rehabilitation initiatives in restoring ecosystems and improving livelihoods. These include the lack of clear guidelines regarding the goals of rehabilitation, management plans, and indicators against which rehabilitation success will be evaluated.

Area exclosures can be viable systems if they have clearly defined users, clearly defined resource boundaries, and realistic, locally established rules (Mengistu et al. 2005b). Most often, attention of the DOA and other stakeholders has been focused on biophysical impacts of rehabilitation of degraded lands, while economic and social well-being of the households have often been neglected (Lovejoy 1985). For example, one of the major challenges with exclosures is the restriction of free livestock grazing, and hence there has to be a strategy for compensating people for the loss of access to grazing areas. To reduce local conflicts, the demand for free grazing land should also be considered when planning establishment and expansion of exclosures (Mekuria et al. 2007). In addition to the cut-and-carry (of grass) method, depending on the management plan and carrying capacity, some form of selective grazing should be practiced inside exclosures to avoid potential conflict among local people, while an intermediate level of disturbance (by grazing) may enhance floristic diversity (Nedessa et al. 2005).

The dependency of local people for grazing and

fuelwood can be reduced through introduction of agroforestry practices, energy-efficient stoves, and woodlots at the farm level. Agricultural productivity should also be enhanced to create better income and food self-sufficiency, consequently reducing pressure on the exclosures. Fodder species ought to be integrated within agroforestry practices, woodlots, and exclosures in order to cater to the pressing need of animal feed. Generally, rehabilitation of degraded forests may also contribute directly to the alleviation of poverty by generating cash income and indirectly by improving crop and animal productivity (Gebre Egziabher 2006).

Furthermore, little emphasis has been paid to community participation in management and decision-making. Such a failing can contribute to the community's sense of alienation and indifference and ultimately to the failure of rehabilitation endeavours. Therefore, understanding the social and economic system of the local people is the starting point for successful rehabilitation. Equitable benefit sharing and genuine participation of local people at all levels (decision-making as well as design, management, and evaluation of exclosures) are foundations for sustaining exclosures.

Involving women in the day-to day running of restoration activities and benefit sharing from the exclosure at Alaba is a breakthrough in the struggle to overcome gender bias in a society where men have had the sole decision-making power in the household. Women also benefit from the exclosures through access to grass and firewood. Rehabilitation may revive springs and make it easier for women to fetch water.

In spite of multiple benefits of exclosures, local people in AD have strongly complained after the establishment of exclosures about the emergence of some wild animals, such as warthogs and baboons, which are browsing and damaging agricultural crops around the exclosures. There must be coordinated efforts among concerned offices (e.g. DOA) and administrative bodies to overcome the problem by using local knowledge and assistance of experts from the Wildlife Conservation Authority.

18.4.2 Alien species invasion management

Prosopis invasion in ANRS is a serious concern due to the extent of invasion, impacts on dryland ecosystems, ecology, and socio-economic effects on the pastoral communities. The management of *Prosopis*-invaded areas has been a daunting task as a result of diverging views on the management strategies, ranging from complete eradication to management through utilisation. The pilot management interventions have clearly demonstrated that, if properly managed, the *Prosopis* thickets are valuable resources for diversifying rural livelihoods vulnerable to food insecurity and for protecting the functionality of the semi-arid ecosystem. However, the lack of a clear policy direction and institutional mandate, coupled with technical and financial difficulties, have constrained the successful management of the *Prosopis* invasion in ANRS. Decentralisation of management of the *Prosopis* invasion could be a promising means of institutionalising and scaling up of popular participation. To address the challenges for decentralisation of management of *Prosopis* invasion, the following recommendations are suggested.

1. The removal of *Prosopis*, followed by conversion of restored lands into other land-use forms (active restoration), is more effective in controlling secondary invasions than passive restoration (simply clearing the invaded area). If passive restoration is pursued, an incentive mechanism should be established (e.g. remuneration) for people participating in these activities.
2. The operational management units of each cooperative should be clearly demarcated within each district and a detailed land-use plan prepared. Arrangements for secured land-tenure rights should be made for restored areas.
3. Identifying the various actors and defining their roles and responsibilities must be worked out in order to establish a revamped local structure, including elected local leaders, traditional community leaders, and representatives of the cooperatives. Any such new institution should regularly hold general public meetings to prepare annual plans of activities, make decisions regarding the allocation of revenues, and present annual audit reports.
4. ANRS should minimise its influence to leave more space for decision-making by members of the cooperatives.
5. To address transparency and accountability issues, mechanisms to enhance information flows, collectively agreed guidelines for benefit-sharing and robust auditing, and audit reporting systems should be established at the local level. In this regard, both government and NGOs would assist through training of cooperative members in bookkeeping. Members of the management committee should be democratically elected and positive affirmative action should be considered to increase the participation of women in the leadership.
   To deter illegal activities, effective law-enforcement mechanisms should be put in place.

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Small forest-based enterprises in The Gambia: Opportunities and challenges

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Abstract: The Gambia is a pioneer in the implementation of participatory forest management in Africa and, in particular, in the use of community forestry (CF) as a mechanism by which forest ownership is transferred from the government to local communities. As a result of this process, various small forest enterprises (SFEs) have been formed. This qualitative, multiple case study assessed the opportunities and challenges facing 16 SFEs located in the Western region of The Gambia in February and March, 2010. These enterprises focused on different forest-based activities: firewood, branchwood, beekeeping, handicrafts (furniture), and ecotourism. Results show that all but one of the studied SFEs were profitable. Community-owned businesses invested profits in village development, whereas individually owned enterprises allocated revenues to meet household needs. All SFEs – except branchwood businesses – had received training in forest management and enterprise development. The government and other non-state actors were revealed as key stakeholders in the provision of capacity-building activities. Concerning financial services, most SFEs had adequate access to deposit accounts. However, while a number of enterprises had received loans from credit unions and other non-financial institutions, none had accessed financing from commercial banks. Wood-based enterprises still faced some challenges, especially related to illegal competition, corruption at road checkpoints, and updating CF management plans. This case study shows that fostering SFEs as a means of generating income for forest-dependent communities in developing economies can be an effective strategy; however, there must also be ongoing support from government (and other actors) in the forms of capacity building and rational policies that serve to create an enabling environment for these enterprises to thrive.

Keywords: The Gambia, community forestry, small forest-based enterprises, livelihoods, capacity building, financial services, corruption, illegal activities

19.1 Introduction

Small forest-based enterprises (SFEs) are seen as a potentially important source of income, employment, and well-being for forest-dependent communities. At the same time, they are viewed as an important means of promoting sustainable forest management (Kozak 2007). However, in many developing countries, SFEs face a number of significant challenges, not the least of which are: a lack of clear and secure access to forest resources; low levels of managerial, technical, and business capacity; and deficient access to finance and capital for starting up, running, and upgrading businesses (Arnold et al. 1984, Fisseha 1987, Mead and Liedholm 1998, Mayers 2006).

As a result of varying definitions, it is difficult to articulate a universally accepted description of SFEs, other than to say that they share an engagement in a wide range of forest-based activities as

their primary sources of income and that they are indeed small. They generally employ fewer than 100 individuals, have annual turnovers of less than USD 1000 per year, consume little in the way of raw materials, and have limited access to capital (Macqueen 2004a, 2004b; Spantigati and Springfors 2005, Mayers 2006). Very often, these businesses occur at the individual or household level with only one or a few workers (Spantigati and Springfors 2005). For the purposes of this chapter, this is what we are assuming – enterprises employing no more than 10 people that typically use family or community members as labour. Business structures and arrangements tend to be simple but can take on many forms, including private ownership, limited partnerships, contracts and subcontracts, collectives, cooperatives, associations, and community-owned enterprises; the enterprises themselves can be part of either a formally recognised or an informal economy (Fisseha 1987, Kozak 2009). Importantly, SFEs tend to be intrinsically tied to the communities in which they operate, and as such, offer higher potential and ample opportunities for local communities to serve domestic markets with much needed forest goods and services in a sustainable manner, generate wealth that stays within the communities, provide local employment, and improve the livelihoods of the rural poor (Fisseha 1987, Kozak 2007).

The Gambia is acknowledged to be a leader in mobilising efforts to foster small community-based forest enterprises as a way to improve the well-being and livelihoods of forest-dependent communities and is seen as something of a success story in this regard (Bruni and Grouwels 2007). However, despite formal initiatives that have been in place for years, anecdotal evidence suggests that some SFEs in rural regions continue to face obstacles. That being the case, it makes sense to conduct case studies in The Gambia, the logic being that much insight can be gained from observing both successes and failures in this nuanced problem. Specifically, we sought to identify the opportunities and limiting factors facing SFEs in The Gambia.

19.2 Context

19.2.1 The Gambia's people and forests

The Gambia is located on the west coast of Africa, bordered by Senegal to the north, east, and south and by the Atlantic Ocean to the west. At 11 300 km^2, it is one of Africa's smallest nations (CIA 2012). Yet, it is densely populated with more than 1.8 million people, 40% of whom live in rural areas (Bojang 2001, CIA 2012). The Gambia provides an interesting and relevant backdrop for this case study for a number of reasons. First and foremost, it is one of the poorest nations in the world, ranking 168th out of 187 countries on the Human Development Index (UNDP 2012). Like many other developing economies burdened with poverty conditions, The Gambia has sought and continues to seek effective and equitable means of economic development and social change that serve to meaningfully improve the long-term health, viability, and sustainability of communities – especially those that are rurally based.

More than one-quarter of the land in The Gambia is designated as forested; these are mostly deciduous and semi-deciduous forests, with some evergreen forests, mangroves, and palms (DoF n.d.). A further 10% of land area consists of shrubs, wooded grasslands, and wooded wetlands (DoF n.d.). There is a long tradition of wood use in the country, with most of the timber allocated for industrial wood and fuelwood purposes and some used for charcoal production and carvings (DoF n.d.). This, coupled with the regular occurrence of bush fires, agricultural expansion, and a general over-exploitation of forest resources, has led to a high rate of deforestation in the country (FAO 2005), reflected by the fact that the vast majority of its forests, regardless of type, are in secondary successional stages (DoF n.d.). The latest National Forest Inventory (2008–2010) indicates that overall forest cover has been reduced by 7% in the past decade, largely within mangrove ecosystems (DoF n.d).

Perhaps the most compelling rationale for conducting a case study in The Gambia relates to the concerted efforts on the part of its Department of Forestry (DoF) to lift forest-dependent communities out of poverty vis-à-vis decentralisation efforts and the creation of SFEs. Since the 1990s, the DoF has been very active in initiating a process of land-tenure reform by devolving land and forest tenures into the hands of communities and encouraging collaborative approaches in the form of participatory governance (FAO 2005, Thoma and Camara 2005). This is very much in line with a larger global movement towards decentralised forest management.

19.2.2 Decentralisation in The Gambia and beyond

Decentralisation of forest management has been a major trend in global forest governance for the past three decades (Ribot et al. 2006, Agrawal et al. 2008). More than three-quarters of developing countries and countries in transition are in the midst of experimenting with decentralisation of natural resource manage-

ment (Ribot 2004, Contreras-Hermosilla et al. 2008). National governments have sought to decentralise many services, including forest management, for reasons that include: 1) appeasing demands from international donors, NGOs, and local citizens for better governance by enhancing public sector transparency and accountability; 2) reducing costs of overextended central bureaucracies; and 3) succumbing to pressure to right the wrongs of commercial forestry that excluded local communities (Agrawal and Ribot 1999, Manor 1999, Brown and Lassoie 2010).

This decentralisation trend is reflected globally in the rise of community forestry and other participatory forest management practices – particularly in the global south – as a way to alleviate poverty and improve living standards in rural communities. It is posited that decentralisation in forest management can be a tool for the empowerment of local peoples by giving them a greater stake in decision-making and authority over the natural resources that they use and the environments they live in or around. Decentralisation can also lead to greater community stability and resilience, as communities are more actively involved in strategies for their own local economic development (Ribot 2004). Furthermore, studies have shown that greater local participation in decision-making has led to positive outcomes for local incomes, forest biodiversity, carbon storage, natural regeneration, and vegetation cover (Aggarwal et al. 2006, Chhatre and Agrawal 2009, Persha et al. 2011) and that community forest enterprises can be profitable and can deliver many additional socio-cultural and ecological benefits to local communities (Bray et al. 2003, Dev et al. 2003, Bray 2004, Molnar et al. 2007).

In The Gambia, decentralisation was a response to the state's failure to manage the country's forests effectively (Camara and Dampha 2007). Prior to decentralisation, the state had total control and ownership of forest resources. During this time, deforestation and forest degradation continued unabated, mainly due to bush fires, expansion of farmlands and plantations of gmelina (*Gmelina arborea*), and the unsustainable use of timber and non-timber products – in particular, firewood (Schroeder 1999, FAO 2005, Camara and Dampha 2007). Camara and Dampha (2007) state that decentralisation of forest management was a necessary strategy to involve rural populations – previously indifferent to forest destruction – in forestry and fire management. Schroeder (1999), on the other hand, argues that decentralisation, rather than being a populist gesture, was part of a deliberate financial strategy to decentralise costs of service delivery (such as mobilising the labour needed to establish firebreaks) and responsibility of forest management to constituencies. Local populations were also more receptive to the idea of forest management at this time due to increasing climate-related crop production shortfalls, as well as decreasing market prices and subsidies for groundnut production (Schroeder 1999).

In the early 1990s, the government of The Gambia began experimenting with participatory forest management approaches in pilot cases. The intent was to increase local participation in forest management and allocate legal ownership and/or exclusive user rights to local stakeholders (Thoma and Camara 2005). After restructuring its administration in 1994,[1] the DoF created the country's first forest policy in 1995, which emphasised the involvement of local communities in forest management. The legal framework for formalising public and private participation in management was further strengthened by a revised Forest Act and Regulations (1998) (Thoma and Camara 2005). A National Forest Fund was also established in 1996. The 2010–2019 Forest Policy reinforces this push for decentralisation of responsibilities and community engagement in forest resource management; one of its primary objectives is explicitly stated as improving living standards through poverty reduction and forest resource enhancement initiatives (Republic of The Gambia 2010).

The establishment of community forests (CFs) was one of the instruments by which the government placed forest tenure in the hands of communities.[2] The DoF is the institution responsible for planning, organising, monitoring, and implementing community forestry in The Gambia. For purposes of the CFs, the organisational hierarchy includes the following: 1) the head of the Participatory Forest Management Unit, whose primary function is to coordinate, support, and monitor the implementation of CFs at a national level; 2) regional forest officers (RFOs), whose main task is the planning, organisation, and implementation of CFs in each region of the country (see footnote 1); 3) administrative circle (AC) heads, who monitor and support CF forest extension and field activities in each administrative circle (e.g. the Western region is divided into three administrative circles); 4) implementation area (IA) heads, who, among other activities, report CF matters within each IA to the AC Head (e.g. each administrative circle

[1] The country is now divided into six forest administrative regions – Banjul, Western, Lower River, Middle River, Upper River, and North Bank (FAO 2011). Each region is subdivided into implementation areas for more efficient service delivery and to bring the forestry sector closer to rural populations (Camara and Dampha 2007).

[2] Other tenure types that promote participatory management include joint forest park management and community-controlled state forests.

in the Western region is divided into three or four IAs);[3] and 5) CF extension and support staff, who execute CF-related activities in the field (DoF 2005).

CFs were implemented with the objective of engendering local peoples' interests in the conservation and sustainable use of natural resources. Communities were entitled to be involved in CF management within their traditional lands so long as an agreement with the DoF was in place (Camara and Dampha 2007). The establishment of CFs focuses on training and preparing villagers and ensuring their meaningful participation. The process takes several years to be completed and is implemented in three main phases: 1) the start-up phase, where villager's organize themselves, identify and demarcate the forest area, carry out a forest assessment, and prepare an initial forest management plan; 2) the preliminary phase, where communities demonstrate their capacity to manage resources in a sustainable manner; and 3) the consolidation phase, where villagers finally acquire the rights over the forest resources (DoF 2005). This phased implementation is used so that each community's technical and managerial capacity corresponds to the new responsibilities gained.

A representative village committee (the CF management committee) is also charged with the responsibility of the day-to-day management of the CF. The committee, one-third of which is meant to be women, is the pipeline between the DoF and the village. The DoF helps this committee implement the first two phases by, among other things, organising training sessions and setting up a simple three-year management plan. After the three years, if the community demonstrates that it can successfully implement the preliminary management plans on its own, a community forest management agreement (CFMA) is issued. The CFMA permanently transfers the exclusive rights to local communities to use the forest and trees, along with the responsibilities for their management. The government reserves the authority to partially or fully revoke these rights if a major clause of the CFMA is violated (Camara and Dampha 2007). As of 2005, more than 260 villages in The Gambia were involved in this initiative (Thoma and Camara 2005), impacting approximately 6% of Gambia's forests (Bojang et al. 2010). This does, however, fall short of the target of 75% of forests in The Gambia being under community or private control, which was set in the government's 1995 policy. As of 2013, the number of CFs has only increased slightly, meaning that the process has been slow and most forests are still under government jurisdiction.

Despite these tenure changes, the government of The Gambia has arguably retained some managerial control over CFs. Schroeder (1999) states that several conditions included in the CFMA contract constrain community management plans and allow the DoF to control many details of forest management. Camara and Dampha (2007) note the continued need for a large supervisory role for the DoF, as many local management committees still lack skills and experience, and there remains a requirement for strong oversight to avoid illegal activities. However, villagers' participation is still central to the development of CFs. At the local level, villagers participate in forest demarcation and assessment, in decisions regarding the utilisation of the forest, and in the development of CF management plans, among others (Camara and Dampha 2007).

Monitoring and evaluation (M&E) are integral to the success of the CF process, as stated in Gambian legislation. According to the 2005 Community Forestry Implementing Guidelines, evaluation activities should take place at various levels, from the local villages to the DoF offices in Banjul. Forestry officers are meant to carry out participatory sessions at local levels to gather and discuss information related to activities being planned and undertaken, problems and constraints encountered, initial and current expectations, and future plans. In addition, the CF management plan is meant to be used by the communities as an assessment tool for evaluating the different activities and goals achieved in relation to the CFs. The M&E unit of the DoF is meant to closely monitor the CF program and to generate annual progress reports (DoF 2005).[4] In addition, some community-based organisations conduct participatory impact-and-monitoring visits to member CFs as a means of ensuring compliance with community-developed forestry and business plans, as well as local by-laws.

Capacity-building processes are also an essential part of the CF strategy in The Gambia. The Community Forestry Implementing Guidelines (2005) of the Participatory Forest Management Unit stress the importance of action learning and incorporating local knowledge into the training of community members, with the goal of achieving self-reliance and self-management. The DoF's community forestry extension and support staff are meant to assist and guide members in their acquisition of managerial skills, including communication, leadership, conflict

[3] The frequency with which the IA heads reach villages is erratic due to inadequate logistical support, namely mobility, fuel, and extension materials. In some cases, IA heads are based in CF villages.

[4] This study did not explicitly assess how these M&E activities are put into practice in the studied villages, nor their respective efficacy.

Figure II 19.1 Firewood collection adjacent to a Community Forest. © M. Fernanda Tomaselli

resolution, and specific forest management skills, such as controlled burning and forest monitoring. Most training is intended to be provided during the implementation period, individualised to the context and pre-existing capacity of each community forestry committee. The DoF encourages NGOs and other collaborating organisations to assist in capacity-building activities (DoF 2005). The 2010–2019 Forest Policy echoes the importance of capacity-building activities, highlighting the need to continue to develop the institutional capacity of rural communities to assume increasing responsibilities for natural resource management, through farmer training, community-based resource-management education campaigns, and the dissemination of resource management technologies, among others (Republic of The Gambia 2010).

A central component of The Gambia's community forestry strategy is to promote the creation and ultimate success of SFEs, largely by implementing the Market Analysis and Development (MA&D) methodology developed by the Food and Agriculture Organization of the United Nations (FAO) (FAO 2011a). This methodology has been piloted in The Gambia since the year 2000. The MA&D focuses on capacity building and strengthening institutions at the local level so that local people are able to control their own resources and develop and run SFEs. The MA&D method is implemented in four phases, taking into account social, environmental, market, and technological facets. As a means of ensuring its continued implementation, detailed steps on how to implement the MA&D are also included in the Community Forestry Implementation Guidelines of the DoF. In addition, facilitators and coordinators from the DoF have been trained in this methodology, and it has been integrated into the curriculum of the National Forestry School (FAO 2011a). With the support of FAO, the DoF has assisted several entrepreneurs in identifying and developing viable and sustainable income-generating activities based in the forest. In fact, by 2005, 72 community-based businesses were incubated in 26 villages, and 11 types of forest products and services, from firewood to honey to ecotourism, were effectively being marketed from the region (FAO 2005, Thoma and Camara 2005, Bruni and Grouwels 2007).

19.3 Case study: small forest-based enterprises in The Gambia

Fieldwork for this project was carried out in The Gambia during February and March 2010. A multiple case-study strategy was employed with semi-structured interviews conducted with business owners and/or staff from a wide range of forest-based enterprises, community members, village leaders, and association representatives. In total, 16 SFEs from four villages were included, encompassing five distinct forest-based business types: firewood, branchwood, beekeeping, handicrafts (furniture), and ecotourism (Figures II 19.1.–II 19.3). The villages were selected based on three criteria in order to ensure that the enterprises in the study had experienced some degree of success. First, they had to be located in the Western region of The Gambia, since enterprises there have greater proximity to infrastructure, including financial services. Second, the villages (but not necessarily the enterprises) had to be associated with an officially sanctioned CF, meaning that access to forest resources was likely assured. Finally, most of the villagers engaged in forest-based business activities had to have undergone some degree of formal business training, either in the form of FAO's MA&D model (FAO 2005) or some other capacity-building initiative.

Interview data from these primary sources was supplemented by additional interviews conducted with financial institutions, most of which were located in the capital, Banjul. In total, representatives from six commercial banks and eight microfinance institutions (four non-bank institutions and four government projects) were asked a series of questions related to the financial services that they offer and their willingness to engage with SFEs. All of this information was triangulated with other sources, including field observations, relevant documents, and policies. NVivo 8 qualitative data analysis software was used to code the data and identify emergent themes in an enumerative process. For further methodological details, the reader is directed to Tomaselli (2011) and Tomaselli et al. (2012).

Figure II 19.2 Wooden bee-hive installed for honey production. © M. Fernanda Tomaselli

This data was used to inform our discussion on the different challenges and opportunities facing SFEs in The Gambia. In this section, we describe the main results concerning the case study enterprises – their activities, their rights with respect to forest resources, their access to support services such as training and finance, and their contributions to individual and community livelihoods. In addition, we describe the key impediments that many of them face, mostly related to corruption and illegal competition but also the need to streamline bureaucratic processes related to CF management.

19.3.1 Case study enterprises

The selected case study enterprises focused on five different activities. A brief description of each is given below and Table II 19.1 illustrates the numbers and types of SFEs studied in each of the four villages.

Firewood – The main undertaking of these businesses is to split wood of different species (e.g. keno – *Pterocarpus erinaceus*, kinkeliba – *Combretum micranthum*) from dead trunks to sell in local markets as fuelwood. The enterprises in this study used resources from CFs and were community-owned.

Branchwood – The principal activity consists of collecting dead branches of different species (e.g. keno – *Pterocarpus erinaceus*, kinkeliba – *Combretum micranthum*, gmelina – *Gmelina arborea*) from the forest floor to sell as fuelwood in local markets. Each enterprise in this study had one proprietor and, in general, did not use resources from CFs.

Beekeeping – These businesses install wooden boxes in mangroves and orchards near the villages as beehives for the production of honey (and occasionally wax). All of the studied beekeeping enterprises were individually owned, except for the business located in Village B, which was community-owned.

Handicrafts – This individually owned business focuses on the production of furniture (i.e. chairs, tables, beds) from the leaves of rhun palm (*Borassus aethiopum*). Raw materials were not collected from a CF but from single palms found close to village houses.

Ecotourism – The main purpose of this community-owned venture is to lodge tourists and provide them with various recreational experiences revolving around the CF, the nearby river, and traditional cultural activities.

19.3.2 Access to forest resources

Access to forest resources varied depending on the activities that were undertaken by each enterprise. For instance, CF-based SFEs in The Gambia, such as the firewood and ecotourism businesses in this study, were regulated under very specific conditions as a result of their close ties to CFs. In these situations, CF committees prepare special by-laws that include, among other information, the umbrella rules and regulations that govern the CFs. These by-laws

Table II 19.1 SFEs included in this case study, classified by village and type of enterprise; each "+" sign representing one enterprise. Source: Tomaselli et al. 2012

Type of SFEs	Villages				Total
	A	B	C	D	
Firewood	+		+	+	3
Branchwood	+ + +		+ +	+ +	7
Beekeeping		+		+ + +	4
Handicrafts				+	1
Ecotourism		+			1
Total	4	2	3	7	16

must be in agreement with The Gambian Forest Act and Regulations and endorsed by the district chief. A copy of the by-laws should be forwarded to the DoF. In addition, CF committees are required to develop a three-year preliminary management plan that focuses on protection activities such as fire management, reforestation, and monitoring of illegal activities. Once a CFMA has been achieved, a five-year management plan must be developed. This plan should specify the activities to be carried out in the forest, the species and quantities to be used, harvesting procedures, and other information. These plans are expected to be grounded in a forest assessment that provides information on forest accessibility, vegetation types, and topographic characteristics, based largely on visual cues and traditional knowledge.

The CF management plans are prepared with the assistance of the local forest officer and staff of collaborating institutions, yet final approval resides with the DoF (DoF 2005). Villagers can access CF resources for subsistence uses so long as these practices are approved by the forest committee and are in accordance with the CF management plan. Similarly, commercial use must be anticipated in the CF management plan; nevertheless, communities also require additional licenses or permits, which are issued free of charge by the regional forest officer. For the transportation of products, a removal permit is needed, which is issued by any forest officer upon presentation of a valid license (DoF 2005). With the revenues obtained from the commercialisation of forest products, CF committees are required to establish a local fund. By law, 15% of the proceeds of this fund should be directed to DoF's National Forest Fund, about 40% should be invested in local forest-management activities, and the rest can be used for community development activities.

Other enterprises included in this study did not obtain their resources from CF areas[5] and were subject to different regulations. For instance, as explained by a DoF representative, beekeeping is primarily governed by the Forest Act and related regulations.[6] In the case of the handicrafts enterprise, its owner had free and open access to raw materials and was not required to obtain any authorization for their collection. On the other hand, branchwood enterprises explained that they do require licenses for gathering and transporting the resource, although many revealed that they operated without these in place.

While this study did not delve into the condition of forest resources in The Gambia,[7] various respondents discussed this in the context of benefits that they have enjoyed due to establishment of CFs and the concurrent changes in rights of access to their villages' forest resources. For instance, some villagers described how the forest used to be: "It was open to everybody…there was no control. The forest was all the time in destruction." They clarified that when they were granted forest rights, they

[5] All SFEs included in this study were located in villages that owned community forests; however, not all of them (e.g. branchwood, beekeeping, handicrafts) obtained their raw materials from CF areas.

[6] Although there are no specific clauses that refer to beekeeping or honey production in the 1998 Forest Act and Regulations, the use of fire in forests is regulated. Wild honey collectors use fire for collecting honey, and by doing so, they often kill the bees and jeopardize forests.

[7] Notably, the last monitoring assessment documenting the impacts of CFs on forest conservation in The Gambia was conducted in 2003–2004.

became more actively involved in the sustainable use of their resources and began to protect their CF areas from illegal intrusions and wildfires. Members from all of the firewood enterprises detailed how they applied the concept of sustainable forest management by practicing zoning, selective harvesting, and replanting. Certain interviewees also recognised the different benefits that a well-maintained forest had generated for their livelihoods: "With the management and protection of the forest and the wise utilisation, we are able to add some income … It has brought a lot of incentive to our community." Moreover, members from one firewood enterprise recognised that the sustainability of its business absolutely depends on the sustainability of the forest. This data is supported by other studies that detail the positive effects that CFs have had on forest cover, biodiversity, frequency of bush fires, and increasing the environmental awareness of local communities (Thoma and Camara 2005, Government of The Gambia and German Agency for Technical Cooperation 2003 in Romano 2007).

Nevertheless, a few respondents also expressed some concerns regarding sustainability issues. For instance, one villager explained that there is currently great demand for forest products in The Gambia and expressed his concern about the potential impact that this market pressure may have on the sustainability of the forest: "Buyers are always interested in us to sell [to] them, so if we are not careful…, especially when you don't have much money you are easily tempted and then you are used to do the wrong thing." A member from one firewood enterprise also perceived that more trees were disappearing relative to the ones being replaced, and another respondent questioned the long-term viability of the enterprise that he is involved in: "One way, it may not be sustainable… the density of the forest is reducing and they are not doing any active planting."

19.3.3 Access to capacity building

With the exception of the branchwood businesses, all of the studied enterprises had taken part in some sort of capacity-building activity. This is an integral part of CF implementation in The Gambia and it has benefited many SFEs, even those that do not obtain their raw materials directly from CF areas (Thoma and Camara 2005). Our data shows that different stakeholders played key roles in the provision of this support service, notably the government and other non-state actors. For example, the DoF of The Gambia was cited as an important provider of training on multiple aspects of forest management and enterprise development for both community and enterprise members. With the support of FAO, the DoF was also responsible for implementing the MA&D methodology in the studied villages. Four enterprises explicitly mentioned being positively impacted by this training.

Many of the firewood businesses also mentioned receiving guidance from the DoF on issues related to forest management, reforestation, and maintenance of CFs. In addition, the handicrafts enterprise owner twice received technical training on furniture development. This entrepreneur further described the additional support that he received from the DoF: "After the training, they [DoF] gave us all the tools that we will need for the work and also they provided us with at least some nails to kick-start. They gave us everything except the rhun palm." One of the beekeepers interviewed in this study similarly characterised the support and assistance that he had received as much needed.

Associations of producers were also mentioned as instrumental in the provision of training to some of the studied enterprises. Various beekeepers mentioned that capacity-building activities were one of the most important services offered by their beekeeping association. One of the entrepreneurs stated: "They trained them [the beekeepers] to prepare the hive..., how to harvest the honey and process, and produce it into good quality." Additionally, some enterprises were given guidance on wax processing methods as a means of diversifying their production. Likewise, some of the firewood respondents discussed the value of their association's role in the provision of technical advice and training in reforestation. Other enterprises explained the important roles of two other stakeholder groups – NGOs and local businesses – in the delivery of capacity-building activities.

Developing business skills is one of the most important factors influencing the success of a business (Macqueen 2010). Although this is an important pillar of the community forestry strategy in The Gambia, and many of the cases included in this study received ample guidance and training on multiple issues, all of the enterprises mentioned the salient need to receive training on an ongoing basis. Most of the businesses studied needed to continue developing their capacities, especially with respect to forest management, technical skills, and general business and financial administration. Our data shows that capacity-building activities should not be restricted to one-time events but rather provided frequently since enterprises are dynamic entities that must address new needs and/or refresh already acquired skills on a continual basis.

19.3.4 Access to capital and other financial services

At the time of the study, many financial institutions in The Gambia – especially banks – were expanding rapidly into rural areas of the country. However, they did not offer a full range of financial services to the studied enterprises, particularly credit. That said, most of the studied SFEs had adequate access to deposit accounts according to our data. The majority kept their accounts in local cooperative credit unions, while others kept them in banks (in spite of the fact that opening an account with a bank was five to 10 times more expensive than with a microfinance institution). The president of a CF expressed the appreciation of having access to savings services in his community: "Thank God for the credit union. It is a logical coincidence; comes the forest with resources and comes the credit union to save our money."

A number of the studied enterprises had accessed credit; however, none had received it from a bank. One executive from a microfinance institution explained that although banks were expanding into rural areas in an attempt to remain competitive, they were focused mainly on the collection of deposits. To fill this gap, cooperative credit unions and other non-financial institutions, such as government agencies, NGOs, and producer associations, were taking the lead on delivering credit to SFEs. While many of these agencies (except credit unions) did not require savings as a condition for lending, the interest rates on these loans varied between 10% and 30%, depending on the institution. In addition, one of the more successful community enterprises accessed capital by winning a National Award on Environmental Management, which was used to complement the village savings.

It is well acknowledged that a major impediment to accessing credit from formal sources is a lack of collateral (Helms 2006). Indeed, most financial institutions in this study required collateral as a condition for lending, with microfinance institutions being more flexible in this regard. One microfinance executive explained: "We look at what you have as collateral and that's what we take. Some collateral … [is] just psychological. They [clients] cannot provide you any guarantees, but they might have some intrinsic value to whoever is giving that collateral." Certain microfinance institutions even rely on local knowledge (Helms 2006) and the character of individuals (UN 2006), while others ensure clients' repayment capabilities by delivering loans gradually. In contrast, banks tend to be more stringent about collateral requirements, as explained by one executive from a commercial bank: "Collateral is always a condition. At the very least you need to have a personal guarantor, so the issue of collateral is important."

A few respondents from financial institutions identified other important barriers that might hinder SFEs from accessing credit. The first was related to the possibility of sudden policy changes in The Gambia (particularly forest policy), which may impact enterprises' operations and their ability to repay loans. This concern was described by a respondent from a microfinance institution: "These groups or individuals who are focusing their activities on the forest eventually might face some challenges because either the government might come up with an embargo or they might come with new rules and regulations against the use of the forest…" The second limitation related to the future availability of raw materials from forests if activities are not carried out sustainably. One executive articulated his thoughts about this issue: "Yes, there is a real challenge in forestry in the rational use and sustainable use of resources." Finally, another challenge mentioned related to the formality and legality of forest-based businesses in The Gambia. One microfinance officer explained that his institution insists on firewood businesses presenting their licenses from the DoF as a requirement for extending loans. The officer added that this strategy reduces the risk of their products being seized while also potentially helping to ensure the sustainability of forest resources.

19.3.5 Enterprise profitability and contributions to livelihoods

All but one of the SFEs included in this study were profitable (i.e. generating revenues in excess of costs) at the time of the study.[8] The ecotourism camp had, by far, the highest revenues, with annual profits exceeding USD 5000, while the handicrafts business had the least, with approximate annual profits of USD 90. Most respondents seemed satisfied with the profits generated by their enterprises. For instance, many of the beekeepers mentioned that revenues from honey sales represent an additional source of income for them and that they invest comparatively little time in this seasonal business. A branchwood entrepreneur described the contribution of her business to the livelihood of her family: "…I am a woman; the children, I am able to educate [them] with this enterprise until they have all finished their high school…"

Notably, the studied enterprises distributed profits according to whether they were community-owned or individually owned, both of which were

[8] One branchwood enterprise started operations in the year that the study was conducted and was not yet profitable.

Figure II 19.3 Furniture produced with local materials by the handicrafts enterprise. © M. Fernanda Tomaselli

found in most of the case study communities. Communal enterprises allocated their profits towards the well-being of the community and the maintenance of the local ecosystem, while individually owned SFEs spent their profits primarily on individual and family needs. For instance, respondents from the community-owned firewood businesses described some of the activities that had been carried out with the financial returns of their enterprises, including, among others, construction and maintenance of community water systems, tax payments for all of the homes in a village, purchase of a vehicle for villagers' transportation needs, payments of school fees for some of the local children, and provision of food for community celebrations. A village leader expressed his satisfaction with the benefits generated by the communal enterprise: "…Everybody appreciates it because everybody has benefited… everybody needs water, everybody needs to pay rates and taxes... The village is very happy about this enterprise." On the other hand, individually owned enterprises spent most of their incomes fulfilling more singular and basic needs, such as food, education, medicine, and shelter. Our data illustrates that, even though both types of SFEs could play an important role in improving the quality of life of forest-dependent peoples in developing economies, communal enterprises seem more inclined to satisfy the medium- to long-term needs of a larger group of people while profits from individual businesses tend to be directed towards the short-term and urgent requirements of particular households.

19.3.6 Challenges for enterprise development

Some of the SFEs included in this study – mainly wood-based businesses – faced significant challenges that threatened their development. These obstacles revolved around corruption, illegal activities, and the requirements for updating CF management plans.

Corruption

A major concern for most firewood and branchwood businesses was the incidence of corruption at roadside checkpoints. Various respondents revealed that police and forestry officers requested illegitimate payments during the transportation of forestry products along Gambian roadways. One branchwood merchant detailed: "It is a very good business and it leaves profit, but then…every police stop, she pays to the police, she pays to the forestry officers." Another enterprise owner explained that she had virtually stopped trading branchwood outside of her village simply to avoid these roadside checkpoints.

Various respondents claimed that they encountered this problem regardless of whether or not they had licenses to operate. One representative from a CF association believed that road officers lacked information on the rules governing CFs and, therefore, did not recognise CF licenses. This respondent was deeply concerned and thought that this situation might threaten the establishment of future CFs:

"More communities want to be involved in the CF [process], but if the concept continues like that…, those people will be discouraged."

Corruption of this sort has been an ongoing issue in The Gambia (FAO 2005). It is a symptom of profound institutional weakness (Hellman et al. 2000) and is a major obstacle to achieving sustainable forest management (Ferguson and Chandrasekharan 2005). Where SFEs are concerned, corruption at this level can jeopardise the formation of CFs by deterring communities and individuals from getting involved in these sorts of decentralisation processes. In addition, corruption can lead legal enterprises to become part of the informal shadow economy should they not realise any tangible gains by acting lawfully.

Illegal activities

SFEs in this study cited a number of illegal activities in The Gambia that were taking place and impeding their development. For example, firewood businesses complained about competition from illegal producers. Members from two enterprises explained that illegal traders affected the competitiveness of their businesses by selling firewood at drastically reduced prices, thus distorting the market. This was especially problematic for CF firewood enterprises since they were also legally obliged to dedicate 15% of their profits to the DoF's National Forest Fund, which increased their prices even more. This was further exacerbated by the fact that several firewood enterprises had agreed to maintain a fixed price for their products as a means of increasing their collective bargaining power.

An additional challenge affecting communal SFEs was the incidence of illegal activities within and outside CF boundaries. One respondent explained that trespassers encroached into the CF to harvest products to supplement their incomes. This issue was of great concern to some since it has the potential to weaken the ability to conserve forests. Along with bush fires, this illegal harvesting by intruders was one of the most frequently mentioned threats to the sustainability of CFs.

Illegal activities reflect a weak enforcement capacity by the government. Like corruption at roadside checkpoints, illegality – if left unchecked – could undermine the development and survival of some CF enterprises by hindering their ability to compete fairly. Many villagers have exhorted the government to increase control over illegal activities. Some respondents even proposed the creation of a "common marketplace" for CF products, where all goods and merchandise that originate from CF areas (honey, handicrafts, firewood, etc.) could be safely and legally sold. They argued that this strategy might help the government identify illegal activities more readily and could even promote the establishment of new CFs.

To some extent, the government of The Gambia is addressing the issue of illegal activities within its forests. However, our data suggests that certain policy measures may be somewhat misguided and ill-conceived. For instance, a ban on the use of chainsaws in Gambian forests has been imposed to curb illegal activities. A representative of the DoF explained that this embargo was implemented in 2008 when timber and log exploitation became uncontrollable, due in large part to high demand for timber from China. The efficacy or impacts of enacting this prohibition are not yet documented and the policy explicitly exempts CFs with valid management plans; however, some respondents expressed concerns. Some villagers explained that the ban penalised individuals or groups that were attempting to manage their forest resources sustainably but who logged with chainsaws. Respondents from two firewood enterprises explained that it had halted the operations of related CF timber and log enterprises, bringing negative economic consequences to the community as its overall sources of income were reduced. This suggests a misinterpretation of the ban by some villagers who may be unaware of its exemptions for CF activities and/or misinformed about the underlying reasons for ceasing timber and log operations within CFs (i.e. it is more likely related to the lack of valid management plans).

Requirements for updating CF management plans

Management plans are required for the legal utilisation and commercialisation of CF products, but members from two firewood enterprises expressed frustration over the length of time that it took to update their CF management plans (more than two years at the time of writing). Respondents in one community explained that the local forestry officer obtained the villagers' input for the design and content of such a plan and was supposed to write a first draft for validation with the community. However, he never returned. This problem is not uncommon and management plans have expired in a number of communities (Thoma and Camara 2005, FAO 2011b). Our data suggests inadequate support from and institutional capacity of the DoF to facilitate the development and/or updates of CF management plans.

The absence of a CF management plan proved challenging for some communities because it restricted their ability to plan and carry out certain activities. For instance, one enterprise could not access credit from a financial institution since presentation of this document was a key requirement (in effect, collateral). Enterprise members clarified that

they were able to fulfil all the requisites for a loan except this one. Respondents from another enterprise explained that in the absence of a CF management plan, they had to request authorisation from the local forestry officer every time they sought to commercialise any forest products. This sort of situation might put the sustainability of forests at risk as decisions regarding use are not in accordance with a longer-term plan but are left to the discretion of the villagers and forest officers. Moreover, these sorts of ad hoc arrangements may encourage illegitimate dealings between these actors.

19.4 Conclusions

The Gambia is frequently cited as a pioneer and successful example of the implementation of participatory forest management in Africa and the concomitant development of CFs and SFEs. The case study presented here on SFEs' operating in the rural forest-dependent communities of The Gambia shows that the establishment of CFs and the creation of an enabling environment can foster business success and ultimately generate a series of positive outcomes for local actors, including a higher degree of empowerment, improved capacity building, and continued access to forest resources. Moreover, SFEs have contributed to villagers' livelihoods by generating additional sources of income, thus contributing to the fulfilment of basic family needs and the success of community development projects. Although this study did not assess the direct impact of the establishment of CFs on forest cover and forest health, there is some evidence to suggest that this initiative has, indeed, promoted forest conservation, democratisation (vis-à-vis local institutions), and improved community livelihoods.

Despite these accomplishments, some of the studied enterprises – mainly wood-based businesses – faced serious challenges that threatened their development. For instance, the studied SFEs still had limited access to financial services. While they were successful in accessing deposit services, many were unable to acquire loans, especially from commercial banks. Our data shows that cooperative credit unions, NGOs, associations, and government projects have each played a major role in filling this gap and satisfying credit demand from SFEs. Corruption and the presence of illegal activities were, and continue to be, ongoing issues in The Gambia, reflecting weak institutional and enforcement capacity on the part of the government. Another concern revolved around the arduous processes and difficulties inherent in updating CF management plans. Delays on this front not only restrict a community's ability to plan and carry out certain activities but also mean that access to much-needed credit from a financial institution can be delayed as well. One less obvious repercussion of the above challenges is that many also have the potential to negatively influence sustainable forest management efforts in the region.

Many of the requisite conditions for success of participatory forest management are currently in place in some areas of The Gambia – access to forest resources and well-defined user rights in CF areas, clear forest management strategies, and capacity building (Thoma and Camara 2005). Some of these outcomes are the result of implementing synergistic policies like the 1998 Forest Act, the 2003 Local Government Act, and the 2010–2019 Forest Policy, all of which promote the transfer of forest management to local communities. In 2011, this success was recognised by the World Future Council and its Future Policy Awards by conferring the Silver Award to The Gambia for its Community Forest Policy. However, while the government of The Gambia has invested considerable time and effort in the establishment of CFs and in transferring capacities in forest management and business skills to villagers, the future of this process appears uncertain, given the limited growth in the number of CFs to date and the generally slow process of decentralisation.

While it was not the intent of this case study to explore inefficiencies and obstacles within government, it is worth noting that several factors still impede the DoF from fully implementing its policies, including increasing population pressures, a need to balance demand and supply of forest resources, uncertainty over land tenures, and inadequate marketing of forest products (Republic of The Gambia 2010). In other instances, arduous administrative procedures hamper the DoF from easily accessing resources from the National Forest Fund, compromising its financial capabilities (Thoma and Camara 2005). Crucially, the DoF also appears to lack adequate funds to continue with the implementation of its plans for promoting sustainable forest management (Thoma and Camara 2005). Additionally, the Gambian government's implementation guidelines for CFs stress the need, as yet unmet, for external funding to facilitate capacity-building programs, establish basic infrastructure, and build a network of operational forest stations and field offices across the country (DoF 2005). However, current national development strategies in The Gambia do not explicitly link forestry activities with poverty alleviation strategies, thus affecting the potential access to future donor funding in this domain (Thoma and Camara 2005).

Without proper funds in place for long-term capacity-building programs, this central aspect of CF implementation in The Gambia is threatened. The provision of business skills training on an ongoing basis is fundamental to the success of CFs (and their

associated SFEs). Businesses are dynamic, markets are evolving, and the political economy within which enterprises are situated is a moving target. In short, entrepreneurs need to be continually acquiring new skills in order to deal with the changing realities of running small forest-based enterprises. Indeed, many enterprises in this case study had taken part in some kind of capacity-building activity. However, the data also indicates that capacity-building activities should not be restricted to one-time events but rather should be provided frequently and in a continual manner. The 2010–2019 Forest Policy echoes the importance of capacity-building activities, highlighting the need to continually develop the institutional capacity of rural communities to assume increasing responsibilities for natural resource management, through farmer training, community-based resource management, educational campaigns, and the dissemination of resource management technologies, among others (Republic of The Gambia 2010). While there is intent on the government's part to scale up the MA&D capacity-building approach across the country, it is unclear how this will unfold without adequate funds.

The research presented here provides insight on the opportunities and challenges of a small number of functioning SFEs operating in villages with community-owned forests located in the Western region of The Gambia. However, it is important to note that the majority of SFEs in this region do not operate within the context of a CF and/or are located in more remote areas and with less infrastructure (Tomaselli 2011). Therefore, the results from this study should not be generalised to other SFEs in the country, which may face additional challenges to the ones identified in this investigation. A broader survey of SFEs across The Gambia, including those not associated with a CF, could strengthen the findings of this exploratory work. Likewise, future investigations could examine SFEs that have ceased operations in order to identify some of the factors that contributed to their failure. We also recommend conducting a policy analysis to elucidate the underlying causes of the weak enforcement, corruption, and illegal activities observed in this study, so that viable solutions that address these issues in a meaningful manner can be brought forth.

In spite of the challenges facing the future of some SFEs in general and CFs in particular, our research shows that local people in our study sites are benefiting in diverse ways from the establishment of CFs and forest-based enterprises. There remains a strong foundation for participatory forest management in The Gambia, and it would be prudent for those developing poverty reduction strategies and policy reforms to take this into account by promoting interventions that create an enabling environment for SFEs and CFs to flourish.

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Local livelihoods in the context of deforestation and forest degradation: A study of three regions in Madagascar

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Abstract: The high value of Madagascar's flora and fauna that can be found in the remnants of primary and secondary forests requires sustainable forest management practices to reconcile the needs of the local population and the demands for biodiversity and ecosystem conservation. This study analyses different local contexts of deforestation and forest degradation in three regions in Madagascar representing different types of forests and livelihood strategies. It shows that a better understanding of local contexts and peculiarities is essential in order to appropriately address direct and underlying causes of deforestation and forest degradation and to incentivise sustainable forest management.

Keywords: Madagascar, deforestation, forest degradation, local livelihoods, dependency on deforestation

20.1 Introduction

Madagascar faces severe development challenges in the context of a decline in natural resources productivity and recurrent political and economic crisis. With 69% of the population living below the poverty line, it is one of the poorest countries in the world. Of the total population of 21.3 million, growing by 2.8% annually (UNFPA 2011), 61% lives in rural areas, with about 82% of the country's labour force engaged in agriculture (INSTAT 2006). Thus, livelihoods in Madagascar are highly dependent on the use of natural resources. Household energy consumption is mainly covered by firewood collected from forests (primarily in rural areas) and by charcoal (primarily in urban areas). In addition, forests provide a source of timber for satisfying basic needs such as the construction of houses and tools.

Madagascar has implemented conservation policies since the beginning of the 20th century. Nevertheless, environmental degradation continues even after the ambitious National Environmental Action Plan (NEAP) was launched at the beginning of the 1990s (Bertrand et al. 2009). The country is still considered one of the hottest biodiversity "hotspots" (Myers et al. 2000); its yearly deforestation rate was 0.45% between 2005 and 2010 (FAO 2010), a decrease from the estimated rate of 0.9% between1990 and 2000 (Harper et al. 2007). However, rates vary considerably, between 0.05% and 6% at the regional scale (period of 2000–2005, MEFT and USAID 2009). One of the major reasons cited for deforestation in Madagascar is slash-and-burn agriculture, called *tavy* in the Malagasy language, which is used by many farmers. Tavy is defined as an area of vegetation cleared and burned for cultivation (Vicariot 1970). The word *tavy* refers to the slash-and-burn practice itself as well as the area where the practice is applied. It may be practiced in both primary and secondary forest. Tavy constitutes a way to access land. Fallows also provide firewood, construction wood, medicinal plants, and fodder. According to Styger et al. (2007), the length of the fallow period, for instance, on the east coast of Madagascar, has declined from a period of 8–15 years to 3–5 years over the past 30 years. After these 3 to 5 years, the fertility of the soils on which tavy is practiced decreases due to increasing growth of weeds. Hence, farmers may decide to clear

another forest plot. The shortening of fallow periods may impact soil productivity and therefore its yield (Guillemin 1956).

As stated, tavy is described as one of the major drivers of deforestation. However, there is an ongoing discourse about the prevalent causes of deforestation in Madagascar. Bertrand et al. (2009) and Pollini (2010) explain that several narratives about deforestation in Madagascar describe rural people as an instrument of the environmental degradation. These narratives that overstate the role of the communities have been answered with a "reverse exaggeration." For the highlands of Madagascar, Pollini (2010) distinguishes three types of narratives: 1) the colonial narrative with "the myth of the green paradise" as an argument for keeping control over the communities; 2) the "modern" narrative, which emphasises both the role of non-human-induced fires and settlement in the expansion of grassland based on paleobotanical, archaeological, and paleontological studies; and 3) the political ecology narrative, which sees "ecosystems as changing rather than degrading" and "policies […] rather than traditional land uses" as drivers of degradation. Pollini concludes that each of these three narratives is tied to specific strategies for tackling social and environmental challenges and should all be taken into account.

In 1922, Chevalier, a French historian and geographer, argued that in all tropical forests the causes of forest clearing are the same and thus require the same solutions. He asserted that human activities, aggravated by colonisation, are similar throughout the tropics. Palo (1994) presented a more complex statement. He wrote that "a fundamental feature of excess deforestation is that the causal factors of deforestation are linked together like a set of chains or mechanisms into a causal system." Palo described a "system causality model of deforestation" that includes underlying factors (e.g. political, economic, technologic, climatic, and demographic) and direct factors (e.g. agriculture, logging, and grazing). Depending on the various links between the causal factors and their intensity, the deforestation is either accelerated or decelerated.

Other frameworks have also been developed that aim to design a more straightforward analytic approach towards addressing the complexity of the deforestation process and analysing the effects of individual drivers. These frameworks are similar in that they each distinguish direct (proximate, immediate) and indirect (underlying) causes. With the help of logistic regression, Mahapatra and Kant (2005) studied the dual effects of underlying causes directly on deforestation, i.e. either an increase or a decrease in deforestation.

Kaimowitz and Angelsen (1998) classified variables from a review of 140 models of deforestation into five categories: 1) the magnitude of deforestation (e.g. forest cover, biomass, and wood production), 2) the characteristics of the agents of deforestation (e.g. education, ethnic group, and initial capital), 3) the choice variables (e.g. land, labour, and capital allocation), 4) the agents' decision parameters (e.g. timber and agricultural prices), and 5) the macroeconomic variables and policy instruments (e.g. institutions, infrastructure, markets, and technology). They are classified as underlying causes, immediate causes, and sources of deforestation.

Geist and Lambin (2001) distinguish between proximate causes and underlying causes. Proximate causes refer to agricultural expansion, wood extraction, and infrastructure extension. The underlying causes are economic, policy/institutional, cultural, technological, and demographic. Further variables dealing with biophysical factors and "social trigger events" (such as wars and epidemics) are grouped as other factors.

Casse et al. (2004) mention the mutual independence of four identified direct causes (agriculture, timber, cattle, fuelwood) in southwestern Madagascar and add that these can be "sequential or complementary, rather than competing." Each direct cause is influenced by different indirect causes (e.g. migration, local market, and export prices). For Fisher et al. (2008), "attempts to understand causal linkages must be related to the contexts of specific situations." They add that to understand the underlying mechanisms, it is essential to take into account "multiple geographical scales and institutional levels."

The objective of this study is to characterise the drivers of deforestation and forest degradation in the local livelihood context. For this purpose, a multiple-scale approach is adopted. Characteristics of regional variables of deforestation are explored with secondary data. At the local scale, the characteristics of the deforestation and deforestation process are assessed through interviews with actors living in the hotspot areas. It is supposed that in each of the three areas, the local population's dependency on forests is different, and thus the role of deforestation and forest degradation in satisfying their basic needs also varies.

This study is based on data gathered in the REDD-FORECA project, a multi-institutional and multinational project to support the government of Madagascar in the development of a national REDD+ strategy (Baldauf et al. 2010, REDD-FORECA 2011).

REDD+ aims at the reduction of emissions from deforestation and forest degradation, conservation and sustainable management of forests, and the enhancement of forest carbon stocks. For an operational REDD+ methodology, a country needs to consider those forest areas that show ample changes in their size or carbon stock. It can be assumed that areas showing such changes are subject to at least one or more typical drivers of deforestation and for-

Figure II 20.1 The three study sites in Madagascar: 1 Tsinjoarivo, region of Vakinakaratra; 2 Manompana, region of Analanjirofo; 3 Tsimanampetsotsa, region of Atsimo-Andrefana.

est degradation (Bucki et al. 2012). In the scope of the REDD-FORECA project, three hotspots were identified – Tsinjoarivo, Manompana, and Tsimanampetsotsa – located in the regions of Vakinakaratra, Analanjirofo, and Atsimo-Andrefana (Figure II 20.1) and representing different forest formations (moist, deciduous, and dry) adapted from IPCC categories (IPCC 2003). An extensive overview of the applied methodology can be found in Plugge et al. (2010).

In the study areas, deforestation and forest degradation take place in regions that differ in their human (cultural and socio-economic characteristics) and environmental (type of forest) systems. Before presenting the method and the results of the study, an overview of political, economic, and institutional issues in Madagascar describes the broad context of deforestation and degradation in this country. Conclusions about the findings and their significance regarding the development of viable SFM close this chapter.

20.2 Policies, institutions, and governance in Madagascar

20.2.1 Commitment and crisis

The government of Madagascar signed the Convention on Biological Diversity (CBD) and implemented the convention through NEAP. A major step for the implementation of NEAP was the creation of the GELOSE process (see section 20.2.2) aimed at a decentralised community-based forest management. Through this, Madagascar promoted the sustainable use of formally state-owned forest resources by handing over forest-management rights to local communities. Furthermore, several projects have been launched in the country to develop a REDD+ strategy for Madagascar (Ferguson 2009). In 2010 Madagascar submitted its Readiness Preparation Proposal to the Forest Carbon Partnership Facility (FCPF) and implemented a technical committee for questions relating to implementing REDD+ activities in the country (FCPF 2010). However, since the coup in 2009, the country has struggled with the implementation of NEAP and the REDD+ policy reforms and is in urgent need of support from the scientific and development community to exchange information on approaches successfully implemented in other parts of the world. The recurrent political crises in Madagascar often hinder implementation of policies and measures for the conservation of the remaining ecosystems of the island by facilitating illegal activities and corruption and undermining long-term approaches.

In the 1990s, international financial support rose for NEAP. During the first phase of the plan (1991–1997), funds were allocated for the creation of protected areas and promotion of conservation. The second phase (1997–2003) was oriented towards the participation of the population in the management of natural resources in a context of political decentralisation (Bertrand et al. 2009). The third phase of NEAP started after the 2001–2002 political crises. To prove its commitment to nature conservation and sustainable development, the new government instituted an environmental policy in which tavy was severely punished (Pollini 2011).

Horning (2008) described a "veritable explosion" of foreign assistance in the 1990s. However, she adds that improvements remained insignificant for two reasons: first, foreign donors competed in influencing state policies for their own interests ("Aid has become a tool for legitimizing power at the domestic level."). Second, Madagascar abetted this competition in order to maintain a currency flow.

For Corson (2011), despite of millions of dollars for conservation, the creation of new protected areas in Madagascar has been conducted with inadequate

financial support for consultation processes with local communities. She argues that time pressures related to political agendas has led to a level of consultation that does not reach the villagers. In addition, the objectives of "consultation" and awareness were not differentiated in order to establish protected areas rapidly. She adds that park boundaries were based on biodiversity and not on local land uses and points out that conservation programs "reinforce nonlocal decision-making by creating a mechanism around which foreign conservationists, working with national government agencies, could influence Madagascar's forest policy." Pollini (2011), who analysed the failures of NEAP's conservation policies, presents similar conclusions. He explains that failures to link conservation and development are due to an international environmental agenda that does not meet the needs of the communities. He adds, "Priority was given to conservation, which led to the utilization of development activities as a Trojan horse for convincing farmers to accept conservation measures and adopt ill-designed agricultural techniques."

20.2.2 Community forest management

Since 1996 Madagascar has pursued the GELOSE legislation (GEstion LOcale SÉcurisée – Secure Local Management) to promote the sustainable use and conservation of natural resources. Theoretically, it implies that farmers are not bound by a centralised governmental land-use plan. Instead, they are granted a management right for some natural resources within a village territory (Bertrand et al. 2009) (Transfer of Management to local Communities). The local communities (French acronym COBAs) are legal entities formed by villagers. Management plans (e.g. for forests, water, or grassland) are developed with the support of several initiatives in which farmers, NGOs, and local decision-makers take part. A contract among governmental bodies, the commune (the smallest territorial division for administrative purposes), and the COBAs hands over the rights to use the resources according to the management plan. The COBAs themselves develop formal agreements for social enforcement of the contract terms (Antona et al. 2004). The use of forests is thus regulated by the COBAs according to their management plans, which are created for sustainable use of a forest resource and are counterchecked by governmental bodies, local authorities, and oftentimes by supporting NGOs. Officially, COBAs have to report all of their activities to local authorities. Nevertheless, there is no fixed scheme for continuous participatory forest monitoring.

COBAs exist in all three study sites and are supported by NGOs. In Manompana, the Koloala project of the Malagasy government and HELVETAS (Swiss Intercooperation Madagascar) aims at concerting the actions of several COBAs to apply community-based forest management, taking into account regional and ethnic circumstances. However, as an elder pointed out during the fieldwork in the south of Madagascar, the implementation of the GELOSE legislation may lead to conflicts between different stakeholders (Rqibate 2013). The community management contract does not allow people the individual use of plots located on their ancestral land, which is a common property. The state recognises the common property but restricts its use by co-owners.

20.2.3 Land and forest tenure

As described above, tenure rights play an important role in the management of natural resources. However, tenure is a highly complex issue in Madagascar. Legally, unregistered land in Madagascar is state-owned. However, due to traditional tenure rights of rural communities, there are parallel official (state) and local (community) tenure systems that oftentimes do not match and may complicate the implementation of conservation and poverty alleviation projects. To address land tenure issues, the government began to implement a National Land Tenure Program (PNF, French acronym for Programme National Foncier) in 2004. According to this program, land tenure security for the local population has to be assured by the "formalization of the non-written land tenure rights, the protection and regularization of the already written land tenure rights" (République de Madagascar 2005). Legislation provides the framework for the protection of land tenure for all land occupied via a traditional way: for example, family patrimony ("traditional meadow land of a family except for very wide meadows which will be legislated differently", PNF 2005), except land accessed through forest clearing. In the PNF, local communities have the responsibility for land-tenure mapping.

20.3 Method, data and results

20.3.1 Context of deforestation and forest degradation

Method

This first part of the study aimed to explore and highlight key variables that characterise the deforestation context in the project regions (Vakinakaratra, Analanjirofo and Atsimo-Andrefana) on the basis of a large existing data set.

Table II 20.1 Explanatory variables (INSTAT 2006, MEFT/USAID 2008) used for the factorial analysis; the deforestation rate in the time period 2000–2005 and percentage of forest cover are used as dependent variables (proxies of the magnitude of deforestation, Kaimowitz and Angelsen 1998) (Rqibate 2013).

Types of drivers of deforestation and forest degradation	Name of the proxy	Description of the proxy	PCA	MCA	DFA
Environmental	Forest type	Dry, deciduous, moist		Categorical variable Dry :1 Deciduous: 2 Moist: 3	
Social	Charcoal users	Percentage of population using charcoal as fuelwood	%	Ordinal variables Low: 1 Medium: 2 High: 3	%
	Collected wood users	Percentage of population using collected wood as fuelwood	%		%
	Urbanisation rate	Percentage of population living in urban area	%		%
	Education	Percentage of workers that have not attended school	%		%
Economic	Poverty	Percentage of the population considered to be poor	%		%
	Income	Mean annual income per household (Ariary)	Ar		Ar
Agricultural	Tavy	Percentage of commune practicing slash and burn	%		%
Demographic	Density	Density of population (persons/m²)	Pers./m²		Pers./m²
Institutional	Tenure	Percentage of families that accessed land through slash-and-burn farming	%		%

Direct and indirect variables classified as proxies of deforestation (Table II 20.1) by Kaimowitz and Angelsen (1998) and Geist and Lambin (2001) were used to perform a principal components analysis (PCA) at the regional scale. The PCA is a statistic tool that allows exploring and interpreting correlations within a large set of quantitative variables. Through the PCA, the set can be described with few factors, which are a linear combination of these variables. This tool allows a graphic representation of the variables that are projected in a map along two axes representing the factors that are interpreted a posteriori. The data set of each region contributes strongly or weakly to the construction of these factors. In addition, two further analyses, the multiple correspondence analysis (MCA) and discriminant factorial analysis (DFA) were performed for the exploration of qualitative data. As in PCA, MCA aims to analyse the relationships between variables and represent them graphically. The *x* and *y* axes are called dimensions. With the help of DFA, the characteristics of a specific attribute (here "forest type") can be highlighted.

Results of the regional analyses

The outputs of the PCA and MCA emphasise three factors and two dimensions. The variables of tavy and forest cover form a factor that can be interpreted as representing the direct causes of deforestation and forest degradation (see Figure II 20.2, Factor 3). The region of Analanjirofo is strongly represented by this factor (see Figure II 20.4). A high percentage of the communes in Analanjirofo are characterised by practicing tavy (79% versus 3% in Vakinankaratra and 36% in Atsimo Andrefana). The results of MCA give more information about the tavy and the context of its practice and highlight the difference in Vakinankaratra. Indeed, MCA (see Figure II 20.3) shows that the proxies discriminate the regions according to slash-and-burn practices (tavy, tenure) and forest attributes (forest cover, forest type). Analanjirofo has the highest forest cover (50% of the territory), which constitutes a means to access land for a quarter of the households (24% of households access land through slash-and-burn practices, compared with 6% in Vakinankaratra and 4% in Atsimo Andrefana). This result shows the opposing factors for Analanjirofo (high tavy, high forest cover) and Vakinankaratra (low tavy, low forest cover).

The variables of population density, deforestation rate, and education compose a factor that describes the underlying causes of deforestation and forest degradation (see Figure II 20.2, Factor 2). On the factorial map, Vakinankaratra contributes strongly to the construction of this factor (see Figure II 20.4). The population density in this region is indeed the third highest in the country (about 77 persons/m² against 38 and 37 persons/m² in Atsimo-Andrefana and Analanjirofo). The region is characterised by a high deforestation rate as well (4.1% versus 1% in Atsimo Andrefana and 0.1% in Analanjirofo during 2000–2005). DFA shows that the variables of forest cover and tavy are discriminant for forest type, which means that regarding these two variables, significant differences between the different forest types exist. In Vakinankaratra, only 0.6% of the region is covered by deciduous forest and few communes (4%) claim to practice tavy.

The data set of Atsimo-Andrefana contributes more weakly to the factor describing the underlying causes (see Figure II 20.4). The context of this region is characterised by a high percentage of workers without education (49.6% versus 17.8% in Vakinankaratra and 29% in Analanjirofo).

The variables of charcoal users and urbanisation rate, poverty, and collected wood users contribute to the formation of another factor (see Figure II 20.2, Factor 1). This factor opposes two types of fuelwood users depending on their economic background and location. The results of the MCA are similar (see Figure II 20.3). The group of variables charcoal users,

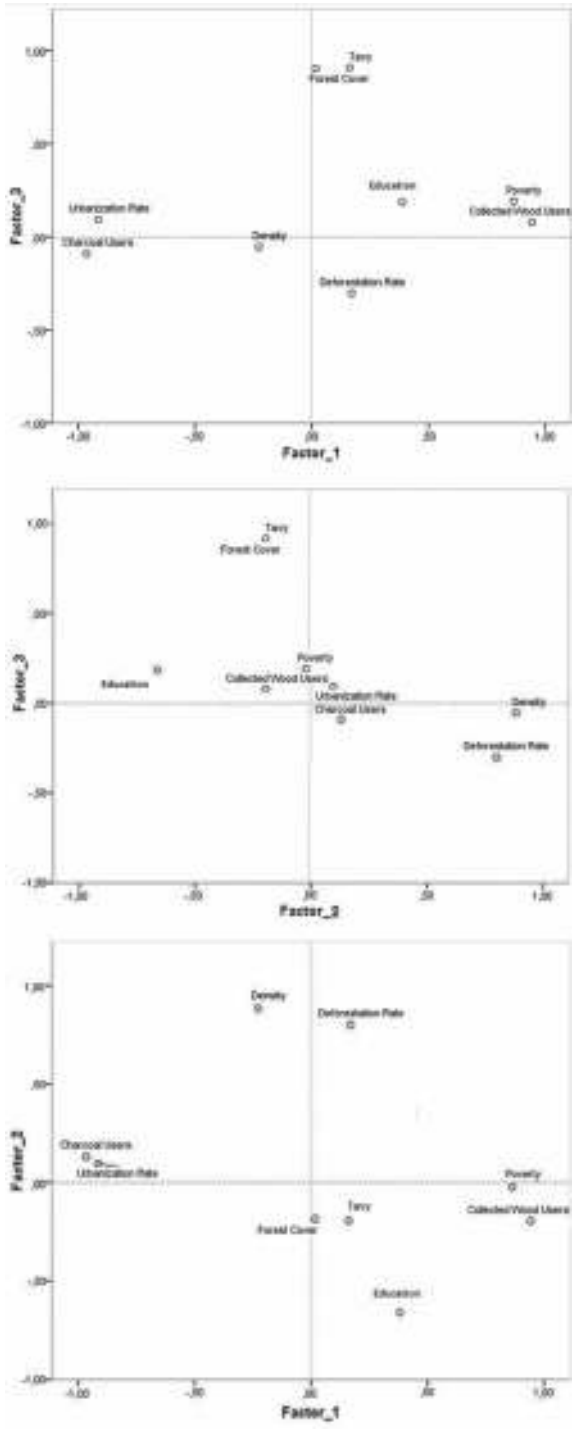

Figure II 20.2 Projection of the variables according to the factors 1, 2, and 3 (Rqibate 2013).

density, poverty, urbanisation, incomes, and collected wood users participate in the construction of a dimension. It represents the type of wood use according to economic (poverty, income) and demographic variables (urbanisation, density). Correlations between these variables show that poverty occurs more often in rural areas than in urban areas (poverty ratio and urbanisation rate have a strong negative correlation). Collected wood is used by rural households with low

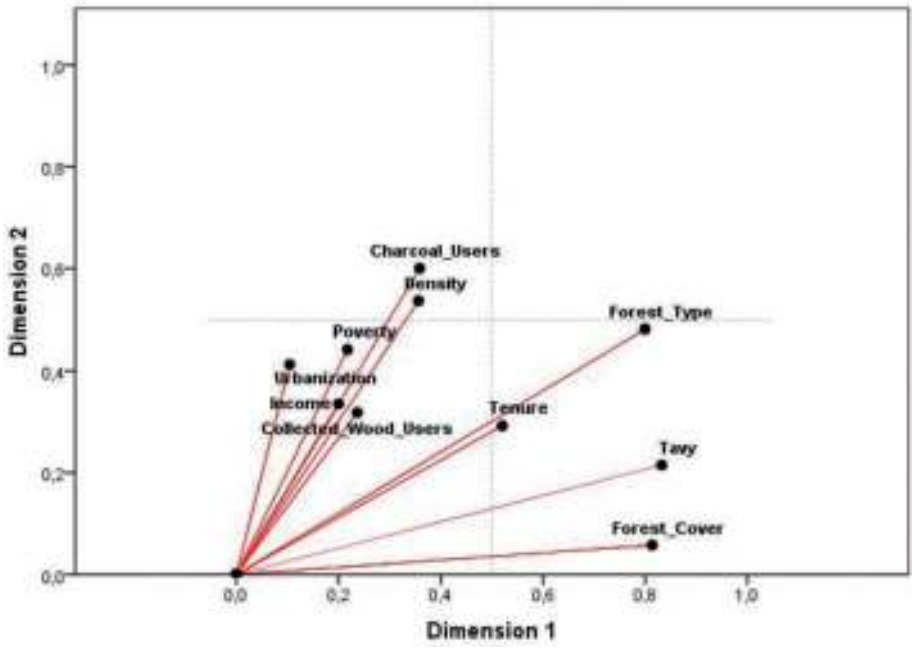

Figure II 20.3 MCA, projection of the variables in accordance with dimensions 1 and 2 (Rqibate 2013).

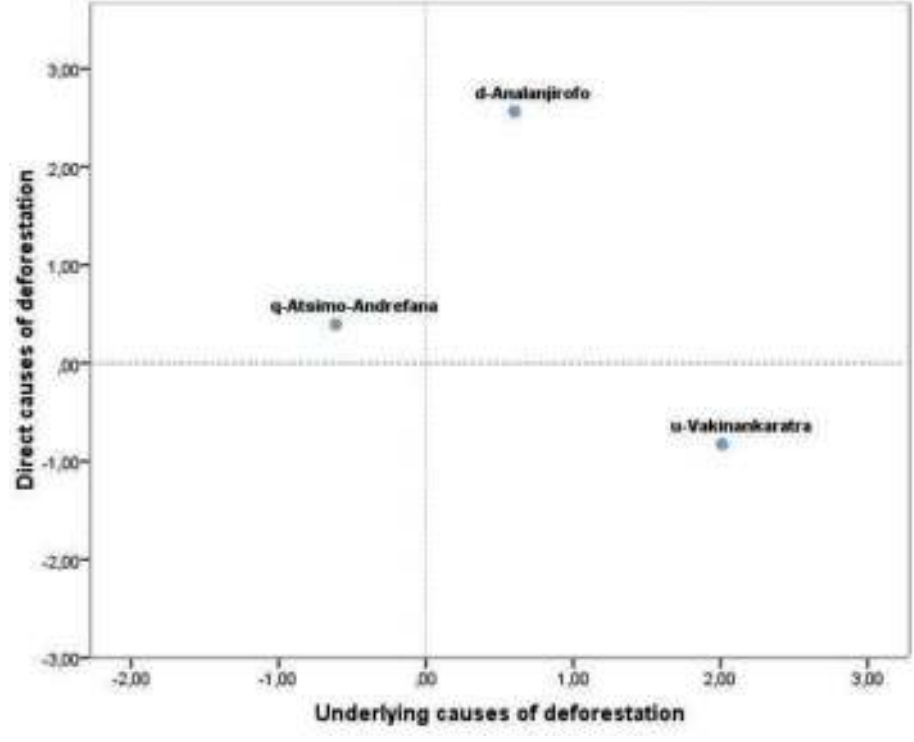

Figure II 20.4 Projection of Vakinankaratra, Analanjirofo, and Atsimo-Andrefana according to components 2 and 3 (letters *d*, *q*, *u* pertain to the rank of the region according to its deforestation rate) (Rqibate 2013).

incomes (collected wood and poverty ratio show a strong positive correlation).

Beyond the variables

Key variables (such as tavy, population, density, education) have emerged from the data set through the statistical analyses. These variables helped highlight main regional characteristics of deforestation and forest degradation and they have significance beyond their mere statistical relevance. Deforestation is an ancient issue in Vakinankaratra. At the beginning of the 20th century, plantations of *Pinus* and foremost *Eucalyptus* were already supplying fuelwood for numerous cities (including the capital) and the region itself. In the 1960s, programs for agricultural intensification took place in the highlands as response to demographic growth and the scarcity of agricultural areas, leading to further deforestation. The forests that remain in the region today are too remote to be utilised profitably (Rabetaliana et al. 2003). It seems then that at the regional scale the population has for a long time depended more on plantations than on natural forest resources.

According to the National Institute of Statistics Madagascar (INSTAT 2006), education level may have a significant impact on living conditions. It influences the decision to use firewood or charcoal and also has an effect on the level of consumption. Subsistence agriculture is practiced more by persons without education. It should be noted that in Atsimo-Andrefana and southwestern Madagascar in general, a major underlying cause of deforestation was the high demand for maize in the early 1980s. Maize export was facilitated and stimulated by measures (elimination of fixed prices for agricultural products, devaluation of currency) imposed by the International Monetary Fund in the face of an important national economic crisis (Scales 2011), and the production of maize changed from subsistence farming to cash-crop production.

In Analanjirofo, tavy is a tradition with religious elements, a manifestation of the ancestor cult – maybe the most important in the Betsimsaraka region (Vicariot 1970) – that continues to be upheld. The large moist-forest cover is a source of agricultural lands even though it is remote and hard to access in some areas. By practicing tavy, farmers have a guarantee to harvest rice although the yield can be insufficient. For Aubert et al. (2003), it is "a good compromise with regard to climatic hazards, labour availability, and food security." Family labour and fire are the major inputs into this agricultural system.

20.3.2 Traditional use of forests in hotspot areas

Method

At the scale of the project areas (Tsinjoarivo, Manompana, Tsimanampetsotsa), the context of deforestation and forest degradation was analysed with data collected through interviews. The viewpoints of local actors, relationships of farm households with the process of deforestation and degradation, and differences between the assessment areas were examined. The hotspots are located in rural areas where agriculture, either subsistence or market-oriented, is the most important source of livelihood. Features of traditional and economic structures of farm households were assessed using information from the interviews.

The farm households were selected on the basis of their distance to the contiguous forest in the study area. For selection of the villages and organisation of the field research, land-use maps were analysed with the help of key informants. Three categories were created according to the spatial organisation of the study area. The villages on the edge or inside the forest were classified in the forest-fringe category; Manompana and Tsimanampetsotsa villages on the coast were classified in the far-area category. In Tsinjoarivo, villages in the west were also classified in the far-area category. Villages between the forest fringe and the far area were classified in the intermediate-area category. Questionnaires for individuals (semi-structured) and group interviews were developed. The questionnaire addressed four topics:

1) characteristics of household and farm (age of the household's head, size of household, migration, land acquisition, area converted to agriculture, production, and quality of the production)
2) farm and off-farm economic data of the household (input and output of the farm for calculating farm income and off-farm income); farm incomes (tavy and non-tavy) disaggregated according to value of farm products (non-tavy); value of products cultivated on tavy plots; income from farm products (non-tavy) sold; income from farm products (tavy) sold; off-farm income
3) household's use of the forest (location of fuelwood collection and logging, wood species, forest activities)
4) informal discussion

Village meetings and discussions with authorities, key informants, and villagers (women, leaders, elders, merchants, cultivators, migrants) dealing with social, economic, environmental, and cultural aspects of the study area were also conducted.

Figure II 20.5 Woman preparing tavy rice in Manompana. ©Aziza Rqibate

Characteristics of the functions of deforestation and forest degradation and their links with the livelihoods of the population were assessed in the three project areas. We describe Manompana more in detail here as an example of the application of the method. The findings concerning the key differences between the hotspots are presented.

Results of the local analyses in Manompana

Ecological and human features

The Manompana study area "on the east coast of Madagascar (region of Analanjirofo) encompasses 46 095 ha, of which 75% remains forested (Plugge et al. 2010). The moist evergreen forest is characterised by high rainfall, a rich topography, and increasing fragmentation. It is part of the Koloala initiative of the government of Madagascar and HELVETAS, which promotes sustainable forest management (SFM). Accordingly, the forest here is classified as a sustainable production forest even though it has undergone some serious deforestation and degradation. The above-ground biomass is estimated to be 272.5 tons/ha (Plugge et al. 2010). The population (about 18 000 inhabitants) of Manompana belongs to the Betsimsaraka ethnic group. About 90% of them practice agriculture. They cultivate rice on hills and in valleys as well as cash crops (cloves, vanilla, and coffee) in mountainous areas. According to the Manompana Community Development Plan (PCD, French acronym) (2006), the principal causes of environmental degradation are the practice of tavy, bush fires, intensive logging, and lack of alternative livelihood options (Figure II 20.5). The acceleration of environmental degradation is stressed in a multitude of documents (e.g. PRD 2005): "At the rate we are heading now, in a few decades, there will be no more valuable primary forests in the region". For the area of Manompana, deforestation is higher than the regional rate. Eckert et al. (2011) estimate the total forest-cover loss between 1991 and 2009 to have been about 18% (1% per year). Analysis of satellite imagery (Baldauf et al. 2010) shows a loss of 1400 ha/year between 2004 and 2008.

The data for Manompana came from 49 interviews (16 in the category of far area, 13 in the intermediate area, and 20 at the forest fringe). In addition, three village meetings were held in which 15 additional actors (mayor, village chiefs, women, elders, cultivators) were interviewed. The mean number of persons who depend on the head of the household was six (± three individuals).

Use of wood for energy and construction

About 17 000 m³ of wood per year is consumed for domestic uses, of which about 12 000 m³ is fuelwood consumed by the population – no alternative source of energy supply is available. Also, small clove distilleries that bring complementary income have an especially high demand for fuelwood. Wood can be found in close proximity to villages and is free of direct costs; dead wood is collected in the forest or from small groves and solitary trees near the village. The remaining 5000 m³ of wood is used for constructing traditional houses, pirogues, and tools. There is also a high demand for wood from cities outside the assessment area. According to the mayor of Manompana, 90% of the round wood is exported.

Cultural function of forests

Resins of specific species are used during Bestimsaraka ceremonies. According to beliefs of this ethnic group, some forests are inhabited by ghost and witches and others are sacred. Villagers reported that "if there are spirits in the forest, deforestation can cause death." Also, "It is forbidden to clear the sacred forests – which are characterised by the presence of knots in vines – with the risk of getting sick." This traditional knowledge is passed from generation to generation and farmers know where they can practice tavy and where it is forbidden.

Forests as a source of off-farm income

Among the interviewed farmers, 80% used the forest as a source of income. Forest-related activities (of artisans, woodcutters, carpenters, transporters, charcoal producers, beekeepers, cloves distillers) contributed 40% to off-farm activities; the remaining 60% of off-farm activities relate to fishing. Alternative incomes were necessary because of the uncertainty of cash-crop cultivation. For example, one villager reported, "Villagers suffer from price fluctuations of vanilla. They should diversify their production to be less dependent on the vanilla prices," Logging activities are taxed and provide income for financing communal projects. However, illegal logging avoids tax payments.

Forest and tavy practice

Tavy, is defined as an area of vegetation cleared and burned for cultivation, with no soil preparation (Vicariot 1970). Tavy may be practiced on different types of vegetation in both primary forest and secondary forest. In Analanjirofo, where Manompana is situated, the poverty ratio is higher (78%) than in the two other regions of the study (73% in Atsimo-Andrefana and 69% in Vakinankaratra). This high ratio may be due to the size of the forest cover, the practice of tavy, and the remoteness of the area. The forest area is indeed large enough for accessing new cultivation plots by practicing slash-and-burn farming. However, the tavy's yield is very low (de Laulanié 2003) and the isolation of the households limits access to markets. Jepma (1995) explains that from the farmer's point of view, slash-and-burn farming could be seen as "rational" because it is economically the cheapest agricultural method. It needs low or no cash input since labour is provided by family members. Through slash-and-burn practices, farmers aim to ensure their subsistence "with a minimum risk" (Jepma 1995).

As mentioned earlier, in Analanjirofo tavy is an ongoing manifestation of the ancestor cult. Vicariot (1970) explains that the spirits of the ancestors are believed to be present on the field during the sowing period. It is an occasion for the family to stay with them for several months. Farmers have to ask the *psykidy* (head of the lineage) for the authorisation to practice tavy on a specific area. Animals are sacrificed before beginning the tavy.

Rice, cassava, potatoes, vanilla, coffee, sugar cane, and cloves are the typical crops cultivated by farmers in this region. All interviewed farmers cultivate rice: 82% in valleys, 76% in tavys, and 57% in both. The lack of valleys for cultivation is one of the major problems mentioned by farmers from the far area. Half of them own tavy rice plots in the forest in the west, requiring up to a six-hour walk to reach these plots. Low productivity of crops grown in tavys is often highlighted. Indeed, 76% of farmers judged their production of tavy rice as "bad," which means not sufficient for their subsistence. In addition, a cultivator living at the forest fringe highlighted the consequence of climate change on tavy production, explaining that "it used to be sunny during periods of burning; now it is raining. The growth of the rice is delayed and yields decrease."

The number of sold products is lower among the smallholder farmers at the forest fringe but they spend more money on agricultural products than those in the far area. This result may draw the picture of a farmer-consumer on the west and a farmer-seller on the east of Manompana, with both also practicing subsistence farming. The only permanent market is in the main village of Manompana located on the coast. During a village meeting at the forest fringe, this issue was raised: "Once we sold paddy rice in Manompana; now we have to buy it. Lower yields and population growth cause food shortages." The lowest farm incomes can be complemented by cash sources from off-farm activities. Furthermore, the ratio of tavy income/farm income was higher for those households with the lowest farm incomes. Tavy constituted the only income possibility for them if they could not complement it with off-farm activities. Farmers who had a non-tavy farm income (15 out

of 49) turned a high part of the value of their tavy production into income. Out of 20 respondents from the forest-fringe category practicing tavy, only five received profit from it.

Results of the local analyses in Tsimanampetsotsa

The study area of Tsimanampetsotsa is situated in southwestern Madagascar. It features a dry forest characterised by a very high rate of endemism in flora and fauna. The forest is partly situated on a limestone plateau and is part of one of the oldest protection areas in Madagascar, recently extended. Of the total area of 43 296 ha, 65% is still covered by forest due to the protected status. The above-ground biomass is estimated to be 98.9 tons/ha (Plugge et al. 2010).

Despite initial, mainly local initiatives to establish private plantations, the forest on the boundaries of the national park is facing high pressure (SuLaMa 2011). Wood may be logged inside the park with special authorisation and in areas for sustainable management allocated by the National Association for the Management of Protected Areas (ANGAP, French acronym, nowadays Madagascar National Parks, MNP). Permits for logging are predominantly given for construction of houses, bullock carts, coffins, and *aloala* (wooden ornaments for tombs). Only 1% of respondents in the 47 households gained ownership of land by deforestation (compared with 4% at the regional scale). Of the interviewed farmers, 21% acquired land by marking boundaries, such as with wood enclosures or plants.

Most slash-and-burn areas are near the recent national park's extension or on the plateau (areas of transhumance). Between April and August, parts of the forest are cleared for extensive cultivation of maize and cassava, which is mainly bought by traders from Toliara and Antananarivo. Farmers change acreages every two or three years, once soil fertility is depleted. Raising cattle is also a major activity in the study area. Cattle are kept mainly as a symbol of status or as a bank account (savings). The interviewed farmers and stockbreeders preferably located both off-farm and farm incomes in cattle activities.

Results of the local analyses in Tsinjoarivo

The study area of Tsinjoarivo is on the high plateau of Madagascar, situated approximately 100 km south of the capital of Madagascar, Antananarivo. The forest can be characterised as moist deciduous and is highly fragmented. Only 6% of the 32 272 ha in the study area is forested (Plugge et al. 2010). While there are initiatives to establish plantations, mainly pine, to meet the demand of local communities, pressure on the forest from its proximity to the capital is high. The above-ground biomass in the forest remnants is estimated to be 163.7 tons/ha (Plugge et al. 2010).

About 85% of the population of Tsinjoarivo lives from agriculture. Irrigated and rain-fed rice is grown and tree cropping (e.g. with *Eucalyptus*, *Pinus*, or fruit trees outside forests) is also practiced by farmers. Rice, cassava, maize, beans, potatoes, sorghum, and sweet potatoes are the principal crops of the commune. At the forest fringe (east of the commune), agriculture, livestock, and fish farming are the main activities; hunting and gathering are secondary. The lack of knowledge on appropriate agricultural practices is a major problem in the east. Cleared plots are thus underexploited. In degraded forests, cut permits are occasionally obtained to establish new agricultural areas if the need is proven. Two villager groups are responsible for the management of two logging areas in the forest. However, land conflicts exist between villagers not organised in these groups and the two groups. Some villagers claim land that has been cleared by their ancestors, yet these fields are located within the management areas.

In this area, 34 households responded to the questionnaire. In their responses, farmers complain about not being able to use the forest as their ancestors did (because of restraints on clearing). They explain that they need to cut trees around crop areas to increase sunlight and thereby increase production. They also need to clear the hillsides (*tanety*) to cultivate products that help finance rice cultivation (their staple food). Farmers claimed that they get cash from tanety and not from rice. Some of them work in other villages as labourers to finance their rice cultivation. They also carry wood to carpenters in the west for supplementary income. Because of clearing restrictions, inheritance poses a problem. Children must divide the plots of their parents and plot areas become too small to feed their families. One solution, if no authorisation to clear is obtained, is to buy existing neighbouring lands to enlarge the farming area. Unlike in the far area (west of Tsinjoarivo), many children do not attend school and there is no access to medical care.

A village chief in the intermediate area explained that shifting cultivation is not practiced in the forest. The rice plantations existed before the bans and they are not extended by their owners; however they cut the wood surrounding the plots to improve exposure to the sun. This wood is usually sold. In the past, farmers from the forest fringe supplied agricultural products to inhabitants of the far area. Now, the opposite occurs because of the difficulties of obtaining permits to clear forest areas. The land used to be fertile, but now yields are decreasing and farmers lack money to buy chemical fertilizers.

20.4 Comparison of local contexts of deforestation and forest degradation

In Tsimanampetsotsa the creation of the national park and its extension has been a long and difficult process of consultation, dealing with land tenure conflicts and the ancestral use of the forest. Conservation projects grant access to water to compensate villager groups for their efforts to manage their forests around the national park in a sustainable manner. In this area, about 75% of the interviewed farmers consider their subsistence as dependent on the forest.

This percentage decreases to 64% in Tsinjoarivo. However, there is a significant difference among the farmers of Tsinjoarivo, depending on their location. Interviewed farmers living far from the forest stated that their subsistence does not depend on the forest. However, even the use of the term *forest* is ambiguous because some consider small planted patched of *Pinus* and *Eucalyptus* as "the forest." In Tsinjoarivo, plantations are an important source of energy for households (75% comes from plantations) and of construction materials (66% from plantations). Construction and fuelwood come from private eucalyptus and pine plantations that also help to prevent erosion. In the forest fringe, fewer trees were planted by the farmers interviewed. Instead, they extracted wood resources directly from the forest and did not need to manage a plantation. In Manompana and Tsimanampetsotsa, farmers did not plant trees for fuelwood – they either collected it around the village or had to buy it.

Farm incomes in Tsinjoarivo contributed 80% to farmers' incomes (compared to 37% in Manompana and 10% in Tsimanampetsotsa). This can be explained by the opportunities available to sell products during two weekly markets and by road connections to the nearest city and the capital of Antananarivo, enabling distribution of the products. In Tsimanampetsotsa, the dryness of the region regularly leads to periods of starvation and prevents cultivation of as many vegetables and fruit trees as in Tsinjoarivo (five +/-two products versus ten +/-two products per farmer). Labour is generally provided by the family – only 8% of respondents paid for additional labour (compared to 21% in Tsinjoarivo and 28% in Manompana) to maximize their annual yields.

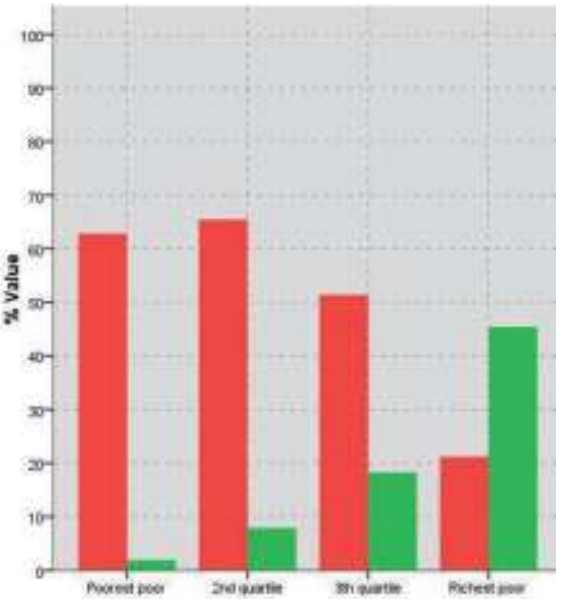

Figure II 20.6 Percentage of farm income from tavy products compared to total farm income and value of products from tavy for poorest poor to richest poor (Rqibate et al. 2010).

20.4.1 Dependency of poor and rich households on tavy products

In Figure II 20.6, farmers are ranked by their farm incomes and classified in quartiles (poorest poor to richest poor). The percentage of income from selling tavy products (rice in Manompana and maize or cassava in Tsimanampetsotsa) compared to the farm income (red bars) and the share of the total value of products from tavy (green bars) for each quartile is calculated. It shows that incomes of the poorest households are most dependent on tavy: their income from tavy products represents 63% of farm incomes (red bars), against 21% for the richest households. In addition, the figure indicates that the richest households benefit more from tavy than the poorer households as they are able to turn a large part of the tavy products that they cultivate into income. This income represents 45% (green bars) of the total value of the tavy products in Manompana and Tsimanampetsotsa (against 2% for the poorest households).

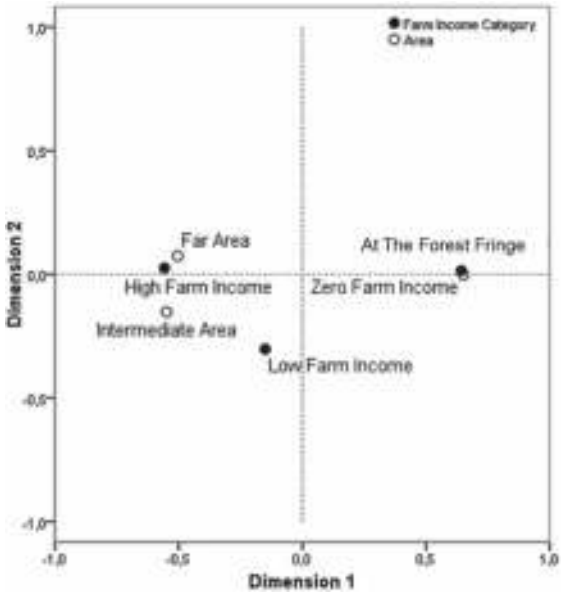

Figure II 20.7 Results of the correspondence analysis with representation of the variables of zero farm income, low farm income, high farm income, far area, intermediate area, and forest fringe on the factorial map (Rqibate 2013).

20.4.2 Distance from forest and farm incomes in Manompana and Tsinjoarivo

Figure II 20.7 resents the result of a correspondence analysis with farm incomes (turned into ordinal variables: zero farm income, low farm income, high farm income) and the areas (far area, intermediate area, and forest fringe) for Tsinjoarivo and Manompana. Dimension 1 separates high farm income, far area, and intermediate area on one side of the axis, with zero farm incomes and at the forest fringe on the other side. The figure illustrates that farmers at the forest fringe get less benefit from their agricultural activities.

20.5 Conclusions

Based on the findings described, the three regions show different prerequisites for the implementation of SFM. The possibilities or hindrances for implementing SFM are closely related to the characterisation of the causes of deforestation and forest degradation. On the east coast in the region of Analanjirofo, the implementation of SFM should focus on the direct causes of deforestation: the practice of tavy and illegal logging in Manompana. Adapted and viable SFM activities should be developed on the basis of the understanding of the local context of deforestation (migration, religious elements, subsistence use). In Vakinankaratra, the development of SFM activities appear to be more complicated and challenging since underlying causes of deforestation, such as population density, must be addressed. In Atsimo-Andrefana, SFM should deal with slash-and-burn practices and charcoal use, which depend on the economic background of the users and location.

The study highlights that cultural, social, economic, and environmental factors interact and guide the behaviour of the actors. Behaviour also depends on forest attributes at the local level. Alongside these, the subordination of technique and economy to social structures and the saturation of space need to be considered. The former describes traditional aspects of the Malagasy society, which may play a role in the poverty of Malagasy households. Lalaunié (2003) discusses social obstacles to economic development, more exactly, he cites André Piettre, who describes a "subordination of technique and economy to social structures." In the study area of Tsimanampetsotsa, for instance, the large number of cattle kept for funeral celebrations may constitute the capital of the owner, which can be sold or not, used for consumption, or used for agricultural work. The owner can perceive he is rich in the sense that he owns cattle. In Manompana, tavy is a traditional practice with religious elements and is still practiced even though its productivity is low. However, poverty is a subjective concept: a poor household (according to the formal definition) may have a positive opinion of its economic situation (INSTAT 2006).

Saturation of space in this context means that massive migration can exceed the capacity of the territory to provide sufficient natural resources to the inhabitants. Long fallow cannot be practiced where population density is too high. Intensification and temporary or long-term migration are among options for the farmers. Where available forest areas exist that have not been distributed among the descendants, settlers can establish their land rights by permanent cultivation. Among those interviewed in Manompana, 47% were migrants. The most common causes of migration were seeking fields for cultivation (33%) or clearing the forest (33%). To promote SFM, it is essential to consider the dynamics of space and population by addressing social issues (migration) and proposing alternatives to address the lack of available land.

These interactions should be taken into account when formulating policies and measures to promote SFM. Only with a thorough understanding of the local context can SFM schemes be adapted to be viably implemented and regarded as sustainable activities. The trend today also reflects this understanding; stakeholders currently involved in SFM tend more to a landscape management approach that respects the

socio-economic and socio-cultural values of forests and landscapes. The broader implementation of these approaches is hindered by unclear administrative issues, corruption, illegal logging, changes in political agendas and NGO priorities, and constrained time frames for project development and implementation. A national forest policy in Madagascar that can be supported by donor countries and international funding organisations is tenuous due to the lack of an elected government. The applied forest policy is weakened by the withdrawal of funds and increasing corruption as well as aforementioned security issues that are likely to worsen.

At the moment, promising SFM approaches focus on local livelihoods and the specific landscape in which they are situated. They involve meetings with communities and local stakeholders who are well aware of the negative impact of unsustainable forest management and seek support to turn the wheel. However, while many approaches to foster SFM exist in Madagascar, the lack of communication among and within institutions and projects as well as the changing political arena has a negative effect on their success. Sometimes various approaches are applied in parallel without identification of their synergies and trade-offs or gaps. This leads to confusion among local stakeholders and reduces their willingness to participate in such projects. The high importance of the remnants of primary as well as secondary forests of Madagascar, which are reserves of some of the most unique flora and fauna of the world, calls for concerted actions and ongoing support for the successful approaches that can be found throughout the country.

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Community rights and participation in the face of new global interests in forests and lands: The case of Mozambique

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Abstract: This case study analyses community rights and participation in sustainable forest management (SFM) in Mozambique and the implications of new global interests in forests and lands. It also looks at the conditions and combinations of conditions that seem to foster positive change towards SFM. The study is based on a literature review from sources of information including legal documents, statistics, thematic reports, and peer-reviewed articles. The results indicate that while forest and land resources are abundant and customary and statutory rules support local communities' participation in forest and land management, inadequate implementation of these regulations jeopardises effective community participation. New opportunities for enhanced community benefits and participation in SFM are arising in Mozambique, but whether Mozambique can fully tap into these will depend on the extent to which key enabling conditions related to institutions, information, and capacity-building can be fulfilled.

Keywords: Mozambique, community forestry, sustainable forest management, tenure

21.1 Introduction

The short history of Mozambique since gaining independence from Portugal in 1975 reveals a young country striving to catch up with international development trends. It emerged in 1992 from a civil war that had lasted 16 years, since independence, and from a centralised economy after years of socialism. In the last decade, as a result of economic and political stability, Mozambique has achieved economic growth and a reduction in poverty levels. The gross domestic product (GDP) in 2012 was estimated at USD 14.6 billion, with an annual growth rate of about 7.4% (World Bank 2012).

Institutions, communities, and policies in Mozambique are striving to cope with the increasingly growing demand for land and natural resources both for domestic and international markets. Deforestation and forest degradation processes are scaling up in proportion to population growth through increasing demand for biomass energy and agricultural land for food production (Sitoe et al. 2012). In recent years there has also been increasing interest by foreign investors in large-scale agricultural, biofuel, and forestry production, which requires extensive land areas (e.g. Nhantumbo and Salmoão 2010, German et al. 2011).

While land and natural resources are state-owned, policies on national land and natural resources recognise the need to involve people whose livelihoods depend on forest and wildlife resources in the planning and sustainable use of those resources (Salomão 2004) and to provide potential for change towards more decentralised natural-resources management, as well as enhanced partnerships between local communities and investors (Sitoe et al. 2012). In the forestry sector, there are a few examples of public-private partnerships that have been created to improve rural communities' engagement in forest management. These include carbon sequestration initiatives (e.g. Sofala Community Carbon project), rehabilitation of degraded lands (e.g. Serra da Gorongosa),

and forestry concessions (e.g. Derre). In addition, a national process for reducing emissions from deforestation and degradation and enhancing carbon stocks in developing countries (REDD+) began in 2009 and is expected to create new opportunities for resource conservation and poverty reduction (Sitoe et al. 2012). However, the realisation of these benefits at the local level is closely connected to the rights of local communities to participate in decision-making and benefit-sharing related to natural resources.

In the face of new global interests in forests and lands, this case study analysis is based on literature review of the current patterns of land and forest-resource use, especially communities' rights and participation and their role in sustainable forest management (SFM) in Mozambique. The analysis sheds light on the conditions and combinations of conditions that seem to foster positive change towards SFM in Mozambique or to constrain it.

21.2 Forests, land-use change, and deforestation

Estimates about the total forest cover vary according to the definition of what constitutes a forest. According to global forest resource assessment, forests with >10% crown cover spread over 50% of the country, a little more than 40 million ha (FAO 2010). The predominant ecosystem in Mozambique is miombo woodland, which covers about two-thirds of the country and is common north of the Limpopo River. Other ecosystems include mopane in the semi-arid regions of the hinterlands (in the valleys of the Limpopo and Zambezi Rivers) and the undifferentiated forests in the coastal region (Figure II 21.1).

Deforestation at the national level was estimated as a function of population density and assuming constant forest-use patterns by Marzoli (2007) at 219 000 ha/year (0.58% per year) for the period 1990–2002, with varying intensity across provinces. The highest rates were observed in the centre (Zambézia province) and in the north (in Nampula province). Agriculture (subsistence and commercial), firewood and charcoal, unsustainable logging, and mining were among the major drivers of land-use change, including deforestation and forest degradation (see Table II 21.1, Sitoe et al. 2012).

21.3 Forests, livelihoods, and capacities

Rural inhabitants in Mozambique are highly dependent on forests for energy and land for agricultural production (Dewees et al. 2011, Figure II 21.2). For-

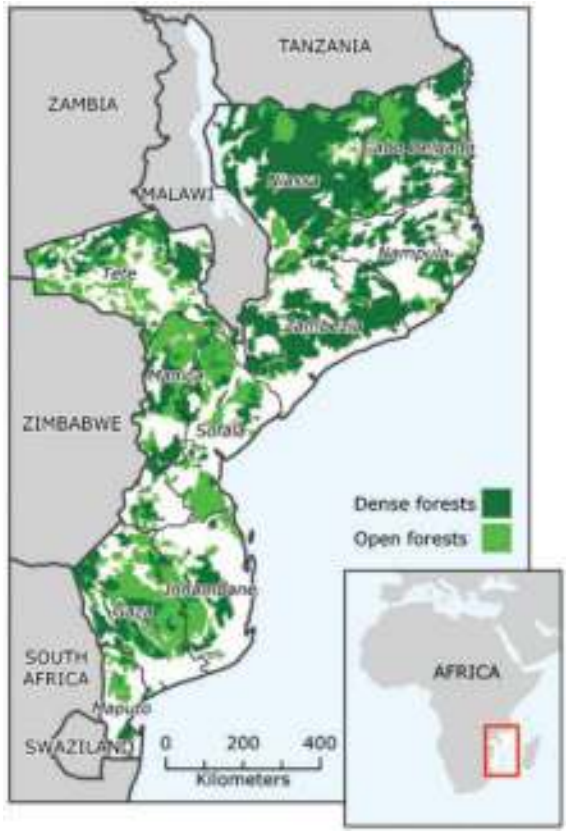

Figure II 21.1 Forest cover in Mozambique in 2007. Source: Wertz-Kanounnikoff et al. 2011 using data from Marzoli 2007.

ests are also important for non-timber forest products and cultural and historic values (Falcão et al. 2007). The legal framework allows free access for subsistence use of forest products while commercial use is based on concessions or annual logging licenses (Sitoe et al. 2003). Local actors do not have preference over outsiders in regard to commercial opportunities. Requirements to engage in commercial exploitation of forest resources include forest inventory, payment of logging fees, etc. These requirements limit communities' ability to engage in commercial activities since they lack the needed technical, managerial, and financial capacities. However, given the weak institutional capacity of the forest service, many local actors are engaged in informal commercial activities selling firewood, charcoal, poles, and medicinal plants, among other products. Capacity-building and training of different stakeholders in the forestry sector has been limited (Sitoe et al. 2012). Most of the existing efforts relate to policy and regulatory aspects, with very little focus on managerial issues.

Some current initiatives promote small and medium enterprises in the forest sector, but information about their impacts is lacking. In general, the dearth of capital has limited SFM. However, informal financing of forest operations has been driving logging

Table II 21.1 Major causes of deforestation in Mozambique.

Cause	Description
Subsistence and commercial agriculture	About 99% of the close to 3.8 million farms surveyed are small (average area per holding is 1.4 ha) occupying 96% of the total area cultivated with food crops. Of these, only 5.3% use irrigation, 3.7% use fertilisers, and 2.5% use pesticides, revealing rudimentary agricultural practices. Many of these areas are subject to shifting cultivation, usually a mosaic of cropland and fallow areas at different stages of development. Smallholder farmers produce both subsistence and cash crops. The latest agricultural census suggests that production areas increased between 2000 and 2010 from 3.2 to 5.1 million ha (59% increase) for the major subsistence crops (maize, beans, peanuts, sorghum, rice, and millet) and from 1.6 to 2.3 million ha (47% increase) for the major cash crops (cotton, sesame, tobacco) (INE 2011).
Wood fuel energy	Dependence on forest resources for energy is high. Sitoe et al. (2008b) have estimated the national demand for woody biomass for energy at about 14.8 million tons (dry matter)/year, the equivalent of 23.68 million m^3/year, or 1.16 m^3/per capita/year. Given the high and increasing population density in towns (where 70%–80% of household energy requirements depend exclusively or partially on charcoal and firewood), the demand is commonly greater than the supply from the neighbouring natural forests.
Unsustainable logging	While logging may not result directly in deforestation, it may lead to forest degradation (through selective logging) and eventually lead, indirectly, to deforestation as charcoal makers, firewood collectors, and agriculturalists use roads opened by loggers to penetrate the forest. In spite of efforts of the forest service to promote SFM through a system of forest concessions and reduction of annual logging licenses (simple license), it has been shown that most of the licensed timber volume (65% in 2009) was harvested on the basis of simple licenses in unmanaged forests (Sitoe et al. 2012). Official statistics show that logging capacity is still very limited. For example, of the 500 000 m^3 annual allowable cut, less than 50% is legally logged; however, illegal logging (for China alone) is reported to be about 48%, suggesting that Sino-Mozambican timber trade is pushing Mozambique's forests beyond their maximum sustainable yield (EIA 2013). In addition, Del Gatto (2003) has estimated that since few species are currently logged, the rate of extraction of the most valuable timber species may be between two and four times its sustainable potential. In 2011, it was estimated that 62% of the licenced timber volume was represented by three species: *Combretum imberbe*, *Millettia stuhlmannii*, and *Colophospermum mopane* (DNTF 2012).
Mining	The mining industry has been increasing very rapidly in Mozambique (Selemane 2010). Although several mining concessions have been given (some of them in forest-covered areas), large-scale exploitation is just beginning, therefore little is yet known about potential damage to the forest (Sitoe 2012) although non-verified anecdotal evidence on negative effects is emerging. Mining concessions are especially located in central Mozambique, in highly productive and protected forest areas such as in Zambezia, Sofala, and Tete Provinces. Potential negative impacts in the forests in provinces like Tete, where there are large-scale opencast mines (concessions with 20 000 ha or more) may either be direct (with the mining operations) or indirect, as job seekers flood the area in search of opportunities, requiring residential, agriculture, and firewood collection areas.

operations; for example, Chinese timber merchants provide financing to local operators to cut down trees and secure markets for logs (Mackenzie 2006, EIA 2012, German and Wertz-Kanounnikoff 2012).

Dewees et al. (2011) have evaluated the policies, options, and incentives for the rural poor in the miombo woodlands and observe that at the policy level the willingness to devolve forest resources to the rural poor is widespread in miombo countries such as Mozambique. However, they also note that there was a large gap between policy statements and practice and that the outcome of the practices is far from sustainable community forestry. The authors indicate that conditioning factors to ensure SFM include, among others, the miombo ecology (low commercial timber stock, low biomass stock, low species diversity, etc.), market structure for miombo products (most products were traded informally, limited access to formal markets), the condition of the rural poor (limited technical and financial capacity

limited information to negotiate, etc.). They therefore conclude that forest policies alone may not suffice to ensure sustainable management of miombo woodlands and rural poverty reduction. However, they also discuss the role of a range of miombo products and services that represent an opportunity for the rural poor, including wood energy, building materials, medicinal plants, and edible plants, which in most cases play the role of rural insurance, or safety nets, in situations of illness in the household and in disasters such as drought and floods or other famine situations.

21.4 Political and institutional framework

21.4.1 Community participation in national policies

The Forestry and Wildlife Policy and Strategy was approved in 1997. Increasing the participation of rural communities in integrated management, fire protection, and use and conservation of forest and wildlife resources is one of the strategic objectives of this policy (Ribeiro 2001). The policy calls for involving people whose livelihoods depend on forest and wildlife resources in the planning and sustainable use of the resources (Salomão 2004).

The Forestry and Wildlife Law was enacted in 1999 and associated regulations in 2002. They form the regulative framework for the use and management of forest resources. The principles governing the law (Act N° 10, 7th July 1999, Chapter 1, Article 3) include "…promoting the conservation, management, and utilisation of forest and wildlife resources without contradicting the local customary practices and according to the principles of conservation and sustainable utilisation of forest and wildlife resources in the framework of decentralisation." The law also emphasises private sector involvement and its contribution to the development of local communities.

The National Land Policy was adopted in 1995 and the Land Law and its regulations in 1997 and 1998, respectively. The Land Law provides strong potential for a change towards more decentralised natural resources management and enhancing partnerships between local communities and investors. According to the Land Law, local communities shall participate in the management of natural resources, conflict resolution, land titling processes, and identification and definition of land occupied by communities. In addition, the law states that communities should be consulted before land-use rights can be issued to outsiders. This provision is meant to protect local communities, particularly poor people, from losing their land that was acquired by customary rights.

Figure II 21.2 Forest-agriculture frontier in Gondola district, Manica province, where miombo forest has been converted to subsistence maize farming. ©Almeida Sitoe

Consultations constitute a mechanism to ensure community participation in forest management, with the intention to provide a dialog platform for establishing partnerships between the forest operators and local communities. The Law of State Local Authorities (Law 8/2003) and its regulation (Decree 11/2005) establish the decentralisation principles, transferring the power of decision-making to local institutions but in coordination with higher bodies at district and province levels. The decree defines the working rules and competences of community committees as the local institutions that coordinate aspects of common interest at the community level, including the management of natural resources. Decree 43/2010 and Diploma 158/2011 link the Law of State Local Authorities and the Land Law, making clear that the local state bodies are the ones that should be used in the consultation process. Sitoe et al. (2012), however, observe that although the intention to decentralise to the community level has been put forward through local bodies, in practice, these bodies receive orders from the national and provincial levels, making it difficult to truly make effective local decisions.

Box 21.1 Forest tenure trends

Since independence in 1975, two periods can be distinguished in Mozambique's history: 1) The period 1975–1991 marked by the nationalisation of private property, centralised ownership, and state control of the land and its resources as the key components of socialism. The 1979 Land Law gave secure rights to cultivated areas in the family sector but not to the extensive natural forests. Forests belonged to the state, whose enterprises could exploit forest resources for commercial purposes without paying taxes or drawing up management plans. The only benefits that local communities in forest areas received were employment opportunities. 2) The period post 1992 was marked by the end of civil war in 1992 and the first general multiparty elections in 1994. Areas that had been inaccessible during the war were opened up, which exposed weak local administrations and communities to settlers, who had different cultural and social habits. This period was also marked by a shift from centralised planning to market economy, which required reforms in land and natural-resource legislation, most of which occurred in the late 1990s, particularly when the Land Law of 1997 and the Forestry and Wildlife Law of 1999 came into force. The Land Law of 1997 maintains some aspects of the socialist Land Law of 1979 by defining land as state property. The state can therefore grant land-use rights to stakeholders while retaining property rights. One important element of the 1999 law is the recognition of customary rights over land, which it puts on the same level as statutory land-use rights. Customary rights, thus recognised by law, can ensure land-use rights to individuals and groups with common interests. To reduce land conflicts between customary and acquired rights, community consultation is mandatory before any land-use right can be issued. These aspects of land-use rights form the basis for community forestry and community participation in SFM.

Source: Adapted from Sitoe and Tchaúque 2006.

21.4.2 Formal and traditional rights to land and forest-resource use

The Mozambican Constitution defines that land and its resources are state-owned. Based on this, the Land Law states that users can be granted land-use rights (DUAT, Portuguese acronym for Direitos de Uso e Aproveitamento da Terra), which can be legally acquired based on statutory definitions of eligibility that include long-term occupation in good faith and occupation in accordance with customary practices. The Forestry and Wildlife Law defines forest-resource access mechanisms through concessions and simple licenses for commercial purposes and through granting free access to local communities for subsistence use.

In Mozambique, land and forests are managed by the Directorate of Lands and Forests (DNTF) within the Ministry of Agriculture (MINAG). The main governing rules are set by the Land Law and its regulations and the Forestry and Wildlife Law and its regulations. Significant changes have been introduced to forest-related rights over the last three decades (see Box 21.1).

According to Jonstone et al. (2004), the main rights and benefits of the forest dependent communities envisaged under the Forestry and Wildlife Law of 1999 are the following: (1) subsistence use of the resources; (2) participation in co-management; (3) community consultation and approval prior to allocation of exploitation rights to third parties; (4) development benefits derived from exploitation under a concession regime; (5) return of the earmarked 20% of forestry tax revenues to the communities; and (6) allocation of 50% of the value of paid fines to the individuals who contribute to denounce the infractor.

Jonstone et al. (2004) as well as Sitoe and Tchaúque (2006) coincide in observing that at present, the best intervention for SFM in natural forests would be a well-functioning private forest concession system. Forest concessions have the potential for generating revenue for the national economy and for local communities through rural employment and the 20% revenue share (see section 21.4.3 on benefit-sharing). However, in practice, the forest concession system in Mozambique still faces challenges which are associated with the weak implementation and enforcement of the laws and policies that govern the forest concession system (see e.g. Mackenzie 2006, Ekman et al. 2012, Wertz-Kanounnikoff et al. 2013). For example, revenues from the forests and the wildlife sector originate primarily from license fees for logging (about 80%), totalling USD 4.4 million in 2009, USD 8.2 million in 2010, and USD 10.8 million in 2011 (DNTF 2012). However, mirror statistics of Mozambican and Chinese custom's data suggest a significant proportion of revenues is lost due to illegal timber harvesting and export practices (German and Wertz-Kanounnikoff 2012, EIA 2013). As indicated previously, illegal logging in Mozambique may account for revenue loss of more than USD 27 million a year (EIA 2013).

21.4.3 Benefit-sharing schemes

The sharing of tangible benefits between the state and the forest dwellers is based on the Forestry and Wildlife Law, operationalized through Ministerial Decree 93/2005. The decree was established to define the mechanisms for channelling 20% of forest and wildlife revenues to local communities living inside the concession areas. To receive these funds, communities must complete several steps, including: 1) organisation and formalisation of a community management committee, 2) recognition of the committee by the district administration, and 3) opening of a bank account for the community.

Various institutions are involved in this process. These include: 1) the state, through provincial forest services (SPFFB, Portuguese acronym for Serviços Provinciais de Florestas e Fauna Bravia), the district administration, the National Directorate of Conservation Areas, 2) local non-governmental organisations (NGOs), 3) commercial banks, 4) local communities, and 5) the forest or wildlife operator. In practice, the value corresponding to 20% of the logging and hunting fees is held in the province in the Community Fund account, where after the verification of compliance with the other steps required by the Ministerial Decree, the value is delivered to the respective community.

Between 2005 and 2011, of the 1089 beneficiary communities, 896 have constituted committees and, of these, only 861 communities have received the funds, totalling about USD 3.8 million (DNTF 2012). Beneficiary communities that have not received funds are mostly located in areas where logging was performed under an annual simple license system. Low logged volume (per area) and the temporary nature of such systems result in low efficiency in implementation of this decree. The organisation and formalisation of community committees and the opening of bank accounts were pointed out as the main bottlenecks in the process of delivering community benefits. Additional limitations result from mistakes made in community consultations. Given the limited capacity of the forest service to verify the logging areas, what happens is that consultation was sometimes conducted in one community but logging took place in another community (Novela in prep.).

The experiences in implementation of the ministerial decree in different provinces across the country provided many lessons that were discussed in a national workshop in December 2006. The discussions revealed differences in the interpretation of the decree. The main difference lay in the definition of *community*; in some provinces it was defined as "district" while in others as "village." These problems still persist, although a recent evaluation of the process suggests that this apparent confusion is to allow for the handling of small amounts generated through simple license fees (DNTF 2012). Chidiamassamba (2012) has evaluated the implementation of Ministerial Decree 93/2005 from 2005 when it was established to 2012 and finds that 1) even in communities where the 20% from the logging tax has been received, community participation in the use of funds is still very limited, since local decisions made by the members of the natural resource management committee; 2) women are generally excluded in the process of decision-making; 3) the money received is commonly used to establish social infrastructure such as water wells, school classrooms, and health centres, among others, but little is dedicated to forest protection; 4) in some communities, funds are used for personal interests of the community leader or other locally influential people. The real impact of this benefit-sharing scheme is still limited, and local communities are not yet in a position to invest the money neither in more productive activities nor in protecting forest as it was expected.

21.4.4 Community forestry models and community participation

Sitoe et al. (2008a) describe 12 possible options for community forestry in Mozambique. Their classification is based on the land-use system (production or conservation) and the land manager (state, private, or community). The options include wildlife management and game farms. In their analysis, the authors show that although the legislation provides room for all of the 12 options, some are limited by either the absence of an operational mechanism for their implementation or by the weak business environment. The evaluation of existing community forestry projects reveals that five of these options are being implemented with some degree of success: 1) co-management in conservation areas, 2) community forestry in natural forests in multiple-use areas, 3) community hunting zones, 4) private concessions in natural forests, and 5) community forest plantation and agroforestry systems. Further analysis of these options by Sitoe and Tchaúque (2006) reveals that private concessions in natural forests could be a highly beneficial option because the concessions – if implemented well – can provide rural employment and generate revenue for the national economy, of which 20% is shared with forest dwellers. State-managed areas, particularly forest reserves, are reported to be facing governance problems such as lack of management plans and limited financial and human resources, therefore generating very limited benefits for local communities and possibly facilitating deforestation and degradation. In multiple-use areas, the problems relate to open access since communi-

ties cannot limit access by other users. The lack of technical, human, and financial capacity has limited success of community-managed areas.

In study of the impact of policy on resource use in Mozambique, Falcão et al. (2007) find that resource conservation and stakeholders' social and economic well-being were improved through sound forest-management practices. This means that regulated forest management systems in which both profits and social benefits are taken into account were potentially more beneficial to local community members than the open-access system. In addition, their analysis shows that an increase in the quantity of forest products sold or in selling prices leads to an increase in per capita benefits of the local communities; however, this increase did not lift households within the communities above the poverty line of USD 1 a day per capita. These findings are supported by Tucker (2010), who has evaluated the impact of forest governance on ecosystems and observes that sustainable management of forest resources is associated with secure rights, institutions that fit the local context, and monitoring and enforcement. In addition, Tucker (2010) observes that publicly governed forests have experienced failures as national governments lack the resources or political will to invest in protecting forests or make poorly informed management choices.

Studies suggest that there is no single solution for successful community forestry (Sitoe et al. 2008a, Tucker 2010). Forests survive or decline in relationship to diverse conditions (such as resource status and abundance) and pressures (e.g. from the markets and other development policies) that interact with human and ecological variability and divergent historical experiences. This means that policies, programs, and institutional arrangements affecting forest governance need to be flexible, adaptive, and responsive to unpredictable contingencies.

Community participation in forest management is also facilitated through Participatory Natural Resources Management Councils (COGEP) comprising representatives of the community, local government, private sector, and NGOs or associations operating in the area. The role of these bodies, established by Forestry and Wildlife regulations, is to decide on the use of local natural resources. These councils are proposed to formalise and operationalize the partnership concept and establish the basis for effective participation in forest management (Nhantumbo et al. 2003). Partnership analysis in community forestry suggests a tri-party model involving communities, the private sector, and the state. The model could have two or three elements and sometimes a fourth facilitating element represented by NGOs (Sitoe and Tchaúque 2006). COGEP was meant to avoid conflicts between statutory and customary resource-access regulations and to support local communities and increase their power in negotiations and representation of local interests in forest-resource use, including in community consultations. The latter presents a formal requirement whereby the approval of communities for establishing concessions is sought, often in connection with additional promises such as support for local schools or health services. In practice, however, these consultations are often corrupted by factors such as lack of formal documentation and bribes to community leaders (German and Wertz-Kanounnikoff 2012). The VI Community Forestry Conference held in 2011 (DNTF 2011) discussed the need to strengthen the partnerships and increase the power of local communities, concluding that the COGEP institution is seldom established and used, although the conference recognised its role in increasing the power of local institutions.

Norfolk and Tanner (2007) state that a well-carried out consultation ensures that local land-use rights are not ignored and can result in local people getting real benefits from the partnership if they cede their DUAT. However, most consultations are poorly carried out and often fail to forestall what is essentially unlawful occupation of someone else's land. In a study in Zambezia Province, Novela (in prep.) has found that community consultations continue to be a weak instrument because informal promises are made by forest operators to access the timber and there is no legally binding instrument to force the operator to deliver those promises.

21.4.5 Enforcement of laws and regulations

Sitoe et al. (2012) indicate lenient implementation and weak enforcement of regulations as the key policy challenges in the forestry sector in Mozambique. They also state that one of the major underlying causes of the institutional weaknesses is a lack of goodwill rather than a lack of capacity. Evidence for these affirmations includes extensive reports of illegal logging, including export of logs of banned timber species, with involvement of forest concessionaires who have conflicting interests.

As a result of weak enforcement, forest operations have been occurring without credible control. The forest service rarely has the means to visit harvesting areas, and enforcement activities are limited to fixed checkpoints along roads (Wertz-Kanounnikoff et al. 2013). In turn, actual timber species and volumes harvested and exported remain insufficiently monitored and controlled. The weakness of the forest monitoring system was reported as early as 2003 (Del Gatto 2003). Although a national strategy for participatory forestry law enforcement was designed (Bila 2005) – including recommendations

such as an increase in quantity and training of forest service personnel; coordination with other law enforcement systems such as the community agents, the police, the tourism scouts, the army, among others; and possible inclusion of independent interest groups (mainly civil society) – little has been done since then. Recent reports (DNTF 2012) indicate that 211 ex-army personnel were incorporated in 2011 as forest scouts, adding to the former 400 across the nation. This number is still far below the 4000 Bila (2005) estimates as the number of scouts required to patrol national productive forests. Law enforcement campaigns were introduced in 2011, taking forest officials from the national office to support the field personnel, resulting in issuance of fines valued at about USD 480 000, in an operation that cost about USD 30 000 (DNTF 2012).

One major official forest policy aim has been to reduce logging through the simple license system in favour of the forest concession system as a means to promote SFM (German and Wertz-Kanounnikoff 2012), stemming from the fact that the one-year simple licenses discourage SFM practices. However, despite efforts to promote forest concessions, simple licenses continue to play an important role in timber operations (Sitoe et al. 2012). Between 2010 and 2011, the number of simple-licence operators increased from 584 to 766 and represented 36% of the licenced volume in 2011 (DNTF 2012). In recognition of these trends, the Mozambican government adopted additional revisions to the forestry regulations aiming at increasing the sustainability of the simple-license system (Wertz-Kanounnikoff et al. 2013). Adopted measures include increasing the duration of a simple license from one to five years, limiting the area of operation to a maximum of 10 000 ha, and reinforcing the requirement for a simplified management plan (Revision to the Forest and Wildlife Law, Decree No. 30/2012). It remains to be seen whether these legal revisions will result in more sustainable logging practices. As an early reaction, in May 2013 the Mozambican Timber Operators Association requested a moratorium on implementing these measures, arguing that it was not a result of consensus and that its implementation would jeopardise forest operations, with the potential of leaving an estimated 50 000 workers without work. The government refused the request, indicating that time had been given since approval of the forest and wildlife regulation in 2002, which discourages the simple license (TVM 2013). The new measures have indeed the potential to discourage simple-license operations; however, as indicated previously, pressure for easy timber is high and illegal logging operates mainly through simple licenses because of their limited requirements and commitments to long-term sustainability. The failure or success will depend on the ability of the law enforcement system, which is also to be improved.

To strengthen domestic timber processing, another official measure has been a ban on log export of timber species classified as first class (German and Wertz-Kanounnikoff 2012). However, the ban has been extremely difficult to enforce in the face of strong demand from Chinese markets for Mozambican timber (Figure II21.3). German and Wertz-Kanounnikoff (2012), using the northern province of Cabo Delgado as an example, have evaluated the Sino-Mozambican relations and their implications for forests. They find that the Chinese timber trade increased dramatically in the 2000s, to involve about half of the forest operators in the province in 2011, most of which did not own a concession but were buyers and exporters of unprocessed logs – although this trends is changing with more Chinese actors acquiring forest concessions (Ekman et al. 2012, Wertz-Kanounnikoff.et al. 2013). EIA (2012) reports that between 2001 and 2010 Mozambique's timber exports to China grew from 10% to 80% of the timber volume, making China the largest timber importer from Mozambique. German and Wertz-Kanounnikoff (2012) have found discrepancies between timber value registered at the Mozambican customs in 2009 (USD 30 million) and what was registered by Chinese customs (USD 134 million), suggesting massive revenue losses to Mozambique. Furthermore, EIA (2013) estimates that USD 29.2 million was lost to state revenue (logging and timber export taxes) from the illegal export to China in 2012 alone. Earlier estimations of revenue losses indicate the range of USD15–24 million (Del Gatto 2003).

21.5 Distilling lessons for more community participation in forest management

21.5.1 Mozambique's experiences with community forestry

Since the introduction of the Forestry and Wildlife Law 1999, which introduced the concept of SFM, and its regulations passed in 2002, about 70 community forest initiatives have been implemented across the country, covering an area of about 2 million ha (Sitoe et al. 2008a). These initiatives include 1) community forest plantations and community forestry projects in natural forests implemented by environmental NGOs; 2) government strategies such as the presidential initiative that states "one child one tree" and "one community leader one forest"; 3) a scheme for payment for tree planting and avoiding deforestation.

Figure II 21.3 Logs of Pterocarpus angolensis (local name: umbila) in a log yard in Pemba, Cabo Delgado province, awaiting export to China. ©Almeida Sitoe

Learning from these experiences can help leverage more community benefits and participation in SFM could be enhanced. For example, an early evaluation from about 10 years ago, conducted at the third national conference on Communities and Natural Resource Management, found that the cost-benefit ratio of the implemented projects was high and that projects were difficult to sustain without foreign investments (Nhantumbo et al. 2004). That conference also concluded that in spite of the high investments, the ideal model of community forestry was yet to be seen. In 2011, at the fourth national conference (DNTF 2011), it was reported that communities themselves were unable to initiate and run profitable forestry projects under current conditions, and the need to support **transparent partnerships** that would help local communities was emphasised.

One of the identified enabling factors includes **the capacity to execute rights and participate** in decision-making processes. Sitoe et al. (2008a) analysed the conditions for successful community forest management in Mozambique and observed that community forestry was a new concept for forestry practitioners and communities, contributing to the difficulty in understanding the roles of the institutions (state or private) and communities. These difficulties enabled better-informed local elites, politicians, and the private sector to take advantage of the situation while leaving rural communities in a passive role of receivers of information and assets.

Another factor, closely related to capacity, refers to **community commitment** to SFM. Kasparek (2008) finds that a participatory process for SFM planning leads to higher commitment by all key stakeholders and lays the foundation for successful implementation of SFM. The author compares four case studies in Botswana, Malawi, Namibia, and Mozambique and concludes that in Mozambique, the commitment of the communities to SFM was lower compared with the other three countries. One possible explanation is that communities were not involved in the resource assessment (data gathering) and thus not as aware of the risks facing the resource. Novela's (in prep.) findings in Zambezia suggest that given low effectiveness in implementing statutory regulations (which would generate higher benefits to communities), community leaders are applying customary regulations, generating very limited and personal short-term benefits. This positioning of community leaders facilitated, in part, illegal logging since it is cheaper to pay at the locally set prices (just a gallon of wine and a few kilograms of corn flour

or rice) to get access to an unestimated quantity of timber. This process is also easier when compared with the community consultations and licensing process required by the Forest and Wildlife Regulation.

21.5.2 Private-sector investments in large-scale land projects

Mozambique has been cited as one of the countries with plenty of available land (Nhantumbo and Salomão 2010, Borras et al. 2011), therefore attracting investments that require extensive land areas such as biofuels, agriculture, and forest plantations. Friis and Reenberg (2010) state that the African continent is perceived to neglect its agricultural potential and many investors therefore consider Africa well-suited for new rural investments. Furthermore, they suggest that the commercial value of land in these countries is still relatively low, which raises an expectation of possible large returns in the future when the predicted struggle for land resources may increase their value.

Although the land and forest laws include provisions to protect local communities' access to land and forest resources, there is evidence suggesting conflicts and land insecurity among the most disadvantaged people in response to this new demand for land (Cotula et al. 2009, Nhantumbo and Salomão 2010, Cotula 2011, Borras et al. 2011, German et al. 2011). Land conflicts between companies occupying large concession areas and local communities have been observed, for example in Niassa Province in relation to forest plantations (ORAM 2008) and Gaza Province in relation to biofuel production (Borras et al. 2011).

Norfolk and Tanner (2007) observe that since fast-tracking investment is the key objective for government, most investors and civil servants do not see consultation as a means of protecting local rights. Instead they see it as one of several administrative steps for securing a new DUAT. Even if negotiations take place, agreements are rarely respected. The area agreed upon is often enlarged when actually laid out on the terrain or registered, and promises of jobs, shops, wells, schools, etc., used by investors to convince locals to sign are not kept. Minutes of meetings are imprecise and therefore useless as documentary evidence if either side accuses the other of noncompliance.

Most of these conflicts stem from unclear and vicious land acquisition processes that ignore community land-use rights, mainly customary rights but also statutory. An evaluation of the land conflicts conducted by ORAM (2008) in Niassa reveals that the private sector argues that the consultation process is cumbersome and costly; therefore, they use shortcuts by talking only to the local elites (the most influential people in the community). On the other hand, the provincial state agency for land registry (SPGC) as well as the district administrations, argue that the private sector asks for relatively small areas and when authorised (or even before), occupy larger areas than requested, in collusion with local elites. Poor people who did not participate in the consultations are the victims, and they often see their land being occupied by foreign investors without their consent.

Most of the conflicts have their roots on **inappropriate implementation of the law**, particularly concerning community consultations and engagement. Although the government, recognising the current conflicts over land, has revised the norms for the community consultation procedure to make them simpler and more inclusive (Ministerial Decree 158/2011), there is a general perception that land conflicts will not be avoided. The limited knowledge of the law by local community members, political interference, corruption, and limited capacity of the institutions to enforce the law, are among the issues listed as the reasons for non-compliance during the community consultation processes (Nhantumbo and Salomão 2010, Sitoe et al. 2012). In addition to capacity-building and appropriate implementation of laws and policies, one further entry point could consist of **skill-transfer partnerships** formalised through social contracts between private companies and local communities, whereby communities are accompanied to gradually provide economically viable services (e.g. production of a specific crop). Incipient experience from the Sofala Community Carbon project suggests that such businesslike partnerships, with economic rationale, can function as powerful incentives – if appropriately accompanied throughout (Jindal 2010).

In addition, **the formalisation of (customary) property rights** appears to be another key precondition for leveraging higher community benefits and participation. After observing a repetition of land insecurity cases in African countries with established customary rights, Alden-Wily (2012) suggests that land rights based on this mechanism may be declining because they are no longer providing the necessary protection to poor people in rural areas. Motivated by the observed modus operandi in practice, civil society organisations continue to put much effort in creating capacity within local communities to understand the process of consultation, to carry out delimitation and demarcation of community land, and to reduce land insecurity for the local poor.

The transparent **use of and access to information** about land-use activity and land-use development plans seems highly relevant. Even though the Territorial Planning Law (No. 19/2007 of 18 July) establishes general rules for territorial plan-

ning aimed at protecting the environment, there is a gap between the legislation and its implementation, which compromises its applicability (MICOA 2012). In practice, the information is generated by and scattered across different ministries and at different administrative levels. For example, although the institution responsible for land management is the Ministry of Agriculture (through the National Directorate of Lands and Forests) there are other institutions in other sectors, such as mining and tourism, that grant land access and use rights. It is also noteworthy that even the land-use rights issued by the Ministry of Agriculture are neither clearly mapped nor demarcated, leaving room for potential conflicts down the line.

21.6. Conclusions

The land and forest resources in Mozambique are perceived as abundant. Statutory and customary regulations provide protection for local communities and enable their participation in several initiatives in support of SFM. In practice, however, the limited capacity of the communities to stand up for themselves and their weakness in developing partnerships with investors put local communities in an unfavourable position – they appear to be the losers in most of the cases. The experiences of benefit-sharing through the devolution of 20% of the logging fees to communities appear to be a good starting point to involve communities in forest management. Much still has to be done before local communities can fully take an important role and make decisions in forest management.

International markets and global processes, including multilateral environmental agreements, are impacting forest-resource use in different ways and represent pulls and pushes in different directions. For example, projections suggest increases in deforestation and degradation of forests, particularly the reduction of economic value of the natural forests, with the increasing role of forest plantations. Impacts on local community access to forest resources are unpredictable, but reduction of commercial value of the forest may result in reduction of direct monetary benefits to communities as well. Hence, unless carefully implemented, government policies that portray cheap land as an attraction to foreign investors may contradict policies to enhance SFM and community-based natural resource management.

In the face of this situation, based on lessons from the numerous community forestry projects and incipient experiences of large-scale land projects, we identify the following three types of enabling factors for leveraging higher community benefits and participation in SFM:

- *capacity-building*, to enable effective community participation and SFM commitment
- *institutional*, including the formalisation of property rights, comprising carbon rights; appropriate implementation of laws and policies; commercially viable skill-transfer partnerships
- *informational*, i.e. use of and access to information on land-use occupancy, activity, and development plans

New opportunities for community participation in SFM may arise with the emergence of new international mechanisms for forest-based climate change mitigation – or REDD+ in short. Mozambique has been engaging in a national REDD+ process since 2008, with pilot initiatives since 2010. Since REDD+ involves land-based elements, we argue the aforementioned enabling factors for more community engagement continue to apply. Mozambique has a unique opportunity to learn from past experience and readjust current practices to leverage higher community benefits and participation in SFM.

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The impacts of decentralisation reforms on sustainable forest management in Central Uganda

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Abstract: The goal of decentralisation of forest sector governance under the Local Government Act in Uganda was to shift responsibility for forest management to elected local government councils and to encourage more active participation of local communities in the management of Uganda's forests. The assumption was that decentralisation of governance of forest resources would create an enabling environment for the development of effective local institutions that could limit harvesting levels and set management strategies to achieve sustainable forest management (SFM). In this chapter, we investigate whether the public administration and forest governance reforms that occurred in Uganda in the late1990s and early 2000s have led to SFM. We monitored changes in mean diameter at breast height (DBH), number of tree stems per hectare, and levels of human disturbance and economic activities in nine forests located in the Lake Victoria Crescent between 1993 and 2012. We found an aggregate decline in mean DBH and number of stems per hectare across the landscape. However forest condition of some individual forest patches were improving and others were stable. We argue that weak enforcement of harvesting laws for forest products, conflicting land use and environmental policies, and corruption as major conditions that have disabled wider introduction and implementation of SFM principles and subsequently caused increased forest degradation in central Uganda.

Keywords: Decentralisation, forests, deforestation, governance, forest rule enforcement

22.1 Decentralisation in Uganda

22.1.1 Introduction

Since 1990, many African countries have embarked on decentralisation in response to demands for better management of natural resources, including forests, and for more equitable sharing of benefits derived from them. It is often argued that decentralisation creates institutions that promote participatory management of natural resources (Ribot 2003). Other authors (Ribot and Peluso 2003, Ribot et al. 2006, Treisman 2007) posit that decentralisation can result into improved efficiency, accountability, equity, and sustainability in the management of public service production. Those who argue against decentralisation of forests note that decentralising forest management may lead to high deforestation rates considering the fact that most local governments lack the human, physical, and financial resources to be effective governors of natural resources (Andersson 2003, Gregersen et al. 2005).

Governance reforms have taken slightly different forms in different countries and experience and lessons learned from them are needed to enhance endeavours towards sustainable forest management and improving livelihoods in the future. In this chapter, we investigate whether public administration and forest governance reforms that occurred in Uganda in late1990s and early 2000s have led to sustainable

forest management (SFM). We assess the outcomes of the reforms on forest governance by analysing forest conditions (as a proxy for SFM) of the adjacent communities in selected forests in six districts of Uganda that are located in the Lake Victoria Crescent: Mpigi, Wakiso, Masaka, Mukono, Kalangala, and Rakai (Figure II 22.1).

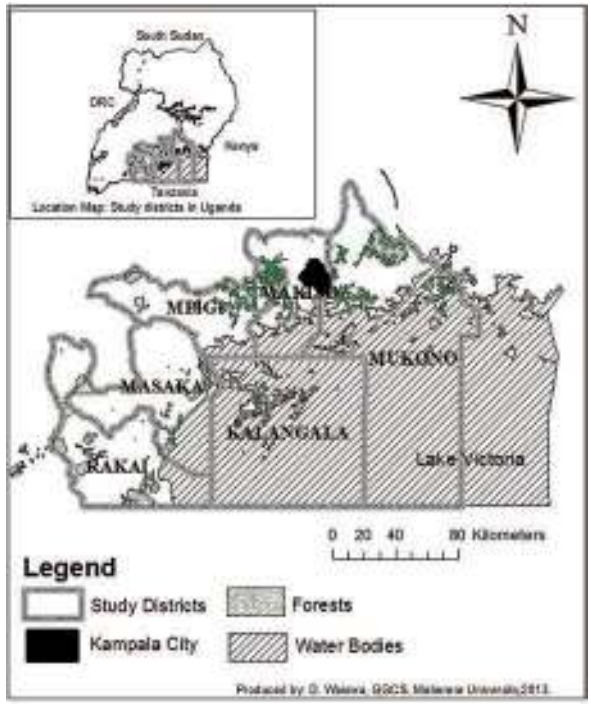

Figure II 22.1 Map showing the distribution of forest resources located along the shores of Lake Victoria in central Uganda.

22.1.2 Changes in forest policy and governance in Uganda

Forests in Uganda have been scientifically managed since the beginning of the last century when Uganda was still a protectorate. Forest reserves were established in the early 1930s following the formulation of the first Forestry Policy in 1929 (Turyahabwe and Banana 2008). These forest reserves were managed through use of command and control with no involvement of the local communities living near them.

There was an attempt to decentralise the management of forest resources in Uganda between 1939 and 1947 with registration and establishment of local forest reserves under the districts' administration. In the Lake Victoria Crescent, local forest reserves were managed by the Buganda Kingdom administration, which was the de facto local government of the time. Forest resources were again recentralised in 1967 after Uganda became a republic and the promulgation of the new constitution of 1967.

Reforms in public administration and governance of the forest sector were initiated once more in 1997 and in 2001. Local governments were established following the implementation of the Local Government Act (1997). An autonomous agency, the National Forest Authority (NFA), was established to manage central forest reserves, and the District Forest Services (DFS) was set up to manage local forest reserves and provide advisory services to private tree farmers with the enactment of the National Forestry and Tree Planting Act, 2003. NFA is a for-profit parastatal that was expected to be financially sustainable within four years of its inception, while the DFS was to be run under the local government structure. These institutional changes implemented the new Forest Policy of 2001 (GoU 2001), the National Forest Plan of 2002 (GoU 2002), and the National Forestry and Tree Planting Act of 2003 (GoU 2003).

New regulations and policy instruments were put into place to encourage the participation of local communities, private companies, and local governments in forest management. Unsustainable forest management under the central government was cited as the major reason for the governance reforms in the forest sector (Banana et al. 2007, Turyahabwe et al. 2007) while improvement in service delivery through devolution of power to lower governments was cited as the major reason for the reforms in public administration (GoU 1997).

The assumption was that involvement and cooperation with all stakeholders in the forest sector – such as local communities, local government, private sector, civil organisations, and development partners – would create an opportunity to manage forests on a sustainable basis due to improvement in policy formulation, decision-making, transparency, and accountability (GoU 2001).

The new regulations and policy instruments also led to changes in land tenure and rights to forests and trees. Forest-adjacent communities were given an opportunity to participate in forest management through collaborative forest management arrangements (CFM) in return for improved access to forest products from central and local forest reserves. Under CFM, communities are engaged in forest management activities such as patrolling and forest maintenance even though they do not own the forest reserve. The statutory authorities responsible for central reserves (NFA for central forest reserves and DFS for local forest reserves) remain the stewards while the community is a management partner.

Under the same rules and regulations, private companies and tree farmers can lease forest reserves for a period of 25 years (subject to renewal) for plantation development as long as the reserves were gazetted for plantation development. In the new forest policy, equity and gender issues are empha-

sised as hallmarks for SFM. For example, the policy states that "government will ensure the integration of gender concerns and issues into the development of the forestry sector." As such, women forest-user groups are given priority under the community tree-planting programme.

In order to achieve the principle of equity and gender equality, the NFA, as the steward of all central forest reserves in Uganda, demands that community-based organisations that wish to partner with it under CFM have a fair representation of women. The Forest Policy of 2001 emphasises equity in benefit sharing, but there are currently no regulations and guidelines developed by the Forestry Sector Support Department, which plays the overarching role of policy guidance for the entire forestry sector and appraises NFA and DFS, for the relevant lead agencies to implement it. It is still common for local communities to be relegated to accessing forest products at the whims of the lead agencies. Civil society organisations have recently demanded active collaboration where all partners are perceived to be equal.

In situations where communities have encroached on forest reserves, the lead agencies responsible are required to ensure that there is fairness in the processes of evicting encroachers from forests. For instance, grace periods are given before evictions are enforced. Communities are also allowed to access some of the products from forest reserves for subsistence. The Forestry and Tree Planting Act (2003) also provides for ownership of private forests. Landowners with natural forests or planted forests have absolute rights over their forests. It is estimated that about 70% of the natural forest cover in Uganda is on privately owned land. The Land Act (1998) further strengthens tenure rights of forest landowners.

22.2 Forest and livelihoods in the Lake Victoria Crescent

Uganda covers an area of about 24 million ha, of which approximately 4.9 million ha (20%) are under forest cover (GoU 2003). At the beginning of the 19th century, approximately 45% of the land cover in the Lake Victoria Crescent was under forest cover (Howard 1991). The vegetation in this agro-ecological zone is characterised as a tropical moist evergreen forest/savannah mosaic (Barbour et al. 1987, Howard 1991). The topography is characterised by regularly spaced, flat-topped hills. The seasonally inundated valleys support forests and the broad, permanently inundated valleys support papyrus swamps, while the hilltops support short-grassed savannahs (Vogt et al. 2006).

Under the NFA management structure, central forest reserves in the Lake Victoria Crescent, also commonly known as the lake-shore range, are managed on an ecosystem management approach basis under the authority of one range manager. A group of neighbouring forests are managed by a sector manager while individual forests are under a forest supervisor.

However, the majority (70%) of the forests in this region occur on private land and or clan land under customary land tenure. Consequently, nearly 15% of the total population in the lake-shore range lives in parishes that neighbour forests, which provide forest products and services for their livelihoods. Most of these forests are composed of secondary growth and are highly degraded because this region of Uganda has a long history of human occupancy, cultivation, and selective felling of trees for timber, charcoal, and non-timber forest products (NTFPs) (Banana et al. 2010).

Large-scale wood-processing industries were operating in the region between the 1930s and 1970s, driven by the virgin natural forests that existed then. Today, most of the timber is harvested from forests on private land using hand saws or chainsaws. Timber harvesting is currently mainly carried out by commercial timber dealers who reap the profit margin from this produce. Landowners and subsistence farmers sell the trees to dealers who have the capacity to process and market the timber. In most cases, the interest of the landowners is to clear the land for cultivation of mainly subsistence-level annual crops, occasionally for cultivation at a commercial level. Most of the timber harvested is consumed by the local market, especially by the construction industry, since the forest resource is too small to sustain export trade in timber (Odokonyero 2005). Data on revenues generated from timber are difficult to access because a lot of timber in the market is illegally sawn and therefore not recorded by formal institutions. In the fiscal year 1999–2000, the Forest Department generated revenue amounting to about USD 5 million, mainly from selling concessions for timber harvesting (MWLE 2001).

In addition to timber, the contribution of NTFPs and forest services to livelihoods of local communities in the region is substantial. Most of the population in the study area practice agroforestry subsistence farming systems. The landholdings are small, often less than 2 ha. Hillsides once covered with forests are now dominated by a matrix of bananas, coffee, and fruit trees (Vogt 2005, Vogt et al. 2005, Vogt et al. 2006). Farmers grow a mix of crops including perennials (e.g. bananas and coffee), annuals (e.g. maize, beans, vegetables, etc.), trees (e.g. *Artocarpus heterophylus*, *Mangifera indica*, *Ficus natalensis*, *Maesopsis eminii*, and *Eucalyptus saligna*), and fodder grasses (e.g. *Pennisetum perpureum*). Trees are grown in the valley and mid-slope portion of the landscape for provision of firewood,

fruits, windbreaks, shade, erosion control, and improvement of soil fertility. About 76% of villages throughout the region were involved in selling some tree products in 2009, mainly poles, fuelwood, and charcoal.

At the national level, forestry contributes about 2% of the GDP. However, most of the contributions are in the informal sector, which if included, would raise the GDP to 6%. In her studies in western Uganda, Jagger (2012) reports that 26% of the total annual household income in that region is derived from the environment, of which forests provide the greatest share. This is mainly from fuelwood, poles, and sawn timber.

According to Bush et al. (2004), the total contribution of forests to local people's livelihoods in Uganda at the national level is approximately USD 190 million. Wealthy households capture most of the financial value. More than 90% of the population uses wood for fuel, which takes 95% of wood production in Uganda. Rural households consume about 97% of the household energy requirements and forestry employs about one million people in the formal and informal sectors, with a high potential for job creation in the firewood, timber, charcoal, plantations, tree nurseries, and other forestry-related activities (NFA 2011/2012).

The Lake Victoria Crescent is characterised by a high population density, with approximately 300 to 400 people per square kilometre (UBOS 2002). Many of the inhabitants rely on forests for their livelihood and this has created immense pressure on natural forestland in this region. More than 80% of the labour force is employed in agriculture, mainly banana/coffee farming systems (UBOS 2008). Because of the coffee wilt disease that has affected many farmers, some are shifting to livestock rearing as an alternative economic activity. Kampala, which is the capital of Uganda, lies in the Lake Victoria Crescent; it provides an immense market for agricultural produce from the farmers because of its high population, estimated to be 1.7 million people (UBOS 2012).

The forests along the lake shore form a ring of protection and act as water catchment area for Lake Victoria, Lake Kyoga, and the Nile River. These forests are a source of many streams that provide local communities with domestic water. Many forest reserves in this range, for example Mabira, Mpanga, and Sango Bay Forest Reserves, are categorised as protected areas of core conservation value and some are characterised as critical biodiversity hotspots in East Africa.

There are several ecotourism sites in the region, attracting more than 50% of tourists visiting forest reserves in Uganda. In addition to having subsistence, economic, and environmental values, forests along the shores of Lake Victoria have important cultural and traditional significance (Gombya-Ssembajjwe 2000, Banana et al. 2008).

22.3 Outcomes of the forest governance reforms on SFM

We used data collected over time under the International Forestry Resources and Institutions (IFRI) research programme to analyse the extent to which forest governance reforms contributed to sustainable forest management in the Lake Victoria Crescent. We limit our definition of SFM to managing and using the forest while maintaining and or enhancing its ecological integrity and health. The IFRI database, located in the School of Forestry, Environmental, and Geographical Sciences at Makerere University, has data spanning the period from 1993 to 2012. Nine of the forests in the database are located in the Lake Victoria agro-ecological zone. These include Busowe Central Forest Reserve (CFR), Kabunja Private Forest, Namungo Private Forest, Lwamunda CFR, Butto-Buvuma CFR, Mpanga CFR, Mabira CFR, Malamagambo CFR, and Jubiya CFR.

Forest field data obtained using the IFRI methodology for the database included biophysical data to describe the condition of the forest, forest products harvested, rules in use, and the socio-economic status of the communities using these forests (Ostrom 1998, Banana et al. 2007).

Furthermore, on-site assessments of plot conditions in relation to human and natural disturbances were recorded. Forests were revisited every four to five years. The majority of the forests in this analysis have been revisited two times. For this case study we analysed changes in mean DBH, tree density, and occurrence of human disturbance to determine whether SFM was being achieved in this region. We carried out Analysis of Variance coupled with either two sample t-tests or pairwise comparison tests to ascertain whether any significant differences occurred.

The results of data analysis show that there was an aggregate decline in mean DBH and number of stems per hectare across the landscape (Table II 22.1). Tree density declined by more than 50% in the majority of forests. In Lwamunda and Butto-Buvuma, the forests were severely degraded and encroached by illegal cultivators. Subsequently, the land was leased to private tree farmers and land use was converted from natural tropical high forest to pine and eucalyptus plantations.

Cultivation, timber, and commercial firewood harvesting were found to be the major economic activities in the forests studied (see Table II 22.1 and Figures II 22.2 and II 22.3).

Even though there was an aggregate decline in mean DBH and number of stems per hectare across

Table II 22.1 Biophysical and qualitative assessment of forest monitored in the Lake Victoria Crescent.

Forest name, tenure, and district	Years visited	Tree mean DBH (cm)	Mean DBH pairwise comparisons	Tree density/ha	Mean tree density pairwise comparisons	Major socio-economic activity and contribution to local livelihoods
Busowe CFR-Kalangala	2000 2003 2012	26.3 25.1 29.8	2000 vs 2003: NS[1] 2000 vs 2012: NS[1] 2003 vs 2012: *	301 231 214	2000 vs 2003: NS[1] 2000 vs 2012: * 2003 vs 2012: NS[1]	Nature reserve, firewood harvesting. Relatively stable forest condition with slight decline in tree density. Declared a nature reserve in 2001 and harvesting of forest produce significantly restricted. Dependency on forest for timber and fuelwood declined from 30% to zero.
Kabunja Private Forest-Kalangala	2000 2003 2012	23.9 24.7 21.3	2000 vs 2003: NS[1] 2000 vs 2012: NS[1] 2003 vs 2012: *	289 209 192	2000 vs 2003: * 2000 vs 2012: * 2003 vs 2012: NS[1]	Clan members depend 100% on forestland for cultivation of agricultural crops, growing palm oil, harvesting commercial timber and firewood. Forest condition found to be degrading in 2012.
Namungo Private Forest-Mpigi	1993 1997 2004	23.3 23.2 24.9	1993 vs 1997: NS[1] 1993 vs 2004: NS[1] 1997 vs 2004: NS[1]	342 315 108	1993 vs 1997: NS[1] 1993 vs 2004: * 1997 vs 2004: *	Commercial fuelwood and timber harvesting by family members. Family depends 100% on forest for fuelwood and timber. Nearby households allowed to harvest fuelwood and NTFPs for subsistence. Large portion of forest converted to eucalyptus plantation in 2004, hence the decline in number of stems.
Lwamunda CFR-Mpigi	1993 1997 2004 2010	23.25 23.32 24.88 0	1993 vs 1997: NS[1] 1993 vs 2004: NS[1] 1997 vs 2004: NS[1]	341.7 315.3 135.4 0	1993 vs 1997: NS[1] 1993 vs 2004: * 1997 vs 2004: *	In 2004, forest highly degraded and then leased to private tree farmers and converted to eucalyptus plantation. Local communities lost access to forest.
Mabira CFR-Mukono	2006 2012	19.1 17.2	2006 vs 2012: NS[1]	114 83	2006 vs 2012: NS[1]	The eastern part of the forest rapidly degrading due to illegal conversion to agricultural use, firewood, charcoal, and collection of fodder for livestock. Local communities depend 100% on forest for provision of fodder and fuelwood. No timber-size trees available in the reserve.
Butto-Buvuma CFR-Mpigi	1994 2001 2005 2010	22.5 25.6 27.6 0	1994 vs 2001: NS[1] 1994 vs 2005: * 2001 vs 2005: NS[1]	332 191 111 0	1994 vs 2001: * 1994 vs 2005: * 2001 vs 2005: NS[1]	Illegal timber and commercial firewood harvesting. Local communities depend 100% on forest for provision of timber and fuelwood. In 2005, highly degraded and then leased to private tree farmers and converted to pine and eucalyptus plantations. From 2005, local communities lost access to forest.
Mpanga CFR-Mpigi	1994 2000 2004	25.1 28.1 28.3	1994 vs 2000: NS[1] 1994 vs 2004: NS[1] 2000 vs 2004: NS[1]	401 385 348	1994 vs 2000: NS[1] 1994 vs 2004: NS[1] 2000 vs 2004: NS[1]	Nature reserve and harvesting of forest products restricted, except widespread timber harvesting for drum-making and crafts. Forest in stable condition.
Maramagambo CFR-Rakai	1998 2001 2007	22.7 23.8 28.3	1998 vs 2001: NS[1] 1998 vs 2007: NS[1] 2001 vs 2007: NS[1]	182 199 186	1998 vs 2001: * 1998 vs 2007: NS[1] 2001 vs 2007: NS[1]	No timber harvesting since 1998, harvesting of NTFPs such as fishing in swamps and river streams and grazing in grassland patches widespread by all pastoralists with payment of fee. These activities controlled by local communities under CFM. Forest condition rapidly improving. Most households with woodlots and practicing agroforestry.
Jubiya CFR-Masaka	1999 2002 2008	24.4 23.2 24.0	1999 vs 2002: * 1999 vs 2008: NS[1] 2002 vs 2008: NS[1]	239 203 199	1999 vs 2002: * 1999 vs 2008: * 2002 vs 2008: NS[1]	Widespread timber and fuelwood harvesting between 1999 and 2002. Strict forest protection between 2002 and 2008 – only NTFPs harvested in this period. Forest supervisor murdered during this period. Cultivation close to forest boundary but forest condition relatively stable.

NS[1] = Not significant at 0.05% * = Significant at 0.05%

the landscape, the condition of some individual forest patches were improving and others were stable. Five of the nine sampled forests were in the "degrading" or "rapidly degrading" categories, and four were in the "stable" category. This suggests that some of the forest patches were being managed sustainably while others were not. The outcome of the reforms was also not uniform within and among forest tenures. Some central forest reserves were stable while others were rapidly degrading. Parts of central forest reserves that were managed strictly as nature reserves were found to be in better ecological condition than those managed as exploitation forest reserves. Similarly, some private forest owners were conservation minded and their forests were in good condition, while others cleared their forests for agriculture (see Figures II 22.2 and II 22.3).

Our findings are in agreement with those from another IFRI study undertaken recently using satellite images and remote sensing (Waiswa 2011). According to this study, forest cover declined by 4.5% between 2002 and 2006 and by 32.8% between 2006 and 2009. The overall forest cover decline between 2002 and 2009 was 35.8%. On the other hand, land-cover conversion from non-forest to forest and vice versa also revealed net forest cover loss between 2002 and 2009, from 9% in 1989 to 4.4% in 2009 in comparison with non-forest cover, which increased from 58.7% in 1989 to 63.5% in 2009. The weighted mean annual deforestation rate from 1989 to 2009 was 2.6%. A visual assessment showed a clustered spatial distribution of forest cover loss and fragmentation of large forested areas. FAO in 2000 estimated the deforestation rate in Uganda to be about 0.9% per year based on the change in the amount of bushland and woodlands from 1990 to 1995. Other official estimates of the rate of land clearance range from 70 000 ha to 200 000 ha (MWLE 2003). These figures imply annual deforestation rates of between 1% and 3%, respectively.

Figure II 22.2 Forest cleared by private forest landowner for establishment of oil palm plantation in Kalangala district. ©Abwoli Banana

22.4 Conditions shaping SFM in the Lake Victoria Crescent

22.4.1 High demand for construction timber and commercial fuelwood

There is high demand for construction timber and commercial fuelwood (e.g. for charcoal, brick burning, and commercial baking needs, Reinikka and Collier 2001) in the region due to presence of major urban centres such as Kampala, Mukono, Jinja, Mpigi, and Masaka towns and increasing rural population, with an estimated population of more than 6 million people (UBOS 2002). The demand for forest produce far exceeds supply. Consequently, there is rampant illegal timber and charcoal harvesting that greatly contributes to unsustainable forest exploitation in this agro-ecological zone. Our study reveals glaring evidence that natural forests on private land were heavily exploited for commercial timber and fuelwood compared to central forest reserves. This is probably because under the current policy and legal regime exploitation and use of forests on private land is at the discretion of the forest owner.

Much as the Forestry and Tree Planting Act, 2003, requires forest owners to sustainably manage and use their forest there are no regulations and guidelines to operationalize that provision, hence it is legally impractical to hold private forest owners who harvest all their trees for timber or fuelwood accountable. This already bad situation has been worsened by the fact that most local governments are financially crippled, so they exploit this "opportunity" as a source of local revenue. Private forest owners are not restricted from commercially harvesting their forests for timber and fuelwood since they pay an array of taxes and duties for local governments (Turyahabwe et al. 2007).

For the past 20 years, there has been a statutory ban on harvesting timber and charcoal from forest reserves; however, this has not stopped illegal harvesting. No efforts have been put in place to integrate local producers into improved market opportunities through the value chain approach or by improving the functioning of marketing channels (Kambugu et al. 2012). As a result, the ban has acted as a disincentive for local communities to participate in SFM because of the limited benefits that accrue to them. The ban has also discouraged investment in technology and

Figure II 22.3 Oil palm plantation by the side of tropical high forest in Kalangala district. ©Abwoli Banana

capacity building by wood-processing enterprises, which are typically small and family-based and have limited investment or technology and low levels of return.

22.4.2 Conversion of forestland to agricultural use

The availability of fertile soils, favourable climate, and markets for agricultural produce in the Lake Victoria Crescent make it more profitable for farmers to convert private forestland to agricultural production (Namaalwa et al. 2001). Encroachment on forest reserves for production of horticultural crops has also increased following the implementation of the economic liberalisation policy that led to improvement in prices for agricultural crops (Vogt et al. 2006, Banana et al. 2007). Government is also promoting commercial farming in the Lake Victoria Crescent. About 20 000 ha of natural tropical high forestland have been allocated to oil palm and sugarcane plantation development in Kalangala and Mukono districts. About 1006 ha of Namanve central forest reserve located near Kampala were degazetted through a statutory instrument in 1997 to create space for an industrial park. The other parts of the reserve (approximately 1294) that were not degazetted have been heavily encroached and mostly turned into settlements. The oil palm plantations are targeting production of vegetable oil for human consumption, while sugarcane plantations are targeting sugar production for domestic and international markets. Again it is more profitable for farmers to convert private forestland to sugar cane and oil palm as contract farmers for the companies involved. These scenarios and many other cases of conflicting government priorities pose a challenge to the forest sector in its quest for SFM.

The Land Act (1998) and Land (Amendment) Act, 2010, give absolute ownership of land to the people of Uganda, including ownership of resources such as the trees and forests on it. This has to a large extent led to loss of most forests on private land since the act allows owners to carry out any activity on the land as long as it is lawful. Many private forest owners have used this act to convert their forest to other land uses, causing unprecedented forest loss. This is despite the National Forestry and Tree Planting Act that requires private forest owners to manage their forests sustainably.

There have been limited efforts to reconcile different land uses and to address competing land uses,

such as agriculture and forestry, energy and forestry, among others. The government developed a National Land Policy to address intersectoral issues and to encourage appropriate and optimal land use; however, this policy is yet to be publicised and implemented. Our study reveals that agricultural encroachment is occurring on both central forest reserves and private forests. This has also been reported in the REDD (Reducing Emissions from Deforestation and Forest Degradation) readiness preparation proposal for Uganda (MWLE 2011). Agricultural encroachment is driven by the high population density and decline in the productivity of land. Use of fertilizers in the Lake Victoria Crescent is low; hence farmers are "forced" to practice shifting cultivation. Clearing forests to cultivate crops gives good yields for the first two rotations, but after that farmers have to clear more forest land.

22.4.3 Corruption and political interference

Corruption and political interference is another major obstacle to achievement of SFM in the study region within the current policy and legal framework. Attempts by forest officials to evict encroachers from Mabira, Lwamunda, and Butto-Buvuma forests are often criticised and frustrated by government officials and politicians: a current presidential ban also disallows the eviction of illegal encroachers in central forest reserves. According to Vedeld (2003), centralised systems tend to be vulnerable to abuse by bureaucrats. There is less accountability and transparency. Jagger (2010) reports that corruption was common in harvesting valuable forest products in both central and local forest reserves in western Uganda. This raises the question whether the reforms in the forestry sector changed the attitude of the leadership and society as a whole to remain committed to promoting SFM in Uganda.

22.4.4 Regional and global forest-related processes

There are few regional and/or global forest-related processes being implemented in the study area because of the reforms that Uganda has undergone and the impact of the reforms on SFM. These include the Clean Development mechanism (CDM); Payments for Ecosystem Services (PES), also known as Payments for Environmental Services; Reducing Emissions from Deforestation and Forest Degradation (REDD); and the Forest Law Enforcement, Governance, and Trade (FLEGT) Support Programme for African, Caribbean, and Pacific countries (ACP-FLEGT Support Programme). Although most of these processes have been implemented in the study area for fewer than five years and there are no measurable outcomes yet on the ground, they have had direct influence on the domestic policy environment and behaviour of the different actors in the public policy arena. There are more civil society organisations pressing relevant government institutions to be accountable when principles of SFM are perceived to be violated. A climate change unit in the ministry of Water and Environment, a REDD focal point, and a REDD working group have been established to stimulate policy discussions on measures that might contribute to mitigation of climate change, including SFM.

Other global processes that have had an impact on SFM in the region include privatisation and liberalisation of the economy. These processes have had a significant impact on development of forest plantations due to increased investment flow into the forest sector by both local and foreign development partners. Farmers have benefited economically from the sale of forest/tree products that may be harvested throughout the year. Thus trees on farms have become an important source of livelihoods for local people. Some central forest reserves in the study area have been licensed to private tree farmers to establish plantations, partly because they were heavily degraded and restoring them through establishing monocrop tree plantations was seen as the only feasible intervention. All these processes have been possible partly due to the reforms in forest governance.

22.4.5 Capacity building and technical assistance

The reforms created a suitable environment for enabling various local and international actors interested in promoting SFM through capacity building and technical assistance. Under a programme titled "Strengthening and Empowering Civil Society for Participatory Forest Management in East Africa (EMPAFORM)" funded through the European Union Tropical Forest initiative, national and international NGOs (non-governmental organisations) focused on strengthening civil society by promoting a pro-poor approach to forest management and conservation centred on individual forest reserves in the study area. By strengthening and empowering communities, the programme aimed at making the implementation of the new forest policy more demand driven and more equitable in addressing the

interests and rights of the poor, women, and children (EMPARFORM 2006).

Several NGOs provide technical assistance to farmers to grow trees on their farms in the study area. For example, Swedish Cooperative CentreVi Agroforestry, an international NGO, provides technical assistance to farmers. Technical aspects covered include seed collection, tree nursery management, collaborative forest management, lobbying, and advocacy. It has a development objective of contributing to the improved livelihood and empowerment of small- scale farmers in the Lake Victoria basin through sustainable management of natural resources and business development. In its 2007 annual report, the project reported increased adoption of agroforestry practices/technologies leading to increased on-farm tree cover for firewood and wood products (Scc-Vi 2007). The most adopted technologies included planting multiple tree species on cropland (64.4%) and boundary tree planting (47.8%), among others. About 31.8% of households had established woodlots, 57% had at least 32 trees per hectare. A total of 722 farmers (328 females, 394 males) had visited the Agroforestry Training Centre (ATC) where profitable enterprises and best agroforestry practices are demonstrated.

The Saw Log Production Grant Scheme (SPGS), financed by the European Union and the government of Norway, is providing funding to private farmers to establish forest plantations for timber production in highly degraded central forest reserves. They are currently offering financial and technical support to members of Uganda timber growers association. They train their clients regularly on various aspects of tree management and support research in plantation forestry. The SPGS project has been successful and already over 10 000 ha of plantations have been established (NFA Annual Report 2005/2006 and 2009/2010). Mostly large private companies have benefited from this fund since local farmers could not meet the conditions set by the government to access these funds.

Potential clients are required to have at least 25 ha of land and should be able to contribute 50% of the initial costs to establish the intended plantation. They should be a registered company with a well-written technical management plan. The programme also provides funds to small-scale farmers who have to form groups of at least 20 people with land ranging between 0.5 to 5 ha to plant trees on private land and in highly degraded central forest reserves that were formally earmarked for plantation establishment. Between 2005 and 2010, approximately 10 200 ha of forest plantations have been established under contract arrangement between the small-scale tree farmers and SPGS (NFA 2011/2012). Although addressing the need to avert timber shortages in the near future, the programme has been criticised by local and international communities for marginalising the forest-adjacent communities through reduced access to forestry resources and loss of biodiversity (Banana et al. 2010).

Farm Income Enhancement and Forest Conservation (FIEFOC) is a government project with funds obtained from African Development Bank; it supports communities and private individuals to plant trees on farms and in woodlots and for training in basic silvicultural practices. The FIEFOC project's objective is to alleviate rural poverty through tree planting for poles and firewood production by small-scale farmers, with particular emphasis on empowerment of women (Banana et al. 2012). The project has been fairly successful and aims to produce 472 500 MT of poles and 94 500 MT of fuelwood – it has greatly contributed to increasing tree cover outside forests in the lake shore region. Approximately 5000 ha of woodlots have been established using planting materials provided by the project.

22.4.6 Availability of researched information to support SFM initiatives

There are a number of research initiatives currently being implemented in the study area to promote SFM. This is partly because of the conducive policy and legal regime brought about by the reforms in the forestry sector. The Forest Policy of 2001 and Forestry and Tree Planting Act, 2003, emphasise the importance of research in promoting SFM.

The International Forestry Resources and Institutions (IFRI) researchers at the School of Forestry, Environmental, and Geographical Sciences at Makerere University have collected field data on social and ecological variables from more than 28 tropical forest sites in Uganda since 1994, nine of which are located in the study area. The IFRI research programme is an international, comparative, multidisciplinary, and longitudinal research programme that studies human-forest interrelationships, forest management institutions, and change processes (Ostrom 1998, Wollenberg et al. 2007).

The National Biomass Study project in the Ministry of Water and Environment has been assessing Uganda's woody biomass resources using remote sensing and GIS techniques since 1989. Using the data collected, mean annual increment (or biomass loss) are estimated for various land-cover classes and total sustainable yields calculated. This unit was created with a policy and legal mandate to offer information that can be used to promote SFM in Uganda.

The Lake Victoria Basin Commission (LVBC) based in Kisumu- Kenya promotes a joint approach to improving forest governance and research in

East African Community (EAC) partner states by harmonising policies and research activities. One of the notable initiatives is the Lake Victoria Research (VicRes) Initiative, which is implemented by the Inter-University Council for East Africa and aims at promoting sustainable livelihood and natural resources management in five East African countries in the Lake Victoria basin of Kenya, Tanzania, Uganda, Rwanda, and Burundi. Another important initiative by the LVBC is the study of losses arising from non-compliance to FLEGT principles within EAC partner states.

22.5 Conclusions

Our study has shown that the decentralisation reforms have registered both positive and negative impacts in relation to SFM in central Uganda. Despite the reforms, tree density has generally declined in the forests within central Uganda. Unsustainable practices are dominant in forests that are near urban or peri-urban centres due to population pressure, lack of political support across all levels, lawlessness, and corruption.

Forest fragmentation and the decline in forest cover and quality over the past 10 to 15 years in central Uganda confirm that efforts made to reduce illegal logging and other illicit activities related to forests or to promote legality in the reforms have not been effective. This is probably because of the high demand for timber due to the booming construction industry, agricultural encroachment linked to high population density, and conflicting government priorities. This therefore implies that without eliminating corruption, strengthening forest institutions to enforce forest laws and regulations, and improved political will; SFM is unlikely to be achieved in the foreseeable future and will continue to be elusive for Uganda.

The study also confirms that CFM can foster SFM, especially when there is fairness and equity in benefit sharing. Forest reserves managed by a responsible agency in collaboration with the adjacent communities are more likely to be sustainably managed than where only the responsible agency manages a forest reserve. The reforms created a suitable policy and legal framework for local and international initiatives to implement research and capacity building programmes targeting SFM.

The measures that might be taken to improve the long-term outlook for SFM include putting in place strategies to implement and harmonise environmental legislation and cross-sectoral instruments that impact forest management and support good forest governance. Many of these policies directly or indirectly impinge on forest management and utilisation. For example, the Leadership Code, the Office of the Inspector General of Government, the Ministry of Ethics and Integrity, Parliamentary and Local Government Accounts Committees, and other routine law enforcement agencies that are relevant to enforcement of forest laws and regulation must be strengthened to reduce corruption and political interference. There is a need to harmonise the energy, environment, population, and environmental laws and policies to ensure that they are in tandem with principles of SFM.

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Assessing forest governance in the Federation of Bosnia and Herzegovina: Views of forestry professionals

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Abstract: The concept of forest governance is related to new ways of managing forests that extend beyond the traditional functions and power of the state. This chapter presents the views of highly educated forestry professionals (forestry engineers) on several forest governance components through an evaluation of their importance and implementation in the forestry sector of the Federation of Bosnia and Herzegovina, one of three units within the country of Bosnia and Herzegovina. By using the Framework for Assessing and Monitoring Forest Governance, the gaps between the importance and the implementation of forest governance components were identified. In order to understand how the conditions shaping sustainable forest management (SFM) at the national level are influenced by the current state of forest governance, the presence, absence, and interactions of these conditions were also analysed. The greatest gaps between the importance and the implementation of the framework components are identified as those that refer to policy and institutional, legal, and organisational preconditions for SFM. The absence of key conditions to foster SFM (sound policies and institutional capacities) is the result of poor public forest administration and lack of an appropriate legislative framework. The forestry sector in the Federation of Bosnia and Herzegovina has characteristics of a resilient policy system, fairly resistant to impacts from the international processes aimed at influencing national-level policies. This resistance is due to deficiencies in adaptive capacities of the national forestry sector, which limits the ability to tackle necessary reforms, and to failure of efforts led by international agencies to empower the national forestry sector. While the international forest governance paradigm can trigger positive changes in forest policy and stakeholders' behaviour, real progress is impossible without proactive domestic actors that are committed to carrying out reform processes in the national forestry sector.

Keywords: Forest governance, sustainable forest management, forestry professionals, Federation of Bosnia and Herzegovina

23.1 Introduction

Bosnia and Herzegovina (hereinafter BIH) is a country in southeastern Europe with the total area of 51 197 km^2 and an estimated population of almost 4 million inhabitants. The country proclaimed its independence from the former Yugoslavia in the spring of 1992 when political conflicts escalated into war. During the war between 1992 and 1995, more than half of the pre-war population of the country was displaced from their homes (Toal and O'Loughlin 2009). In terms of administrative and political regulation (Figure II 23.1), the country consists of the following three units: the Federation of Bosnia and Herzegovina (FBIH) – the focus of this study, the Republic of Srpska, and the District of Brcko. Twenty years after the war, the country is still characterised by numerous problems that jeopardise further political and economic development. According to the last European Commission's progress report on acceptance of BIH as a member state of the European Union (EU) the country achieved little or limited

Figure II 23. I Administrative structure of the country of Bosnia and Herzegovina.

progress in almost all aspects, concluding that the key issue seems to be a lack of shared vision among political representatives on the direction the country should take and its administrative set-up (European Commission 2012).

Covering more than half of the country, forest resources are important both to the national economy and to local livelihoods. Forests have a critical role to play in maintaining biodiversity, regulating water and soil regimes, mitigating climate change effects, and providing substantial additional income for rural communities. Together with the wood-processing industry and agriculture, forestry plays a key role in the development and well-being of most rural areas. Forests also provide a number of ecosystem services, benefits, and resources to society. The forestry sector has had an irreplaceable role in post-war reconstruction, rehabilitation, and the economic stability of the country.

As in other countries with economies in transition, BIH is facing an unprecedented scale of changes that has shaped social, economic, and political realities. Although these changes are more and more driven by national actors, it seems that the formal commitment to join the EU is still the prevailing agent of change that promotes acceptance of internationally recognised principles of sustainable development. In that context, the concept of sustainable forest management (SFM) and the shift from government to governance in policy formulation have also been introduced in professional debates in BIH. The national forestry sector[1] is under pressure to pursue these guiding global paradigms but there is no comprehensive understanding of how they are currently implemented at the national level.

Forest governance has become the new progressive industry in forestry science and practice (Arts and Visseren-Hamakers 2012). Generally, forest governance is about new ways of managing forests, such as forest certification, corporate social responsibility, national forest programs, participation and partnership between the private and public sector, community forest management, etc. It is generally accepted that these ways of forest management are better able to take care of public issues related to forest resources than are the classical methods of management by state institutions. Still, the achievements of forest governance are predicated upon mutually

[1] As mentioned, Bosnia and Herzegovina consists of the Federation of Bosnia and Herzegovina, the Republic of Srpska, and the District of Brcko. Since the chapter focuses on the forestry sector of the Federation of Bosnia and Herzegovina, the term *national* in this chapter refers only to the Federation of Bosnia and Herzegovina.

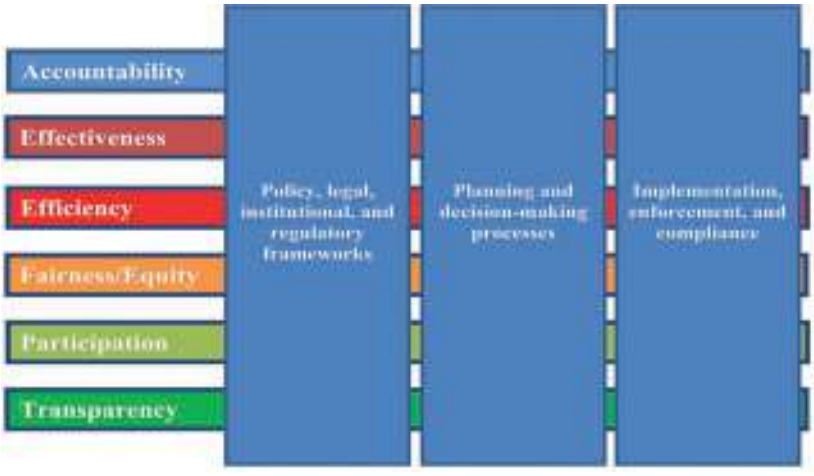

Figure II 23.2 Pillars and principles of the Framework for Assessing and Monitoring Forest Governance (PROFOR and FAO 2011).

supportive and cooperative relationships among government, the private sector, and civil society. However, forest governance is successful when the principles and practices of governing create greater democratic and transparent processes for adaptive and iterative, cross-sectoral, and multilevel, forest policy-making, and implementation (Shannon 2012).

In the Western Balkans, studies focusing on forest governance at the national and regional level are still in initial stages. Some authors have explored various issues dealing with forest governance in a wider context. These studies range from forest certification (Avdibegovic 2001, Avdibegovic et al. 2003) and dynamics of regulatory instruments of forest policy (Brajic et al. 2011, Grašic et al. 2011) to private forestry issues (Glück et al. 2011, Pezdevšek-Malovrh et al. 2011) and relationships among different stakeholders regarding natural resources (Selmanagic-Bajrovic and Avdibegovic 2010, Vuletic et al. 2010, Maric et al. 2012). The most consistent research on perception of forest governance at the national level was presented just recently (Mutabdžija 2012). The modest practical experiences in forest governance in FBIH make understanding of the influence of this concept quite difficult. The deficiencies in relevant empirical research regarding the implementation of forest governance principles calls for an evidence-based analysis that takes into account the views of forestry professionals. This case study presents an overview of the forest sector in FBIH and examines how the different components of forest governance are currently implemented at the national level. The focus is on the conditions shaping SFM, their interactions, and especially how they are influenced by the current state of forest governance. These conditions are discussed in the following sections: section 2 presents an overview of the natural resource base; section 3 looks at livelihoods, capacities, and cultural and socio-economic aspects; section 4 is on policy, institutions, and governance; and section 5 focuses on research and monitoring. Conclusions are presented in section 6.

In order to analyse the success or failure of SFM in FBIH, the analytical framework presented in the Part I of this book was used to evaluate presence, absence, and interactions among these four groups of conditions. Empirical evidence provided by forestry engineers' views on the importance and implementation of forest governance components in FBIH was used to support the analysis. This information was obtained from the GOVOR project, which intends to foster better understanding of forest governance in southeastern European countries. This is an ongoing regional research initiative (implemented within the Forest Policy Economics Education and Research – FOPER – project of the European Forest Institute) that deals with the adaptation of national forest policy systems in southeastern European countries to new modes of global forest governance.

Since forest governance has meant different things to different people around the world, the need for a comprehensive analytical framework to diagnose, assess, and monitor forest governance was widely recognised. In 2011, in order to facilitate description, diagnosis, assessment, monitoring, and reporting on the state of governance in national forestry sectors, the United Nations Food and Agriculture Organisation (FAO) and the World Bank's Program on Forests (PROFOR), in close cooperation with the UN REDD/ Chatham House initiative, developed the Framework for Assessing and Monitoring Forest Governance (FAMFG). The overall design of the FAMFG is based on the idea that the governance is both the context and the product of the interaction of a range of actors and stakeholders with diverse interests. The FAMFG consists of pillars and principles of good forest governance (Figure II 23.2) (PROFOR and FAO 2011).

Table II 23.1 Forest Governance Components.

FAMFG Pillars	Forest Governance Components
1. Policy, legal, institutional, and regulatory frameworks	1. Forest-related policies and laws 2. Legal framework to support and protect land tenure, ownership, and use rights 3. Concordance of broader development policies with forest policies 4. Institutional frameworks 5. Financial incentives, economic instruments, and benefit-sharing
2. Planning and decision-making processes	6. Stakeholder participation 7. Transparency and accountability 8. Stakehol der capacity and action
3. Implementation, enforcement, and compliance	9. Administration of forest resources 10. Forest-law enforcement 11. Administration of land tenure and property rights 12. Cooperation and coordination 13. Measures to address corruption

Table II 23.2 Total growing stock, annual volume increment, and annual available cut in FBIH (Federal Ministry of Agriculture, Water Management and Forestry 2012).

	Total growing stock (m^3)	Annual volume increment (m^3)	Annual allowable cut (m^3)
Conifers	68 020 804	1 988 887	1 292 867
Broadleaves	93 821 784	2 212 128	1 639 502
Total	161 842 588	4 201 015	2 932 369

Under the FAMFG structure, each pillar has several essential components (Table II 23.1). These are further divided into subcomponents that identify important aspects of forest governance that facilitate assessment of the components (PROFOR and FAO 2011).

The primary data for this case study was collected in 2012 through an e-mail survey directed to forestry engineers in FBIH. The questionnaire was designed to obtain information from them on the importance and implementation of the 13 forest governance components presented in Table II 23.1 and to identify the gaps between the level of importance and the level of implementation of these components (Mutabdžija 2012). The rating was on the scale from 1 to 10, where 1 means "unimportant/non-implemented" and 10 means "important/implemented." In addition, different sources of existing literature were used to develop an overview of the current situation of the forestry sector of FBIH and the challenges it faces.

23.2 Natural resource base

The extent and conditions of forest resources largely define the ecological limits for management activities of forestry companies. The data on growing stock, annual volume increment and annual allowable cut in FBIH is presented in Table II 23.2.

According to the official data (Federal Ministry of Agriculture, Water Management and Forestry 2012), forests and forestlands in FBIH cover 1 521 400 ha (48% of total area). The state owns 1 244 400 ha (81.8%) while private forest owners hold 277 000 ha (18.2%). State forests in FBIH have the following structure: high forest 568 432 ha (45.6%), coppice 255 615 ha (20.7%), and bare land 290 882 ha (23.2%). As a consequence of the war, roughly 130 000 ha of all categories of forests are contaminated by mines, which heavily affects effectiveness of forest management, including fire and disease control. Average growing stock of all

Figure II 23.3 In rural ares of BIH forests are important for subsistence, employment, energy, and recreation. ©Bruno Maric

forest in FBIH is 196.6 m^3/ha (high forest: 251 m^3/ha and coppice 75.7 m^3/ha) while the average annual volume increment is 5.08 m^3/ha (high forest: 6.26 m^3/ha and coppice 2.47 m^3/ha). Based on the proportion of the total annual volume increment and annual allowable cut as well as the fact that total cuttings in 2011 were 2 291 852 m^3, it can be concluded that total growing stock of state forests in FBIH is permanently increasing.

As for the general tendencies related to forest areas, some authors mention positive changes over past decades. Although full-scale data of the second state forest inventory (carried out between 2006 and 2009) are not available yet, some preliminary results point to a tremendous increase of forest area in some regions of FBIH (Lojo et al. 2008), though these tendencies probably do not have much to do with forestry management activities. In many cases, rural populations displaced during the war did not return to pre-war settlements and many villages are still abandoned. On the other hand, poverty in rural areas has led to increased exploitation of forests – clearly illustrated by a statement of the deputy minister of forestry of the federal Ministry of Agriculture, Water Management, and Forestry: "In the immediate aftermath of the war, it was natural that many people, especially refugees, would illegally cut down trees, either for firewood or to sell to try to make ends meet" (Hawton 2005). According to official data for the period between 2003 and 2009, more than 560 forest fires occurred each year, annually affecting an area of 7100 ha (Federal Office of Statistics 2010).

Forest ecosystems in BIH are extremely rich in terms of biodiversity. Estimated number of plant species, subspecies, and varieties is 3572, with 500 of them endemic (Gibson et al. 2003). Only 2% of the territory is under formal protection (Dalmatin et al. 2010). Global trends for nature protection and strengthening of the non-governmental sector have spurred initiatives to establish new protected areas. Due to this, large areas of productive forests have been protected, resulting in a transfer of management responsibilities from foresters. In the process, a long tradition of close-to-nature forest management can often be neglected. The concept of urban forests has become more and more pronounced in FBIH with the request by urban populations for forests and greenery for amenities such as scenic beauty and recreation. Still, there is insufficient data related to trees outside forests and their contribution to the production of goods and ecosystem services such as outdoor recreation, water and air quality, flood prevention, and carbon sequestration.

23.3 Livelihoods, capacities, and cultural and socio-economic aspects

23.3.1 Contribution of forestry to the national economy and well-being of the population

More than 50% of the BIH population lives in rural areas and relies in one way or another on forest and mountain ecosystems as an important source of subsistence, employment, energy, and recreation (World Bank2013, Figure II 23.3). From an economic point

of view, forests and forest-based industries in FBIH contribute significantly to improving socio-economic conditions on the local level. According to official data (Federal Office of Statistics 2011), more then 16 000 people (3.7% of total workforce) are employed in forestry and the wood-processing industry. Official sources indicate more than 300 registered business subjects in FBIH related to forest activities, mainly forest resources utilisation (Federal Ministry of Justice 2012). These two branches of the national economy are often the most important drivers for development of rural areas where forests provide various benefits and substantial additional income for local communities (Custovic et al. 2012). People from rural areas rely heavily on fuelwood for energy, so fuelwood for domestic purposes is the predominant type of use of private forests in BIH. Only 20% of private forest owners are market-oriented – selling either fuelwood or sawlogs (Glück et al. 2011). Forestry and the wood-processing industry generate 1.8% of the gross domestic product in FBIH. With a share of 7.8%, wood and wood-based products are also very important for FBIH exports (Delic 2011).

Recent positive changes in terms of providing environmental and cultural benefits from the forests to local livelihoods are evident from the introduction of the concept of high conservation-value forests (HCVFs), which several forest companies have applied in order to obtain Forest Stewardship Council (FSC) certificates. This practice results in some environmentally or culturally relevant areas of great importance for local population being managed by special management regimes.

23.3.2 Stakeholders' capacities

Stakeholders other than public forest administration and forestry companies are slowly improving their technical, managerial, and leadership capacities. Training activities conducted by the Association of Forestry Engineers of FBIH focused on specific forest policy instruments (forest certification) and regulation (EU Timber Regulations), with the aim being to educate forestry professionals. In combination with similar efforts, these activities generated some improvements in social capital in the forestry sector. Capacity improvements, however, have been largely focused on public forest administration and employees of forestry companies, with no substantial participation by non-governmental and private sectors. The reason stems not from access barriers but rather the limited capacities of these two latter groups to take part in such opportunities. Integration of local producers into improved market opportunities mainly related to a United States Agency for International Development (USAID) project to develop a wood/furniture cluster-based initiative. Targeted activities in this initiative included company-level assistance on product development, workforce development, training on international technical standards, and building supply chain linkages among companies.

For public forestry companies, some channels to obtain capital were provided by various international organisations such as the World Bank, FAO, USAID, and the Swedish International Development Cooperation (SIDA). In cooperation with governmental institutions, the World Bank implemented several projects in forestry focused on forest recovery, development, and forest protection. Some strategic projects in FBIH – such as development of national standards for forest certification, a federal action plan to combat illegal activities, a federal forestry development programme, and the second state forest inventory – have been financed or co-financed by the World Bank.

23.4 Policies, institutions, and governance

Forest governance is a broad term involving multiple actors, complex actions, and interrelationships, many of which are relatively poorly understood. It is largely unknown how various initiatives associated with forest governance influence people's livelihoods and sustainable forest-related development in FBIH. The responses of forestry professionals (the results of the GOVOR project) offer more empirical evidence about the gaps between estimated level of importance and implementation of forest governance components in the FBIH forestry sector (Figure II 23.4). The data in the figure can be interpreted as the higher the number, the bigger the difference between estimated level of importance and implementation. The components with higher numbers can be treated as the weaker elements of forest governance in the FBIH forestry sector (Mutabdžija 2012).

23.4.1 Institutional conditions for SFM in FBIH

Land tenure and property rights are crucial social institutions that define opportunities and constraints related to SFM. Only minor changes happened in terms of land tenure and forest ownership rights due to processes of restitution and denationalisation in FBIH. The comparison of data from the period of the Austro-Hungarian monarchy with the current size of private forests leads to the conclusion that the share of private forests will not significantly increase as a

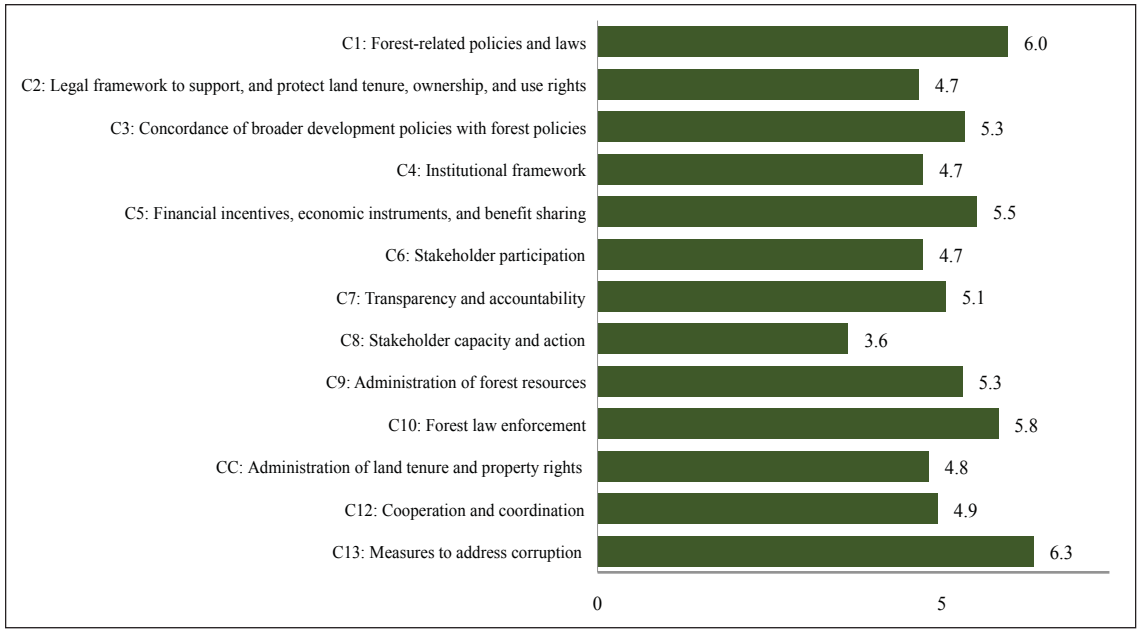

Figure II 23.4 The differences between the level of importance and the level of implementation of forest governance components in the FBIH forestry sector (Mutabdžija 2012).

result of the restitution process (Glück et al. 2011). Although it is generally held that agrarian reform had a strong impact on private land ownership in the former Yugoslavia, the fact is that the land nationalisation process has mainly influenced private agricultural properties (fields and pastures) while the greatest part of private forest estates was already below the prescribed maximum (Sabadi 1994).

The results of the GOVOR project related to the legal framework to support and protect land tenure, ownership, and use rights (FAMFG component 2) show that 90% of interviewed forestry professionals found component 2 of forest governance important or very important while almost 70% of them evaluated the level of implementation as low or even non-implemented. These answers largely relate to the current situation in private forests, which are dispersed among thousands of non-organised owners. Individual properties are fragmented and the number of owners is increasing as a result of continuous division owing to inheritance processes (Glück et al. 2011). Similar results of importance and implementation levels are reported for component 11 (administration of land tenure and property rights) (Mutabdžija 2012).

The organisation of the forestry sector reflects the constitutional character of the country, where the administrative units of BiH and the District of Brcko and 10 cantons (within FBIH) have strong impacts on forest resource management. Due to the decentralised administrative structure, there is neither a state-level forest policy nor a framework for forest legislation. FBIH devolves its management competencies to cantonal governments – each canton has competency over the forest resources within its administrative boundaries. A more controversial issue, however, is the extent to which forest-related mandates of federal and cantonal authorities are clear and mutually supportive. As both these authorities and cantonal borders are the result of post-war political negotiations rather than natural considerations, this structure does not lend itself to rational forest resource management. The results of the GOVOR project related to the institutional framework (FAMFG component 4) in the national forestry sector show that more than 80% of forestry engineers found this component very important while almost two-thirds of them evaluated the level of implementation as inadequate. In addition, the current institutional framework and organisation of public forest administration was evaluated as non-functional by key national forest policy actors (Delic et al. 2012). Such decentralised organisation calls for a revision of the role of public forest administration. More than 90% of the respondents evaluated FAMFG component 9 (administration of forest resources) as highly important. At the same time, more than 60% of responses related to implementation of this component were negative. Low quality and adequacy of staff in public forest administration was frequently mentioned as the reason for the gap between estimated importance and implementation of this component (Mutabdžija 2012).

Traditionally, forest resources management in FBIH is entirely formulated by bodies that have constitutional authority (public forest administration) and is based on a hierarchical, top-down approach. This results in lack of participation and stakeholder cooperation in forest-related planning processes

and harms local stakeholders through inequitable distribution of forest benefits and the absence of a platform for prior and informed consultations. As to rights of local communities to be involved in decisions related to forest management, the Association of Municipalities and Cities in FBIH requested the Constitution Court to decide whether the Law on Forests[2] is harmonised with the European Charter of Local Self-Government. The court identified serious discrepancies between the law and the charter and ordered necessary alignments in terms of respecting the rights and vital interests of local communities. Since such alignments were not realised on time, the Law on Forests was proclaimed invalid. Although various institutions have proposed several drafts of a new Law on Forests, there is as yet no political agreement on this. The key point of disagreement is about the role of cantonal and local governments in terms of forest management. Moreover, the political crisis in FBIH after the common elections in 2010 set this issue aside from general political debate, failing to observe negative impacts of that situation on SFM.

The issues of stakeholder participation and capacities to cooperate with public forest administration were also researched in the GOVOR project. The results related to the importance of stakeholder participation (FAMFG component 6) show that only 50% of respondents found it very important. This clearly points to slow reactions of the national forestry sector to emerging initiatives to secure public involvement in forest-related policies and decision-making processes. On the other hand, the evaluation of FAMFG component 8 – stakeholder capacity and action – show that only 25% of forestry professionals found strong capacities of civil society, non-governmental organisations, watchdog organisations, and the private sector to participate in forest-related planning as important preconditions for SFM. It seems that forestry professionals in FBIH still do not recognise the necessity to create and maintain partnerships with other stakeholders in order to secure active participation of civil society as an important element of good forest governance.

[2] Official Gazette of the Federation of Bosnia and Herzegovina 20/02.

23.4.2 Policy impact on SFM in FBIH

Although some strategic documents (e.g. the National Environmental Action Plan) propose clear goals related to the forestry sector, an overall commitment to SFM in FBIH is at least dubious. The issues related to the forestry sector are only occasionally subjects of public political agendas (e.g. forest fires). As documented, forest policy does not exist, so processes related to SFM hardly can be evaluated as positive. The results of the GOVOR project emphasise a large gap between importance and implementation of forest-related policies and laws in the FBIH forestry sector (FAMFG component 1). Long-term societal commitment to SFM cannot be achieved without active and harmonised participation of all policy actors. This is particularly important in countries like BIH where the complicated constitutional system calls for close cooperation between different administrative levels. Similar to other components, almost 90% of the respondents found cooperation and coordination (FAMFG component 12) in FBIH as important or very important, while two-thirds of them find this component as little implemented or not implemented.

The most important effort to address the issue of illegalities in the forestry sector was the 2005 federal Action Plan to Combat Illegal Activities in Forestry and Wood-Processing Sectors. It was recognised that forest regulations alone cannot fully eliminate illegal activities. Thus, the action plan consists of three main lines: 1) improving external control (e.g. strengthening forestry inspection, independent assessment of type and volume of illegal logging, etc.), 2) internal development of public forestry companies (e.g. human resource development, application of market-oriented mechanisms for forming wood prices, etc.), and 3) parallel and supporting activities (e.g. formulation of the National Forest Program, promoting forest certification, etc.) (Government of the Federation of Bosnia and Herzegovina 2006). While significant improvements have been achieved in some aspects (e.g. forest certification), the majority of activities prescribed by the action plan are not yet implemented. Results of the GOVOR project related to forest-law enforcement (FAMFG component 10) in the national forestry sector show that two-thirds of forestry professionals found this component poorly implemented though 90% of them found it very important. The largest gap between importance and implementation found in the GOVOR project relates to FAMFG component 13 – measures to address corruption. More than 90% of respondents found it very important while 60% of them believed that measures to address corruption in the forestry sector are not implemented at all.

23.4.3 Influence of global initiatives on forest-related policies

Multiple international processes and initiatives aim at enhancing sustainable use of forests strongly influence forest policy in FBIH. Important activities for improving the state of the art in the national forestry sector (e.g. development of the National Forest Program, combating illegal logging, etc.) have a clear aim – to support implementation of various international processes focused on forest conservation at the national level. While it is clear that the strongest drivers of change in the country originate from outside the forestry sector, a more controversial issue is how these changes are perceived by key national forest policy actors and to what extent are the principles of global forest governance essentially adopted. The empirical evidence from the GOVOR project, based on the views of forestry professionals, points to high importance but low implementation of all components of the FAMFG. Following this, one can evaluate the forestry sector in FBIH as being a resilient policy system that is quite resistant to the influences of international initiatives and processes. The formal commitment of the government to fulfil its international obligations stands, but practical implementation has not always led to SFM and positive changes in the national forestry sector.

By analysing the case of the European Charter of Local Self-Government and the role of the FBIH Association of Municipalities and Cities in proclaiming the Law on Forests as invalid, one can understand how local implementation of international rules may influence national policies in a negative way. The result has been a four-year absence of the Law on Forests in FBIH, which has brought various negative consequences due to the non-existence of a sound legal framework. Furthermore, GOVOR project results prove that influence of internationally driven initiatives (e.g. good forest governance and associated principles) on the national forestry sector and related policy-making processes are merely symbolic.

Of the international initiatives, forest certification has probably had the most important influence in FBIH. Forest certification has become a solid self-sustainable instrument for increasing the competitiveness of forestry companies as well as an effective tool for successful public relations. According to the official data from the Forest Stewardship Council (FSC), more than 50% of all state forests in BIH are FSC certified (FSC 2012). Furthermore, several actions initiated by forest certification (e.g. establishing HCVFs, adopting a rule book for transparent distribution of timber, etc.) have led to better forest management. Different from other pathways through which international processes may influence policies at national or local levels, forest certification is based on international market demands and relies on the final consumers values. Based on positive experiences with forest certification as a market-driven instrument, it is worth exploring the capacities of some legally binding instruments such as the EU Timber Regulation to support national forest policy development. Through different agencies and direct governmental agreements, the EU can offer a wide range of services (e.g. technical assistance, training, and capacity development, etc.) aimed at harmonisation of the national forestry sector with global forest-related processes. On the other hand, some sceptical opinions about the extent of the influence of global processes on national policy can hardly be neglected. Although the war in BIH was ended by direct foreign intervention, the role of external actors in national policy-making processes is a highly delicate matter. Almost two decades of relatively slow economic and social progress show that direct and strong influence of international institutions (e.g. EU, the World Bank, USAID, etc.) to national policy processes cannot be effective without an active role of domestic policy actors and wide national commitment to change social, political, and economic realities.

23.5 Research and monitoring

The analysis of research programs in FBIH has shown that there is no common initiative to provide information on SFM and generate the necessary knowledge to support forest management decisions. Ongoing research projects in forestry vary in the following aspects:

- Field of interests (focused mainly on a single SFM dimension or, rarely, on a combination of dimensions)
- Financing institutions (mainly financed by public authorities and governments, rarely by private sector and non-governmental organisations)
- Financing sources (international donors, foreign governments, state institutions, international non-governmental organisations, etc.)

Research projects funded by public forest administration (federal forestry office and cantonal forestry offices) are mainly focused on technical and environmental aspects of SFM while only a few deal with economic and policy issues. On the other hand, the projects financed by international organisations are mainly focused on social, policy, and economic dimensions of SFM. Research projects financed by external (international) sources also vary in their geographical focus. For example, several collaborative regional research projects dealing with forest policy and economics have been conducted in the Western

Balkans within last few years (under the umbrella of a FOPER project entitled Strengthening Capacities of Education and Training for Forest Policy and Economic Development in the Western Balkan Region, financed by the Finnish Ministry for Foreign Affairs).

Due to decentralised administrative regulations in the country, there is not a continuous monitoring program aimed to generate information on SFM. However, public forest administration at the federal level publishes annual statistical information on the state of forests and forestry. These publications are available online and provide information related to the status of forests, activities in forest protection and afforestation, forestry production, financial data, etc.

23.6 Conclusions

The analysis of the four groups conditions shaping SFM in FBIH and how they are influenced by the current state of forest governance (based on views of forestry professionals) leads to the following general conclusions:

- The presence of a firm natural resource base can foster SFM, but the absence of other important conditions (particularly sound policies, strong institutional capacities, and good forest governance) hinder it
- The overall interaction among the four groups of conditions is complex and results in serious constraints on forestry-supported sustainable development

The extent of forest resources and the biodiversity values of forest ecosystems are the most advantageous conditions for SFM in FBIH. Forests play a great role in different aspects of the national economy and provide various environmental, economic, and cultural benefits for local livelihoods. Still, it is clear that the national forestry sector is failing to deliver all potential benefits. It seems that forests are perceived as an endless natural resource, suitable merely for satisfying short-term economic and political interests. The absence of collective responsibility of the society for forest conditions is largely encouraged by poor institutional capacities and lack of an appropriate legislative framework. Non-existence of basic instruments of forest policy, such as a framework for forest legislation, is a direct consequence of the administrative organisation of the forestry sector, which is based on political rather than economic or natural conditions. This is affirmed by the results of the GOVOR project, which identify that the greatest gaps between importance and implementation exist in exactly those components of FAMFG that refer to policy, institutional, legal, and organisational preconditions for implementing forest governance.

The role of several international institutions (World Bank, FAO, SIDA, USAID, etc.) is important in terms of implementation of various international forest-related processes and also in provision of necessary financial means. However, the empirical evidence shows a relatively modest impact of the international forest governance paradigm on the national forestry sector. Starting from the statement that good forest governance is "characterised by the prevalence of the rule of law, low levels of corruption, robust institutions, high competence of officials and other functionaries who implement rules, willingness to address forest sector issues, sanctity of critical legal elements such as enforcement of property right and voluntary contracts" (World Bank 2009) and taking into account the views of forestry engineers presented in this chapter, one can conclude that forest governance pillars, principles, and components are poorly implemented in FBIH. Why this is the case needs to be clarified in order to make progress towards forestry-supported sustainable development. An additional question that begs for answers is whether this situation is the result of deficient adaptive capacities of the forestry sector to implement the necessary changes and fully take advantage of international support or whether something is wrong with the supporting policy. The substance of supporting policy, particularly the role of international development agencies in post-war economic reconstruction, is a controversial topic. When it comes to this issue, the attitude of the international society, particularly the EU, is more and more recognised as a serious obstacle to further development in BiH. Instead of genuine strengthening of the capacities of national institutions in order to make them capable of implementing necessary reforms, the foreign support has often been limited to technical assistance and formal acceptance of international norms. Without readiness to conduct internally driven structural changes, national forest policy actors become passive consumers of this support, too lethargic to perceive and integrate the principles of good forest governance in the national forestry sector. Although global forest-related processes have great potential to trigger necessary changes in forest policy and stakeholder behaviour, any real reform requires the action of domestic forest-policy actors as key drivers of change.

The formal commitment of the government to implement key principles of good forest governance is probably out of the question.The absence of essential changes in the pattern of decision-making in forestry leads to a situation where practical implementations of these commitments do not appear. The concept of forest governance driven by the complexity of international forest-related processes has resulted in new modes of forest management in which the role

of public forest authorities is significantly changed. While such change would not exclude forest authorities from decision-making, it would include the emerging interest groups mobilised by the changing political environment. In countries in transition, the role of the non-governmental sector and civil society in the transition processes is irreplaceable. The current situation can only be improved by serious changes in public forest administration that would hopefully result in enhanced participatory governance, support for stakeholder cooperation, and empowerment of local stakeholders. Again, further progress in FBIH requires improvements in those conditions of SFM dealing specifically with policy, institutions, and governance.

In the future the society will be increasingly interested in changing the ways forest resources are governed. This entails transparency and accountability in decision-making, equitable allocation of benefits, and sustainable maintenance of the national resource base. In moving towards SFM, the principles of good forest governance have to be clearly recognised, understood, and adopted by key forest policy actors in FBIH, properly integrated into the national forest policy, and consistently implemented in practice. This is the crucial precondition to prevent negative aspects of poor forest governance and to create an environment in which the national forestry sector can respond to both the demands of global forestry-related processes and the changing needs of society relative to forests.

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Heated and frozen forest conflicts: Cultural sustainability and forest management in arctic Finland

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Abstract: Cultural and social aspects are crucial for sustainable forest management that targets the well-being and tranquillity of society. Environmental conflicts rooted in these cultural and social aspects not only can be harmful but also mean success or failure in forest management. This paper introduces two forest disputes from arctic[1] Finland. The cases show that institutional tools for sustainable forest management are still weak in recognising local cultural needs and customs and in dealing with environmental conflicts. Indigenous and remote communities that have recently gone through rapid cultural change simultaneously derive needs for forest use from old traditions and future prospects. Stakeholders, actors, and decision-makers the in natural resource scene are multi-ethnic, traditional and postmodern, and local and global, creating special challenges for administrators of sustainable forest management as they must recognise cultural needs of certain area and communities.

Keywords: Cultural sustainability, Finland, Saami, Lapland, conflict management

24.1 Introduction

During recent years cultural and social dimensions have been the focus when thinking about sustainable development. Moreover, there has been increasing political and administrative concern about cultural issues when planning and implementing environmental projects and programmes. Messages from different land-use management projects around the globe emphasise that local cultural conditions or cultural boundaries between different stakeholders must seriously be taken into consideration. Multinational companies dealing with natural resources such as minerals are today increasingly seeking a social license to operate, which means that their businesses must be approved by society and local communities. Without a social license, companies could provoke conflicts and risk their businesses with respect to both markets and investors.

However, the problem is that cultural and social concepts seem to be more unclear than economic and ecological concepts when it comes to defining sustainability. Cultural and social entities are often seen as abstract and more complex to measure and interpret than, for example, economical outcomes and trade-offs. That is, no doubt, one reason why cultural issues and viewpoints are quite often dismissed and ignored in political agendas, management practices, and land-use decisions.

There are several reasons why environmental conflicts occur. Ecological conditions have traditionally been the focus: lack and quality of natural resources, population growth, resilience of ecosystems, etc. Economic and political conditions can launch or resolve environmental conflicts, but social and political aspects of environmental conflicts are also widely studied (Diehl and Gleditsch 2000). A conflict typically takes place on many levels and venues and has multiple parties. Environmental conflicts are complex situations that deal with cultural differences based on different values, languages, and ways to communicate. To manage or seek resolutions for environmental conflicts, mediation, communication, and collaborative learning about the issues are essential. Conflict is not necessarily a negative social

[1] According to strict definitions based on natural science, there are only sub-arctic areas in Finland. However, the term arctic is also a political term and commonly used. Finland is one of the eight member countries of the Arctic Council (http://www.arctic-council.org/index.php/en/).

situation. Conflicts and disputes bring important issues up for public discussions that otherwise would never have been recognised or debated (Daniels and Walker 2001).

Forestry is a common area for environmental conflicts. What's more, the lack of conflict may even be a sign of an unsustainable situation in the forestry sector. Forestry conflicts are deeply connected to social and cultural conditions of societies and, according to Eeva Hellström, every society has its cultural ways of managing and producing forestry conflicts (Hellström 2001).

This paper focuses on cultural aspects of sustainable forest management in two forest disputes from the arctic region of Finland. If we do not understand and recognise local and national cultural traits, values, customs, and habits, we cannot understand why forest disputes take place and how to manage them. We must speak the same language in order to implement culturally sustainable practices. Since conflicts are social situations that allow us to recognise cultural collisions and learn about them, there is special reason to study them.

24.1.1 Cultural sustainability

Conventionally, sustainability encompasses three dimensions: ecological, economic, and social or socio-cultural. Sometimes cultural is considered to be a separate, fourth pillar of sustainability. Social sustainability was originally introduced in Gro Harlem Brundtland's report as an element of the sustainable development concept (WCED 1987). Cultural sustainability was first mentioned in 1995, when the World Commission on Culture and Development defined cultural sustainability as inter- and intra-generational access to cultural resources (WCCD 1995, Axelsson et al. 2013).

Efforts to add culture as the fourth pillar of sustainability has continued within processes of the United Nations, especially the UNESCO Universal Declaration on Cultural Diversity (UNESCO 2001) and the Rio+20 process (Culture 21 2011, UN 2012). Within forest science there has also been a push to establish cultural sustainability as an essential element of sustainable development (Saastamoinen 2005). The concepts of social and cultural systems focus not only on the material cultural heritage and classic social needs but also on the immaterial aspects (Axelsson et al. 2013).

The concept of culture has hundreds of definitions (Kroeber and Kluckhohn 1952). One generally agreed-upon definition states that culture is based on the shared meanings and knowledge of some social group. Systems of shared knowledge and meaning generate human action with beliefs, customs, habits, and techniques, as well as human artefacts. Meaning systems are called cultural models (D'Andrade 1995, Shore 1996, Strauss and Quinn 1997, Harris and Johnson 2002)

The components of economic sustainability are perhaps most well-known and studied due to the long history of economics. Criteria for ecological sustainability are also relatively well-known when compared to social and cultural sustainability (Berkes and Folke 1998). The difference between social and cultural sustainability is rather blurry. Social sustainability often refers to such global ideas and values as welfare, justice, and employment (Saastamoinen 2005). Cultural sustainability, on the other hand, tends to relate to more local, national, or ethnical issues. This paper suggests that one distinction between social and cultural is that *social* is a compilation of human relationships and *cultural* is the meaning that those compilations and relationships are loaded with. Still, the distinction is not sharp and there is considerable overlap between these concepts.

In looking at the cultural sustainability of some operation, we must first discover the relevant cultural traits and, then determine whose culture and cultural sustainability we are concerned about. When reaching cultural and social sustainability, the key issue is to identify and decide on the essential cultural features and values that should be taken into consideration. Usually the values and practices that are widely shared and well-established are in the cultural core. For example, in Finland "Everyman's Right," free access (hiking, camping, berry and mushroom picking) to public and private forests, is a widely shared and accepted cultural feature. Any restrictions on this right would likely be considered as weakening the cultural sustainability of forest use. Everyman's right is an essential part of the national heritage that an overwhelming majority of Finns support (Silvennoinen and Sievänen 2011). The question of exclusive rights has been raised recently in Finland because of activities of foreign berry pickers hired by the food industry.

Measuring cultural sustainability is not a simple task. The established or formal calculations that exist for economic approaches are not available. Ecological studies benefit from systematic methods for evaluating, for example, viability of species and populations. Social and cultural sciences, whose task is to deal with cultural sustainability, can, of course, use statistical data and systematic approaches, but these but are predominantly based on description and interpretation. What is common for all of these approaches is that the key element in measuring sustainability is argumentation. Under what terms can certain conditions or changes fairly be seen as sustainable or unsustainable?

Berkes and Folke suggest (1998) that social-ecological systems that have survived over extended

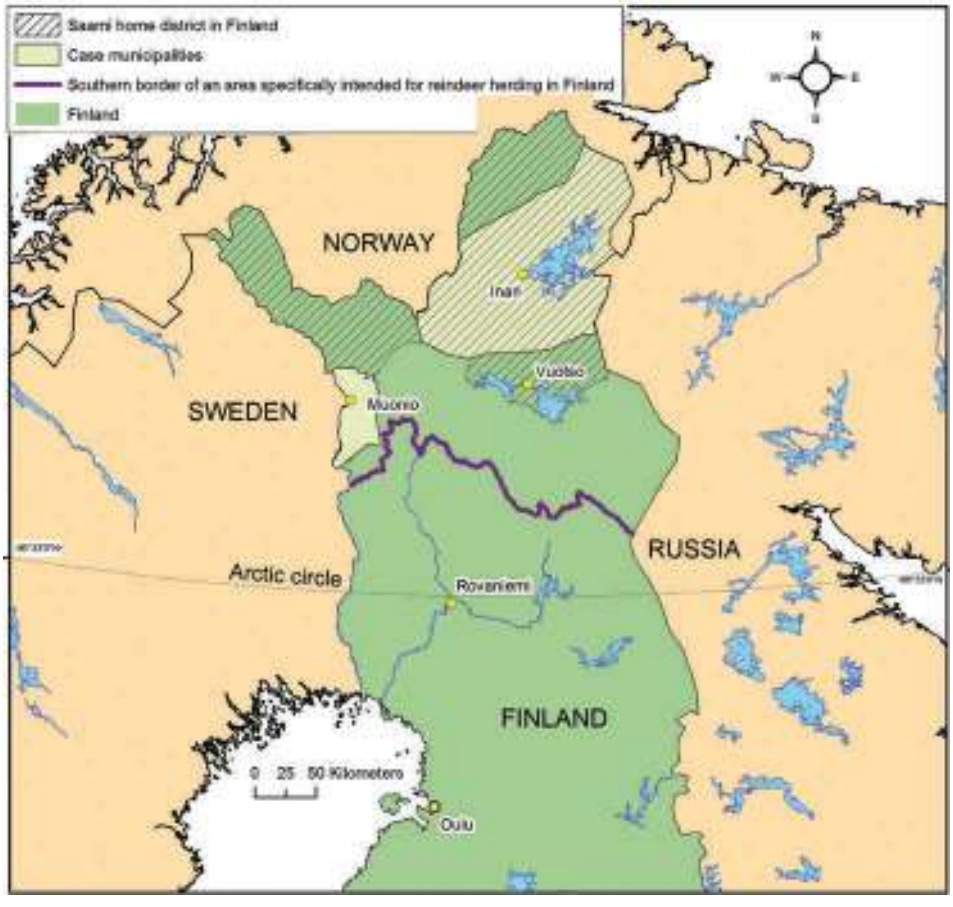

Figure II 24.1 Case municipalities and Saami home district in Finland.

periods can be called sustainable. Measuring cultural or social sustainability of some specific operation is a process that combines scientific, expert, and lay knowledge, and the final evaluation is based on arguments. What is socially or culturally sustainable or acceptable is not in the end only a matter of science: it is an agreement. Measuring cultural sustainability involves defining valid arguments for decision-making. Evaluation is based on knowledge and values. What we can know about presumable causes of certain operations and discussions and are these changes acceptable? In the end, it is about selection: what viewpoints and values do matter.

24.1.2 Saami culture and indigenous rights in northern Finland

Cultural forest issues in Lapland usually focus on the indigenous Saami people. Similar to other indigenous peoples, the Saami economy and way of life was historically based on nature-dependent livelihoods – fishing, hunting, gathering, and reindeer herding. Most Saamis never practiced large-scale reindeer herding. With modernisation, Saami culture has changed and only a small minority of Saamis earn a major apart of their living from reindeer herding. According to a survey conducted in 2006, only 20% of Saamis living in northern Lapland get more than 50% of their income from reindeer herding, and 70% do not get any income from reindeer husbandry (Hallikainen et al. 2006).

Reindeer ownership, however, is quite common among Saamis. Around every third Saami living in the Saami home district (Figure II 24.1) owns reindeer – in 1999 the average number owned was 56 reindeer. According to herders' estimations for professional reindeer herding, one must own about 300 reindeer (Kemppainen and Nieminen 2001, Saami Parliament 2013).

Thus reindeer and herding are common and important elements of Saami culture – reindeer herding is a means to distinguish oneself from the majority of people in Lapland of Finland. Being a member of the reindeer society offers a place in the social network and provides social and cultural capital for personal or collective identity. Professional and traditional words, habits, and the Saami language draw from herding practices (Pennanen and Näkkäläjärvi 2003).

Table II 24.1 Saami and non-Saami populations in Saami home district in 2011*.

Municipality	Saami		Non-Saami		Total
	n	%	n	%	n
Inari	2137	31.6	4617	68.4	6754
Utsjoki	768	59.4	526	40.6	1294
Enontekiö	275	14.5	1618	85.5	1893
Lapin paliskunta/ Sodankylä	163	N/A	N/A	N/A	
Total	3343				

*Non-Saamis are almost totally Finns. Ethnic Saamis are citizens of Finland and in that sense also Finns.
Source: Saami Parliament, Population Register Centre and Statistics, Finland

The rights of Saami people as an ethnic minority are guaranteed by the United Nation's International Covenant on Civil and Political Rights (1976) and by the Constitution of Finland (1999), Section 17: "The Sami, as an indigenous people, as well as the Roma and other groups, have the right to maintain and develop their own language and culture."

During recent decades, questions about the Saamis' right to maintain their own culture have arisen in relation to forestry issues. Logging of old-growth forests by others evidently diminishes ground and arboreal lichens, so that the reindeers' access to food resources becomes difficult (Helle and Jaakkola 2006, Jaakkola et al. 2007). Since the late 1990s, the main argument against logging in several forest conflicts in Lapland has stemmed from the Saamis' indigenous rights, while earlier conflicts were conservation-based (Veijola 1998a). During several forestry and mining conflicts, the Saami people have appealed to the UN covenant and the constitution, claiming that large-scale exploitation of natural resources harm their right to practice their own culture (Raitio 2008).

24.2 Two forest conflicts in Finland's arctic region

24.2.1 Natural resource base, policies, and social aspects of the case areas

The two forest dispute cases analysed in this chapter are located in the municipalities of Muonio and Inari, both in polar Finland (Figure II 24.1), where great majority of the land and forest resources are owned by the state and governed by Metsähallitus (former Forest and Park Service). Metsähallitus is a state-owned enterprise charged with managing state protected areas and supplying wood to Finland's forest industry and conducting forest real estate and soil business. Muonio covers 2038 km^2 and had 2394 inhabitants at the end of 2012, Inari covers 17 334 km^2 and has 6732 people (Statistics Finland 2013).

The polar region of Finland is covered by boreal taiga and mountain birch forests along with fells and open peat land. The northern timberline of Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) goes between latitudes 68° and 70° (Esseen et al. 1997, Veijola 1998a, Veijola 1998b).

The most important nature-based livelihoods are tied to reindeer herding, tourism, and subsistence use of nature through fishing, hunting, and gathering. Nature conservation as an administrative field can also be seen to support livelihoods through sustaining jobs in conservation and promoting nature-based tourism (Hallikainen et al. 2008).

Though the natural resource base in northern Finland is strongly focused on renewable natural resources, the mining and mineral sector is growing. There are no mines yet in northern Lapland, but several reservations, concessions, and claims have been put in place.

There has been no major change in public-land tenure rights since Finland became independent in 1917, but there have been discussions about whether Finland should ratify United Nations ILO Convention169, which deals with the rights of tribal and indigenous peoples. In the Saami region, the question is about the Saamis' rights to lands and waters now owned by state. In the countries encompassing the Saami region, only Norway so far has ratified the convention; in Finland there has been no real progress. Though considered politically intractable, the issue is still on the national agenda. Locally, con-

tradictory opinions about it exist among Saami and non-Saami populations.

Saami people are a minority in their home district, which consists of the municipalities of Inari, Utsjoki, and Enontekiö, and the reindeer-herding cooperative (*paliskunta*) Lappi, located north in the municipality of Sodankylä (Table II 24.1).

Traditionally subsistence use of forests (reindeer herding, hunting, gathering) in the case study areas has been important. Beginning in the early 20th century, forestry grew rapidly in economic importance; however, in the 21st century, nature-based tourism has become the economically most important business. Multiple-use of forests and free or easy access to natural resources are key issues culturally.

In Inari, nature-based livelihoods are economically important and part of the local culture. Tourism is clearly the most profitable business in terms of incomes and jobs (Vatanen et al. 2006). In Inari 41.5 % of incomes come from tourism and in Muonio rate is 32.5 % (Satokangas 2013). Subsistence use of nature, such as berry picking, fishing, and hunting, still has a significant role in the economy of households (Hallikainen et al. 2006). In this polar area, industrial forestry has diminished in recent years. Local sawmills do not employ people as before, and most of the commercial forest products are from heavily manipulated natural forests.

Everyman's rights guarantee access to berries, mushrooms, and hunting with certain regulations. In another instance, reindeer herders and Skolt Saamis have extended rights to collect free firewood. Selling licenses to tourists for hunting and fishing raises the question of whether there should there be positive discrimination for Saamis or other local people.

Natural forests in national parks and other protected areas are important both for reindeer herding and for the tourism industry. Metsähallitus monitors the state of endangered species, nature protection, and tourism flows in natural parks. Several research projects by the Finnish Forest Research Institute (Metla) and mainly Finnish universities study the issues of sustainable forest management but there is no ongoing research or monitoring project. The Finnish National Forest Inventory, started in 1921, covers the whole country and provides the public with information about forest resources, health, land use, biodiversity, and carbon balance.

Metsähallitus uses a landscape and ecosystem management approach in its planning system (Metsähallitus 2012b). A participatory planning process is in use, but the public does not have a major influence in that process – it can only express opinions on natural resource planning. In 2011 Metsähallitus adopted Akwé: Kon guidelines as a part of its management system. Akwé: Kon guidelines, from the implementation of the Convention on Biological Diversity, defines voluntary guidelines for the conduct of cultural, environmental, and social impact assessment regarding development in areas occupied or used by indigenous and local communities (Secretariat of… 2004). In Finland these guidelines concern use of natural resources in the Saami home district (Figure II 24.1) and the cultural needs and heritage of Saami people (Akwé: Kon ohjeet 2011).

During first decade of 2000s two forest disputes took place in the municipalities of Inari and Muonio, which were selected for this study because they reveal the contradictory interpretations of sustainable natural resource management at local and non-local levels. These forest disputes concerned state-owned forests where, by law, different objectives should be accounted for and natural resources should be managed in a sustainable manner (Act on Metsähallitus 2004). These objectives relate to the profitability of forestry, guarantees that the Saami people can continue their cultural practice of reindeer herding, biodiversity protection, recreational use of nature, and employment, among others. Natural resource planning as an avenue to sustainable forest management is one key tool for reaching these objectives (Metsähallitus 2012a). Though the Finnish forest sector has branded itself as a leader in sustainability issues, as cases and conflicts from Finnish Lapland show us, there are still several institutional problems for implementation of sustainable forest management – even in public forests.

Both dispute areas represent, globally, the northernmost timber-harvesting districts. In Inari the dispute focused on an area close to Nellim village in the eastern part of municipality, while in Muonio the dispute was over Mustavaara forests in northwest sector of the municipality. Both forests are old-growth forests where clear-cutting has never taken place, although selective cuttings were conducted in the early 1900s. Both areas are considered valuable for reindeer herding and the Mustavaara area also includes nature-based tourism and local recreation. Inari is part of the home district of the indigenous Saami people. Muonio and Inari are located in an area specifically intended for reindeer herding that, according to the Finnish Reindeer Husbandry Act (Reindeer Husbandry Act 1990) "may not be used in a manner that may significantly hinder reindeer herding." Reindeer herding is organised within reindeer-herding cooperatives (paliskunta) that have legal status. There are eight cooperatives in Inari and two in Muonio. Saamis are a majority in most of the reindeer-herding cooperatives in Inari, but the Ivalo cooperative that is located in the disputed area also has many non-Saami herders. Most of the reindeer herders in Muonio are non-Saami.

Table II 24.2 Forest resources and logging in the case study municipalities.
Sources: Tomppo et al. 2012, Finnish Forest Research Institute and Metsähallitus

Area and proportion of land classes on forestry land								
Municipality	**Forest land**		**Poorly productive forest land**		**Unproductive land**		**Total**	
	ha	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**
Inari	713 708	47.7	410 915	27.4	327 797	24.9	1 497 420	100.0
Muonio	126 987	68.5	33 349	18.0	25 164	13.6	185 500	100.0

Municipality	**Average loggings 2000–2013**				**Total loggins**
	State		**Private**		
	m³	**%**	**m³**	**%**	**m³**
Inari*	132 811	68.7	60 474	31.3	2 705 998
Muonio**	35 519	59.2	24 465	40.8	839 766

*State loggings include loggings in munincipality of Enontekiö
**Private loggings include loggings in the municipality of Enontekiö in 2002

24.2.2 Material and methods

Conflicts in general have at least two sides. They can be fruitful in the sense that they raise important issues and viewpoints that otherwise would be overlooked (Daniels and Walker 2001). But if conflict continues without any solutions or agreement, it may negatively affect well-being. There have been no serious security issues or violence in the study area but threats to life and health have occurred (Hyvönen 2006) and the forest disputes have generated psychological stress and malaise in local communities, especially in Inari.

Data for this case study comes from three survey studies and personal interviews conducted in northernmost Lapland, which includes Inari. Survey studies were conducted in 1999, 2005, and 2013, using questionnaires that were mailed to a population of local Saamis and non-Saamis. Detailed information on data and methods of the first two surveys are reported in Jokinen 2000 and 2001 and Hallikainen et al. 2006.

The author also conducted 87 personal interviews in northernmost Lapland during 1999 and 2000. Interviews dealt with the use of nature, conservation, and cultural issues connected with environmental themes. Purposive sampling and snowball sampling were used (Bernard 1995). Informants were males and females representing different ages and various social, professional, and ethnic groups (Jokinen 2001). Participatory observation took place during Metsähallitus natural resource planning in 1999 and 2000 (Sandström et al. 2000) and periods in the field with Saami reindeer herders in 1998 and 1999. Observation took also place during the research project Sustainable Multiple Use of Forests in Northern Lapland between 2004 and 2008 – the author was a member of the research team and steering group. Both quantitative and qualitative methods were used to analyse the material. Qualitative methods included text and discourse analyses.

There have been several recent studies on both of the conflict cases (Linjakumpu and Valkonen 2007, Raitio 2008, Sarkki 2008, Sarkki 2011). Publications concerning natural resource planning by Metsähallitus and newspaper articles were used as background material for the evaluation of sustainable forest management.

24.3 Forestry and reindeer herding dispute in Inari

24.3.1 The conflict

Forestry in the Saami home district is strongly concentrated in the municipality of Inari, to some southern parts of the municipality of Enontekiö, and to northern parts of Sodankylä in the Vuotso area. The state owns 90% of land in Inari, and Metsähallitus governs the area. (Sihvo et al. 2006). Private forestlands make up only 13% of forestlands in the Inari municipality (National forest…2010) but about 35% of timber in Inari comes from private forests (Table II 24.2). On average, forests in Inari are at least 140

Figure II 24.2 Loggings in state-owned forests in Saami home district. Almost all timber comes from municipality of Inari. Source: Metsähallitus.

years old, so they are fairly rich in arboreal lichens and important for reindeer (Jaakkola et al. 2007, Hallikainen et al. 2008). State forestry is less intensive than private forestry, but it has been under scrutiny due to its character as a common pool resource (Ostrom 1990) and common national property.

Tensions and disputes between forestry and reindeer herding on lands of the crown have a long history. In the 19th century, the growing forest sector saw reindeer economy problematic because herders cut down trees with arboreal lichens to feed the herd during wintertime. Later, extensive logging in state-owned forests from the 1960s to 1980s (Figure II 24.2) raised worry about pastures (Veijola 1998b, Rytteri 2006.) The first public voice of Saami reindeer herders against logging was presented in 1970 in the article "Metsähallitus Destroys Reindeer Pastures" (Nyyssönen 1997).

The Inari forest conflict started in the late 1980s and was more or less active up to 2009 (Veijola 1998a, Hallikainen et al. 2006, Hallikainen et al. 2008, Raitio 2008). The latest escalation of the conflict began in early 2000s after Metsähallitus designed its first natural resource plan for northern Lapland in 2000. Reindeer-herding cooperatives of Inari stated that they will not accept the logging plans (Sandström et al. 2000). Herders from the Hammastunturi cooperative stated that valuable old-growth forests for reindeer should not be logged.

From the point of view of reindeer herders, logging causes devastating damage to winter pastures because it reduces the amount of arboreal lichens (Figure II 24.3). Arboreal lichens are indeed important food in springtime when snow conditions are difficult (Jaakkola et al. 2007). Reindeer access to ground lichens also is made more difficult when logging wastes cover the snow or winds toughen the snow in clear-cut logging areas. Forestry creates more pressure on pastures that have already declined due to use by tourism or the energy industry. Herders also stress that herding provides job opportunities, especially in remote villages, and it is an important part of maintaining Saami culture.

Loggers, state forestry, and forestry NGOs stated that logging and reduction of arboreal lichens are a minor problem. According to them, the larger problem is overgrazing caused by the reindeer herders themselves. The forestry view is that the whole conflict was caused by outsiders, especially Greenpeace, which they believe mislead some Saami herders – their stance is that the conflict should be solved locally, without any outsiders.

Harvesting is mainly done by forestry workers and is subsidised by the government. Economic calculations indicate that forestry is a better business at the regional level than reindeer husbandry, but husbandry creates more jobs (Vatanen et al. 2006). Metsähallitus has reduced logging from the top levels of 300 000 m^3 in the 1980s to close to 110 000 m^3.

The Finnish Ministry of Agriculture and For-

Figure II 24.3 Arboreal lichen is important food source for reindeer. ©Mikko Jokinen

estry named an official receiver to find a solution to the situation. The receiver heard from 30 different quarters: stakeholders, NGOs, interest groups, and institutions. The report and its recommendations had a contradictory reception. Environmental organisations were mainly satisfied; Metsähallitus, the municipality of Inari, and forestry organisations were mainly dissatisfied (Linjakumpu and Valkonen 2007, Raitio 2008).

Stakes were high during 2004 and 2005. Herders complained about the situation to the United Nations Human Rights Committee. Saami reindeer herders called Greenpeace to make it aware of forest issues in Inari (Linjakumpu and Valkonen 2006, Rytteri 2006). Greenpeace entered Inari and established a Forest Rescue Station to support herders' demands for saving old-growth forests and important winter pastures (Greenpeace 2012). Soon after, loggers built a counter-camp, Anti-Terror Info Center, as a protest against Greenpeace activists.

Greenpeace's actions raised a strong response in Inari. The municipality circulated a petition against Greenpeace. Outsiders were seen as a major problem that fomented disputes among local actors, disputes that otherwise would not have taken place. The future of the forest industry in Lapland and the Kemijärvi pulp factory, owned by Stora Enso Ltd., was seen as threatened (Linjakumpu and Valkonen 2006.) In 2007, the pulp factory decided to close down. The company denied that the decision was made because of Greenpeace or the forest dispute, claiming it was due to cost-effectiveness.

Three Saami persons, the Paadar brothers, sued Metsähallitus in 2005 over logging in the Nellim village area, complaining that these operations harmed their constitutional right to carry on Saami culture. The Finnish district court decided on acquittal and Metsähallitus demanded considerable compensation due to delayed logging (Raitio 2008). The situation seemed to be deadlocked, but finally in a surprise

move, Metsähallitus and the Paadar brothers reconciled in 2009 and 16 000 ha of forestland was set apart from forestry activities for 20 years. The agreement terminated all lawsuits between the parties and the process underway in the UN Human Rights Committee, as the Paadars withdraw their appeal to the committee. After successful negotiations in Nellim, Metsähallitus made an agreement with other reindeer-herding cooperatives in Inari in 2010. A total of 90 000 ha of forestland was excluded from forestry activities for the next 20 years (Metsähallitus 2010). The forest conflict in Inari was finally settled after more than 20 years.

24.3.2 Local perceptions of the impacts and reasons of the conflict

The third survey in 2013 was conducted together with Seija Tuulentie and Liisa Tyrväinen concerning the use of nature in northern Lapland and the Inari forest dispute. The survey was targeted to 18- to 75-year-old residents of the municipalities of Inari, Utsjoki, and Enontekiö. Sampling was stratified random sampling, where 50% were people having Saami as their first language and 50% with Finnish as the first language. Among other background variables, people were asked to identify their ethnic background. A total of 1480 persons received the questionnaire through the mail and 504 persons responded, for a response rate of 34.1%.

About one-fifth of local people mentioned that the forest dispute had a negative impact on their personal well-being. It is interesting that almost half of the ethnic Finns estimated that the dispute had negative impacts on all local people of Inari. People felt that they were more tolerant than their fellow citizens (Table II 24.3.)

The majority of local people in Inari (Finn 47.6 % and Saami 66.7%) expressed that the reason for the dispute was rooted in the high economic aims of Metsähallitus. In Finland, parliament sets objectives for Metsähallitus to make a profit. In Finnish forest discussions, these objectives are seen as perhaps the major reason for logging that is too intense and for problems arising from reconciliation of forestry and other land-use forms (Rytteri 2006, Lapin Kansa 2012). That is also how local people afterwards viewed the situation (Table II 24.3.).

People were more in agreement about the objectives and role of Metsähallitus: 50% of Finns and 59.1% of Saamis felt that the forest dispute was prolonged by contradictory objectives set by Metsähallitus. Only few disagreed with the statement. A bit less than half (Finns 39.6% and Saami 45.5%) also felt that the dispute was protracted because Metsähallitus had a double role in the conflict (Table II 24.3.) It was a stakeholder as well as a mediator that tried to keep up negotiations between reindeer herders and the forestry it was carrying out.

There is a statistically significant difference (khi^2 test, p=0.000) between Finns and Saamis concerning opinions on the role of outsiders in the forest dispute: 76% of Finns and 44.8% of Saamis agreed that the conflict took place because outsiders like Greenpeace took part of the process – 37.3% of Saamis disagreed with the statement. (Table II 24.3.)

It is also very clear that Finns (66%) saw collaboration between herders and Greenpeace as negative, while Saamis (58.2%) saw it as acceptable. The statistical difference is evident. Moreover, Finns (only 17.2% agreed) did not see reindeer herders' demands as acceptable while Saamis did (68.7%). Furthermore, Finns (39.1%) viewed forestry demands more acceptable than Saamis did (23.9%). A total of 28.4% of Saamis saw Greenpeace's role as essential in the agreement, compared with 6.6% of Finns. There is no doubt that ethnicity mattered in the case of Greenpeace, reindeer herding, and forestry (Table II 24.3.)

More than one-third (35.8%) of Saamis felt that reconciliation had major positive effects on their well-being, compared with 18.7% of Finns. About half of both groups did not have an opinion. 40.3% of Saamis and 34.9% of Finns saw reconciliation promoting well-being in the municipality (Table II 24.3.)

Finns believed that the agreement had more positive impacts on reindeer herding than did the Saamis: 28.4% of Saamis disagreed that the agreement guarantees adequate pastures, while only 10.3% of Finns disagreed. Still, 70% of Finns felt that preservation of forests according to the agreement does not significantly help with overgrazing due to reindeer herding, while 41.8% of Saamis felt the agreement did not help reindeer economy because of overgrazing. With respect to whether preservation is a threat to forestry in Inari, 37.3% of Finns felt that it is, compared with 28.4% of Saamis. Saamis believe more generally (59.7%) that the agreement's decision not to harvest also supports nature-based tourism. Only 38.4% of Finns agree with that (Table II 24.3.)

The survey study shows that there was a general concern about the role in Metsähallitus in the conflict. Local people also felt that economic aims established by Metsähallitus are too high and that the organisation has contradictory objectives. Saamis and Finns saw the role of Greenpeace very differently – Finns more negative than Saamis – and Finns feel more positive about forestry than the Saamis, who viewed reindeer herding as more important. Ethnic background is a key variable that divides opinions and attitudes. The situation has not changed since earlier studies (Hallikainen et al. 2006).

Table II 24.3 Local Finns' and Saamis' opinions about Inari forest dispute.

Statements. Do you agree? N = 213–218.	Ethnic background	Totally or fairly agree	Totally or fairly disagree	No comment or can not say	Total	Significance level khi² test
Dispute had major negative impacts on my personal well-being.	Finn	20.0 %	34.0 %	46.0 %	100.0 %	
	Saami	25.8 %	45.5 %	28.8 %	100.0 %	
Dispute had major negative impacts on my well-being of residents in Inari.	Finn	47.3 %	17.3 %	35.3 %	100.0 %	
	Saami	31.8 %	33.3 %	34.8 %	100.0 %	
The reason of the dispute was due to too high economic aims set to Metsähallitus.	Finn	47.7 %	17.4 %	34.9 %	100.0 %	
	Saami	66.7 %	9.1 %	24.2 %	100.0 %	
Dispute protracted because Metsähallitus has contradictionary responsiblities (like nature conservation and forestry).	Finn	50.0 %	14.9 %	35.1 %	100.0 %	
	Saami	59.1 %	7.6 %	33.3 %	100.0 %	
Dispute protracted because Metsähallitus has double role (stakeholder and mediator).	Finn	39.6 %	15.4 %	45.0 %	100.0 %	
	Saami	45.5 %	10.6 %	43.9 %	100.0 %	
Dispute took place because there where outsiders in process (like Greenpeace).	Finn	76.0 %	10.0 %	14.0 %	100.0 %	0.000
	Saami	44.8 %	37.3 %	17.9 %	100.0 %	
Co-operation between Saami reindeer herders and Greenpeace was acceptable.	Finn	9.3 %	66.0 %	24.7 %	100.0 %	0.000
	Saami	58.2 %	26.9 %	14.9 %	100.0 %	
Demands of reindeer herders were acceptable.	Finn	17.2 %	54.3 %	28.5 %	100.0 %	0.000
	Saami	68.7 %	17.9 %	13.4 %	100.0 %	
Demands of forestry were acceptable.	Finn	39.1 %	16.6 %	44.4 %	100.0 %	0.001
	Saami	23.9 %	41.8 %	34.3 %	100.0 %	
Agreement could not have been made without Greenpeace.	Finn	6.6 %	68.2 %	25.2 %	100.0 %	0.000
	Saami	28.4 %	37.3 %	34.3 %	100.0 %	
Agreement could not have been made without new scientific knowledge.	Finn	19.9 %	8.6 %	71.5 %	100.0 %	
	Saami	22.4 %	22.4 %	55.2 %	100.0 %	
Agreement had major positive impacts on my personal well-being.	Finn	18.7 %	25.3 %	56.0 %	100.0 %	
	Saami	35.8 %	20.9 %	43.3 %	100.0 %	
Agreement had major positive impacts on personal well-being of residents in Inari.	Finn	34.9 %	14.8 %	50.3 %	100.0 %	
	Saami	40.3 %	6.0 %	53.7 %	100.0 %	
Agreement guarantees adequate pastures for reindeer herding.	Finn	44.5 %	10.3 %	45.2 %	100.0 %	0.004
	Saami	37.3 %	28.4 %	34.3 %	100.0 %	
Preservation of forests do not help reindeer economy significantly due to overgrazing.	Finn	70.0 %	3.3 %	26.7 %	100.0 %	0.000
	Saami	41.8 %	40.3 %	17.9 %	100.0 %	
Preservation of forests do not threat the future of forestry in Inari.	Finn	27.3 %	37.3 %	35.3 %	100.0 %	0.032
	Saami	49.3 %	28.4 %	22.4 %	100.0 %	
Preservation of forests supports nature-based tourism in Inari.	Finn	38.4 %	23.8 %	37.7 %	100.0 %	0.004
	Saami	59.7 %	14.9 %	25.4 %	100.0 %	

24.3.3 Locals meet outsiders, Saami and non-Saami

A theme that always emerges in northern forest and land-use issues is the power of decision-making. Lapland has a centuries-old tradition of antagonism between centre and periphery, south and north – a confrontation that has its roots in the colonial history of Lapland (Valkonen 2003.) The antagonism is alive and well and is reproduced in today's discourses and interpretations that steer opinions concerning what is right or wrong for Lapland. Decision-making power in natural resource issues is perhaps the main field where this juxtaposition occurs.

Local people's opinions on who should have power in land-use issues has been studied in northern Lapland (Jokinen 2000, Hallikainen et al. 2006). The main result from these survey studies shows the desire for giving more decision power to local people, less to stakeholders that are considered outsiders. Almost 25% of respondents said that the Finnish Parliament should have no decision-making power at all, even in questions related to state-owned forests in northern Lapland. It is likely that local people in northern Lapland are not that radical; the answer would likely be different in face-to-face interviews. But results of the surveys indicate that there is a strong and widely shared cultural model for including locals much more strongly in decision-making. The parallel message is that outsiders, including the Finnish Parliament, should not make decisions about "our" lands and waters.

The cultural model would also give more power to local individuals than to local organisations. When asked, Saamis said persons should have more power in decision-making but that the Saami people's democratic organisation, the Saami Parliament, should have less power. The result is not surprising: individuals usually generate a more positive image than organisations or institutions, which are considered to be more powerful and responsible for policy-making, both good and bad.

The fact that local people want to increase their decision-making power is not unique – it is a cross-cultural, global phenomenon. People believe that decisions having significant impact on people's physical environment and local economy should be made locally. However, in Finnish society, the demand for local decision-making in northern Lapland seems to be stronger than elsewhere in Finland. One reason is undoubtedly the strong regional identity that northern Lapland and the Saami home district (*Sápmi*) have (Valkonen 2003, Lehtola 2012).

The Inari forest dispute is a complex of cultural, social, ecological, and economic issues. The nature of conflict and social tensions between ethnic groups cannot be understood without the historical perspective. Saamis belonging to different language groups (Northern Saami, Skolt Saami, and Inari Saami) are the ethnic group known to have lived longest in the area and, as an indigenous group, are a minority.

Saami historian and professor of Saami culture, Veli-Pekka Lehtola (2012), has studied encounters between Saamis and Finns in Finland. He points out that the public and academic discussion on Finnish colonialism related to Saamis and ethnic authenticity that has proliferated in recent decades has been simplistic. When Finnish immigration to areas now in the Saami home district really started in the 17th century, it was not just that non-Saami groups occupied land and natural resources of the Saami. Nor did it mean that Saamis as an ethnic group started to vanish while Finnish ethnicity and culture took over. Some ethnic Saami families and individuals adopted new livelihoods and cultural features from Finns and were finally recognised as Finns. Sometimes ethnic Finns assimilated into the Saami community and were finally recognised as Saami. Due to marriages and cultural trade-offs, there were also people considered to be mixed blood. The history of aboriginal and non-aboriginal people in Finland is not the same as what happened, for example, in Australia and the United States. Encounters and consequences were less drastic. Lehtola stresses that the history of Finns and Saamis in Lapland is more like cultural change, interaction, and adaptation.

In 2013 the question of Saami status in Finland remains a hot topic. Arguments in newspapers and other media have looked to broaden the definition of who can have Saami status. In 2011, the Supreme Administrative Court made a decision to accept four persons as Saamis due to documents that go back to the 1820s and because the persons identified themselves as Saami (Supreme Administrative 2011). That has raised a worry among Saamis that masses of non-Saami Finns could get status as Saamis, marginalising genuine Saamis inside the "neo-Saami" community (Näkkäläjärvi 2013). In 2013, 35 academic scientists from various disciplines appealed as a scientific community to the Finnish government not to broaden the Saami definition too much to avoid assimilation by Finns and also to stress the meaning of group-identification instead of self-identification in the acceptance process (Yleisradio 2013).

24.3.4 Who should have more power in land-use decisions?

The question of who is a "real" Saami (Valkonen 2009) or local (Valkonen 2003) has been going on in northern Lapland for the past 20 years or more. Being a Lappish native-born person does not necessarily guarantee genuine membership as part of local people. Family backgrounds and kinship issues are considered essential factors in small ethnic and tribal communities (Harris and Johnson 2002).

Based on ethnographic observation and data from this study, local people in villages and municipalities in northern Lapland seem to not identify themselves as "general Finns." If they recognise themselves as Finns, they are a special category, perhaps Lappish. Saami people have their own identity but there are also people with mixed identities, and a person can have both Saami and Finnish identities due to mixed family kinship. Still, in our survey study in 2013, only 0.6% (three persons) mentioned their ethnic identity as something other than Saami or Finn.

		ACTION						
Ethnicity	Compared to	Loggings	Nature-based tourism	Reindeer herding	Mining	Berry picking	Mushroom picking	Non-locals hunting and fishing
Saami	Finns	***	***	***	**	**	***	***

ANOVA – * p=0,01-0,05, ** p=0,001-0,009, *** p≤0.000

Figure II 24.4 Diverse ethnic opinions on land use in northernmost Finland.

Immigrants who are referred to as "brought by train" have the weakest status, right after tourists. The overarching element between the different social groups is that local people want to stand out from other Finns and especially southerners. Without doubt it can be stated that there is north Lappish subculture in Finland.

The cultural model of antagonism between north and south is overwhelming. The state-owned lands are considered to be "our lands" or "our backyards." The idea, though old and traditional, has no legal status. From the government's viewpoint, there are no local privileges on state-owned lands, but the local folks' model is something completely different. There have been several studies on the history of law (Korpijaakko 1989, Korpijaakko-Labba 2000, Joona 2003, Enbuske 2008) trying to prove or resolve the Saami people's rights on crown lands. No solutions to this politically problematic issue have yet been found.

Compared with local Finns, the Saamis, have different relationships to many land issues. For example, Saamis have a more negative attitude towards logging, mining, and tourism and a more positive link to reindeer herding (Figure II 24.4), which is not surprising. The essential question is why Saamis think differently. Presumably it is because of their position as a minority and their identity as the first known nation in the area. In general, ethnicity has been found to be the most important background factor explaining different attitudes to certain land-use patterns. Tourism, forestry, and mining can be harmful to reindeer husbandry while they also represent the activities and power of the majority.

24.3.5 Differences in attitudes towards land-use patterns between Saamis and Finns

The largest nature conservation areas in Finland are located in northern Lapland. About 66% of lands and waters are under some level of conservation (Sihvo et al. 2006). Several studies have focused on the local people's opinions about nature conservation in the north (Jokinen 2000, 2001, 2002). Almost every informant stressed the point that conservation is a problematic thing, something negative. When asked whether conservation areas should be eliminated, the answer was again unanimous: no. People who seem to be against nature conservation are in fact satisfied with large conservation areas.

The paradox can be explained. People resist nature conservation because in many cases it represents something non-local, imported, or "south" that has a negative connotation. The concept of nature conservation carries the invisible label of "other" and it can be recognised as an attempt to control "our" lands and waters by "others," The term *conservationist* has an even more negative echo, though many informants pointed out that he or she did not even know any conservationist. Nevertheless, conservation areas support local and traditional needs for subsistence use of nature – hunting, gathering, and fishing – and restrict devastating land-use patterns and outsiders like tourist hunters. Conservation areas support the heritage of old-time nature use and needs. Time itself is an important variable when studying and implementing the cultural sustainability of forest management in Lapland. New solutions and decisions on land-use that support traditions are usually found highly acceptable (Jokinen 2009)

The unresolved question about the land and water rights of the Saami as indigenous people is implicit in the conflict (Raitio 2008, Nyyssönen 2011, Hallikainen et al. 2008). Finland has not ratified the International Labor Organization Convention on Indigenous and Tribal Peoples (ILO 169), which concerns the rights of indigenous and tribal peoples. Social tensions between individuals, families, social, and ethnic groups have been present in Inari. This is not an unusual situation in small traditional communities where this kind of social heritage over generations partly promotes the conflicts.

Figure II 24.5 Mustavaara old-growth forest nearby Pallas-Ylläs national park. ©Eero Haapala

24.4 Forestry and tourism dispute in Muonio

The Muonio forestry dispute in 2006 and 2007 arose between Metsähallitus and local people and entrepreneurs. During the natural-resource planning process, local people and the Muonio municipality had during the 1990s and 2000s suggested that the northern part of Muonio, especially the Mustavaara (Figure II 24.5) area that covers about 13 000 ha, should be excluded from logging due to its importance for nature-based tourism, reindeer herding, and local people's recreational use. The Muonio reindeer-herding cooperative, which is mainly non-Saami, is located in the Mustavaara area.

The message had been extraordinarily unanimous, and it is unusual for a Finnish municipality to oppose logging because of economical and other reasons. A few local tourism entrepreneurs also stood for the exclusion and against logging. Those against logging stated that uncut forests of Mustavaara provided more jobs in tourism than forestry gave to a few harvester entrepreneurs (Sarkki 2008).

Even though the local message was clear, Metsähallitus decided to start logging in Mustavaara at the end of 2006. This decision launched large demonstrations in Muonio and for first time in Finnish environmental history, leaders of a municipality and notable businessmen were protesting against forestry operations. The conflict situation led shortly to non-public negotiations between Metsähallitus, entrepreneurs and the municipality. Stakeholders against logging wanted to handle this environmental conflict at the local level, without Greenpeace or other non-local organisations. The simultaneous forest conflict in Inari was seen as an example to avoid.

Finally, businessmen were willing to pay a rent to Metsähallitus not to log Mustavaara for 10 years. Details and sum of the rent were not published (Sarkki 2008). The solution was unique in Finland and largely questioned because the Act on Metsähallitus (1378/2004) states that local and multiple uses as well as social and cultural needs should be taken into account in the forest operations of Metsähallitus. Criticism focused on the point that Metsähallitus now collected a fee for the services that it should, by law, provide free. The rent was nicknamed "protection money (Figure II 24.6). The Metsähallitus natural-resource planning process, which had already been criticised for not really focusing on local needs (Raitio 2008), turned out to be even more unconvincing.

The Muonio forest dispute and the solution to the conflict were boosted by publication of an open letter to the minister of Agriculture and Forestry by scientists in 2007. In this letter researchers appealed the government and Metsähallitus not to log anymore in natural (old-growth and pristine) forests in order to

Figure II 24.6 Cartoonist Seppo Leinonen's view on forest dispute in Muonio.

support biodiversity, reindeer herding, Saami culture, nature-based tourism, and other multiple uses. Forest management in state-owned forests was considered unsustainable (Avoin kirje…2007).

In both the Inari and Muonio forestry disputes, local needs, and cultural aspects have been an essential part of the discussion. It was important to define what kind of locality and whose local opinions were the most significant. In Inari, forestry workers have asked whether the Saami reindeer herders' culture was more valuable than theirs, as did the Saami forestry workers. The tacit and politically incorrect answer by those defending Saami reindeer herders was presumably "yes." The idea of positive discrimination for Saami people (or any minority) was built on same logic.

In both cases only a temporary solution was achieved. Originally the Muonio deal was to expire in 2017, but in April 2014 Metsähallitus, Muonio municipality and local stakeholders including reindeer herding co-operative and tourism business in the area reached an agreement about the land use of 13 300 ha. This new agreement is in force until 2040. It expanded protected by 2000 hectares (of this 53 % forest land). Forestry use will continue on 4600 hectares (35 % of total area), but according to the agreement, only moderate thinning, selective loggings or small-scale openings are allowed on forest land. The needs of tourism and reindeer herding as well as landscape and ecological values should be taken into consideration in logging operations (Ylimuonion valtionmaiden… 2014).

Pressure to maintain old-growth forests has not disappeared. In 2013, the University of Lapland undertook a study that showed that 41.5% of incomes in Inari and 32.5% in Muonio come from tourism (Satokangas 2013), and nature is the main pulling force in tourism in Finnish Lapland (Tyrväinen et al. 2010), Jokinen and Tyrväinen 2013).

24.5 Conclusions: Was sustainable forest management out there?

The forest disputes in Inari and Muonio were finally resolved. The critical question from the perspective of this book is whether it was because of successful forest management or other non-institutional reasons.

Both conflict venues were located in state-owned forests governed by Metsähallitus. In both cases Metsähallitus was a stakeholder in the conflict, but at the same time, it was the authority responsible for nature conservation, supporting local employment, and for making a profit out of forests and use of natural resources in a manner that would not hinder the Saami peoples' possibility to continue their culturally important reindeer herding. Metsähallitus was also the mediator in conflict management. It is quite obvious that Metsähallitus was loaded with complex and contradictory tasks and roles. In environmental conflict management, it is important that roles are clear, the mediator is independent, and discussion processes are open (Daniels and Walker 2001, Kyllönen et al. 2006).

The key tool for sustainable forest management by Metsähallitus is the participatory natural-resource planning process where stakeholders and citizens can give their statements and express opinions concerning the use of natural resources. Still, as observed

in Inari and Muonio, this management tool is not valid enough to prevent or handle conflict situations. Moreover, there seems to be significant mistrust and frustration about the planning process among the local public (Hast 2013). People feel that in the end their opinions do not have any real effect on the plan and operations itself (Sarkki and Heikkinen 2010).

There are at least three possible reasons why the public feels that the planning process does not work. First, local communities are not homogenous and they usually have divergent opinions on how natural resources should be used, as demonstrated by the case in Inari. This is also a challenge for culturally sustainable local development.

Second, the public might have misunderstood the nature of the natural-resource planning process. It was not decision-making but rather a discussion about what should be done.

Third, it is possible that even in situations where the local message is solid and coherent, it does not necessarily have an influence on final decisions, as was the case for over a decade in Muonio. This hints that the public criticism on a malfunctioning planning process is justified.

If it was not successful forest management, what resolved the two forest disputes? The answer may be cynical, but it seems that the final key for harmony was money and markets through networking, international campaigns, and pressure. In Inari, Greenpeace, together with the Saami Council (non-governmental organisation of Saami people), initiated an international campaign against logging in Inari and to remove the main timber buyer, Stora Enso, from all ethical index listings, such as the Dow Jones Sustainability Index and the Nordic Sustainability Index (Raitio 2008). Stora Enso was removed from the Italian Banca Etica ethical investment fund in 2007 (Saami Council 2007). As a global actor, Stora Enso did not want to harm its reputation by buying small-scale amounts of disputed timber. Finally Metsähallitus was willing to settle with reindeer herders and opposing parties. Stakeholders declared that they are happy with the resolution. It is highly probable that without international operations and market pressures achieved by the actions of Greenpeace and the Saami Council, the settlement would have not taken place. The Inari forest dispute was deliberately expanded to an international case in environmental and aboriginal networking (Linjakumpu and Valkonen 2007). In the end, the Saami reindeer herders' culture had more weight than other local cultural aspects.

The Inari forest dispute got international attention not only because of Greenpeace and the Saami Council. The documentary film *Last Yoik in Saami Forests* was published in 2006 (Hyvönen 2006) and received awards in several international film festivals. The television drama *Lopun alku* (*Beginning of the End*) was aired in 2009 in Finland and told a story about the Inari forest conflict (Kujanpää 2009). Both films sympathised Saami herders. It is difficult to estimate the level of impact those films had on decision-making but it is possible that they supported the settlement.

In Muonio, the community that was against logging chose another strategy. It wanted to keep the dispute and conflict management local (Sarkki 2008). Communication through natural-resource planning and the local level, between Metsähallitus and the municipal administration, did not bring solution within some 15 years. Finally two notable local businessmen from the tourism sector negotiated with Metsähallitus about the rent they were willing to pay for protection of the forests under conflict. When this deal was about to expire, an institutional solution was finally found. Near future will show how solid the settlement is.

Multiple-use is the key word in forest issues in Lapland. Households have traditionally had several sources of incomes, such as fishing, hunting, and reindeer herding. This model is still valid for modern households. New parallel opportunities are tourism, entrepreneurs, and public services. Other important uses and management tasks are nature conservation and local people's recreational use of forests. Cultural sustainability of forest use in Lapland is strongly tied to the continuous opportunity for traditional and free activities like fishing, hunting, and berry picking. Nature-based tourism is a rather new way to make a living out of forests, and in certain areas of Lapland, it is the most important livelihood in economic terms.

Forest management in these cases was not sensitive to cultural forms of forest use other than forestry. Other needs were identified but they did not have strong weight in the decision-making process during early years and without outside pressure.

The cases of Inari and Muonio are not unique. The questions of who has access and rights to local and national natural resources and who should have decision-making power are asked around the globe. The demand for enhancing indigenous and local peoples' rights on land and natural resources is worldwide as well.

Stakeholders in both forest disputes have been local, national, and global (Heikkinen et al. 2010). The government, through Metsähallitus, sees forests of northern Lapland as a natural resource or business potential the same as any state-owned resource in Finland. Meanwhile, local people see them as "their backyard," a property that belongs to local people even though there is no juridical statement by the Finnish government supporting that interpretation. Saami rights to land are also unclear and an unresolved political issue. These divergent interpretations, institutional and local, set very different premises for

what can be a socially or culturally sustainable use of nature.

While the majority of local people wanted to keep forest disputes and negotiations local, the solutions were found through international campaigns, companies, and markets. We can say that there is an ongoing cultural shift in northernmost Finland. Local people see and want to see themselves as self-sufficient and independent, but flows of natural resource material, decision-making, and power are more delocalised than ever. People appreciate traditional livelihoods and patterns of nature use but mostly earn their livelihoods elsewhere. The past is strongly present in everyday life and cultural values, which is typical in all (arctic) cultures that have gone through rapid cultural change. This kind of parallel timescale creates special challenges for administration and policy-making because multiple needs are derived from past, present, and future.

What were the lessons learned? In the future, there will probably be more and more pressure to use natural resources in non-traditional ways, and nature-based tourism will be one key stakeholder in the area. Struggles for access to natural resources will be tougher in the future, also for mining. Solving the issue of Saami rights on land and water will continue to be on the political agenda. Global markets and global actors are here to stay and there are no weak or strong signals predicting the return to the purely localised management systems. However, from the viewpoint of socially and culturally sustainable forest management, we cannot dismiss local needs and voices. One approach could be explicit "glocalization," a process that ties together global and local conditions, cultures, and actors. Companies and other actors would be simultaneously local and global (Swyngedouw 2004). Through networking, local communities might be able to mobilise their cultural values and practices to global processes. From the perspective of cultural sustainability, local communities must be conscious of the process and accept it.

If sustainable forest management is taken seriously, present planning and decision-making processes must be enhanced and made plausible.

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Old solutions for today's problems in the Urbión Model Forest

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Abstract: The case in study involves internationally recognised Urbión Model Forest, a 35-municipality, 177 368 ha landscape that maintains a high degree of identity, both in economic terms (the National Employment Institute classifies it a single space in terms of employability, although it lies in two different provinces), and in social and cultural aspects (its 17 000 inhabitants share a common system of cultural traditions and forest governance systems). This conjunction, it is argued, has allowed the development of a forest governance system that keeps the different actors (municipalities, forest service, the population, and the private productive sector) responsible for their specific roles but aware of the whole mechanism. This landscape and system provides livelihoods for its inhabitants that, on average, are among the best in Spain.

Keywords: Forest governance, sustainable forest management, Model Forest, multifunctionality, concerted action, landscape identity

25.1 Introduction

The area that constitutes Urbión Model Forest is located in northern Spain, on the western slopes of the Iberian Range. The Duero River, which flows into the sea in Portugal, starts in this area. Distances to main cities in northern Spain range about 200 km, from Madrid in the south to Valladolid in the west, Bilbao in the north and Zaragoza in the east (see Figure II 25.1).

Human settlements in Urbión date from prehistoric times. The cave of Atapuerca, with the earliest-known Hominid remains in Eurasia (more than 800 000 years old), is located less than 100 km away. The transition from a culture of hunter-gatherers to the Neolithic culture took place here between 3000 and 2000 BC, and the area was conquered by the Roman Empire in 200 BC. Today's towns and villages date back about 1000 years, following the Moorish occupation between AD 700 and 900 and the Christian repopulation that took place from the 10th century. The oldest documentation on forest-use regulation, preserved in municipal archives, dates from the 13th century.

Population density has been traditionally low due to the harshness of the climate, which makes farming the land a difficult task. Even today, only 12.71 inhabitants/km^2 are distributed across 35 towns and villages, which average 512 inhabitants each. For at least 5000 years, the most common human activity has been raising livestock (both cattle and sheep). As a result, the forests have been greatly altered, but they have never disappeared altogether. The manufacture of charcoal and the collection of firewood were the second important use of the forests. The large distances between the area and the coast and main towns and cities hindered woodcutting for urban and naval construction. However, some of the main architectural projects in Spain after the 16th century used girders made of Urbión timber, such as the Seo (Cathedral of the Saviour) of Zaragoza, which in 2006, after 400 years, commemorated the substitution of its Urbión-originated girders with new ones of the same origin.

At present, forests cover 80% of the 177 368 ha of the Urbión territory (see Figure II 25.2), with no plantation area included. The dominant tree species are naturally occurring pines: *Pinus pinaster*,

known locally as *negral* or *resinero* pine, and *Pinus sylvestris* (Scots pine), known locally as pino albar. They grow next to small plots of *Pinus uncinata* and beechwoods (*Fagus sylvatica*) on shady slopes. The southern part of the territory is covered in limy soils that sustain stands of *Pinus nigra* (including some of the best in Spain), juniper groves (low forests with *Juniperus thurifera*), holm oak (*Quercus ilex*), and deciduous gall oak (*Quercus faginea*).

Technical management has evolved to enable new uses such as ecotourism and non-timber forest productions, while a main feature of the local governance, a benefit-sharing arrangement rooted in traditions dating back into the 13th century, has kept the population deeply linked to forests, its managers, and the common good. The key to this organisation has been ownership of the land, and (from the beginning of the 20th century) tenure arrangements that incorporate participative decision-making and benefit-sharing. The royal privileges on forest uses granted to villagers in order to colonize this border area in the 13th and 14th centuries, together with communal property of the productive areas in settlement surroundings, allowed populations to thrive and develop a vision of sustainability through self-management of the resources. This vision remains, and today management (although it has become more technical), local awareness, maintenance of forms of local distribution of the wealth generated, and a feeling of belonging facilitate the successful implementation of measures for forest protection and development.

In 2006, in order to serve and represent this long history of concerted action and the area's achievements in sustainability, the Asociación Monte Modelo Urbión (Urbión Model Forest Association) was created by a constituency of more than 60 public and private agents (municipalities, trade associations, unions, and civil society organisations). The association does not replace existing management arrangements but provides a local forum for the discussion of internal issues and a platform for external outreach, advocacy, and networking. The association joined the International Model Forest Network (IMFN) in 2007 with the aim of sharing Urbión's experience and learning. A Model Forest is a voluntary association of people, entities, organisations, etc., in a particular territory that are interested in discovering, defining, enhancing, and guaranteeing its sustainability and in sharing experiences and knowledge to contribute to global environmental goals. The IMFN is a voluntary network of landscape-level initiatives that has promoted sustainable land management at a landscape scale since 1992, when it was presented during the Rio Summit (UN Conference on Environment and Development) as a contribution of the government of Canada. The IMFN currently includes more than 60 landscape initiatives in more than 25 countries

Figure II 25.1 Urbión Model Forest.

(Arbour et al. 2012, Bonnell et al. 2012).

This presentation of the Urbión experience focuses on 1) technically sound coherence across a landscape larger than a single management unit; 2) a simple, participative and sensible benefit-sharing arrangement that keeps people linked to forests; and 3) a shared long-term vision. The case study demonstrates that these features can enable a forest-based landscape to provide dignified livelihoods for its inhabitants over an extended period of time (the 20th and 21st centuries are analysed here, but the system's main features have a much longer standing), while at the same time preserving and indeed enhancing the natural values at stake.

25.2 The evolution of land tenure and forest legislation

The concern for the use of the forests appeared as early as the 13th century when rules were drawn for commons and later given legal status. These rules institutionalised local residents' communal use of the territory, which under different legal arrangements exists until today. The Crown's intent was to consolidate and protect the territory reconquered from the Andalusian Arabs and then repopulate the lands abandoned by "the Moors". In the area of study, a system of communal forest management developed, in which every town kept a number of forest estates (*montes*) and established a system for sharing the proceeds among its inhabitants (see Box II 25.1). The administrative processes were meticulously supervised by the locals, who took great care to maintain legal protection and respect for local legislation by the new terms and conditions, especially in maintaining the registration of the *montes* as communal

Figure II 25.2 The Urbión landscape.

property of the neighbours (status defined in local ordinances). In 1748, Spain took steps to protect its forest resources and, via the By-law of Marina (Navy), prohibited woodcutting throughout the territory to allow forests to recover and to ensure the availability of timber for shipbuilding, a key factor in defence of the Spanish Empire and in its shipping trade with mainly the Americas and the Philippines. This measure led to protests by the locals of Urbión, who again obtained recognition of the exceptional nature of the territory from the king and continued their forestry work.

The present framework for forest management was established through setting up the first Forestry School in Madrid in 1848, creating the state Forest Engineer Corps in 1854, and the May 1, 1855, General Disentailment Law, also known as the Madoz Law. While forest title was kept in the hands of municipalities (installed during the 18th and 19th centuries), often in the name of communal, sub-municipal groupings such as villages, technical management was placed at an upper level of government, first at the national level and then, with the 1978 Constitution, at the regional level. This arrangement remains

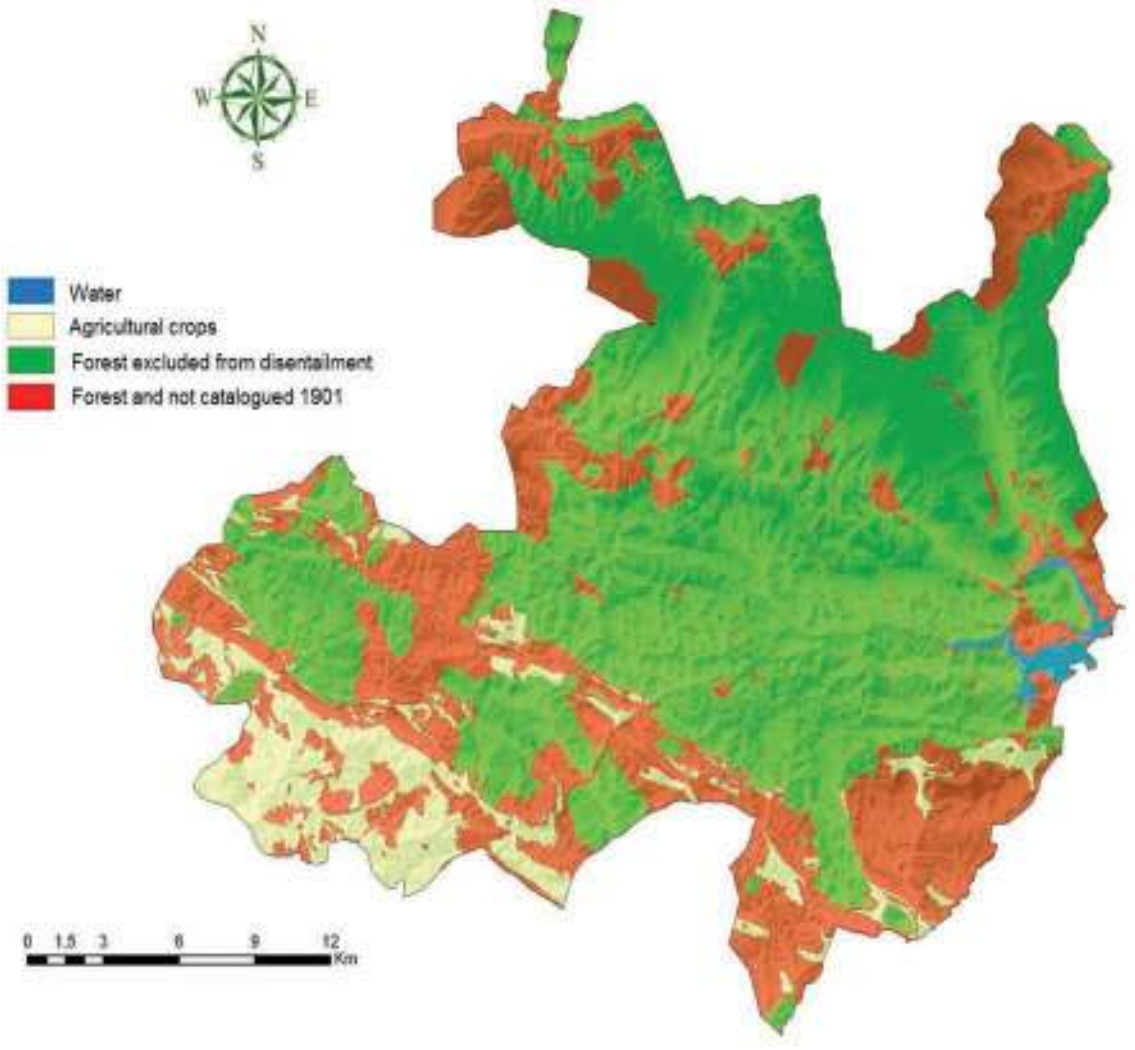

Figure II 25.3 Approximate map of the forests excluded from disentailment (in green) as land of public interest (1901) for the Urbión Model Forest area. © SIGMENA, authors' own work.

today and this case study purports that its existence and permanence explains the successful management of forests in this area.

The inclusion in Article 1 of the Madoz Law (sellable properties) of town and village commons and estates was particularly important to the Urbión area since it referred to a large part of the area's forest. The disentailment (privatisation) of public property (mostly communal property in this part of Spain) lasted almost 70 years and its level of intensity was ever-changing during that period. Overall, the disentailment led to the sale of large areas of forest in the Urbión Model Forest area, which became private property. In the province of Soria alone, some 12 600 ha were disentailed, which suggests that the total figure for the territory could have been about 20 000 ha (Cuerpo de Ingenieros de Montes 1864–1866, ed. 1991a; Cuerpo de Ingenieros de Montes 1864–1866, ed. 1991b; Cuerpo de Ingenieros de Montes 1901; Ortega Canadell 1982; Castrillejo Ibañez 1987; García Martino 1869; Sanchez Salazar 1988). However, forests in the area were mostly excluded from the disentailment in the Madoz Law. A Catalogue of Public Forests excluded from selling was created in 1901 (see Figure II 25.3). This catalogue became the first network of protected areas in Spain. It still exists and is known as Catalogue of Public Interest Forests (*Catálogo de Montes de Utilidad Pública*, Spanish acronym CUP). The 1957 Forest Act reinforced what was ruled almost a century ago. The previous Forest Act was from 1863, in which the rights of the communities were already considered, although it gave management to the forest administration.

The Forest Act of 1957 provides that most of the forests with common use in the area are to be included in the catalogue and registered in the name of the local authority whose town or village benefits from the use: said use must be respected. This awards communal forests unseizable, indefeasible, and inalienable status, and they were placed under

Box II 25.1 Evolution of the local benefit-sharing system: An example of Covaleda 1983–2011

Amaya Martínez Rioja

Estate No. 125 of the Catalogue of Public Interest Forests of the province of Soria corresponds to the village of Covaleda: the municipality is owner of the forest, which has been communal property since the 13th century. The Residents' Civil Timber Society of Covaleda manages the proceeds.

The Timber Society, formerly responsible for the sale of forest products, was incorporated as the Residents' Civil Timber Society of Covaleda in 1983. It is independent of the municipality. Its executive board is made up of 10 people (chairman, treasurer, secretary, and seven more board members). Board membership is renewed every two years and all society members can elect and be elected. Even though ownership corresponds to the municipality and technical management belongs to the Forest Service, association's constituency gives board members the duty of ensuring protection of the forest and correct management of forest use. They report annually to society members at the Ordinary General Assembly.

The society is fully integrated in the village and its members are aware of the forest's value as a valuable natural environment and historical heritage that needs to be passed on to future generations. Society by-laws provide for the care and protection of the area and convey a common understanding of its values.

The municipality and the Forest Service draw up the annual felling plan, which is then used by the executive board to allocate a starting price to each batch; the sale is made by public auction and the society shares the profits obtained among the members who have the right to receive them.

Each year, the municipal authority draws up the census of residents with the right to forestry proceeds, which is given to the society to be used in the allotments. The conditions for inclusion in the census have been provided in the by-laws that have governed the allotment and distribution of the communal uses of the pine trees of the forests of Covaleda since 1949.

technical management by the forest service (National Institute for the Conservation of Nature, Spanish acronym ICONA, and later, in the case of Urbión, by the General Directorate of Forests of the Junta de Castilla y León, the regional government). At the present time, most of the forest estates in the area are included in the Catalogue of Public Interest Forests (Gil 1994, Rojas Briales 1995, Asociación Forestal de Soria 2010). The economic benefits of forestry (which range from thousands to hundreds of thousands of euros) are collected and managed by the local residents, organised in local resident associations (*sociedades vecinales*) or by the local authorities themselves in accordance with local legislation (see Box II 25.1). Fifteen percent of the revenues from forests are allocated to an improvement fund for reinvestment in works designed to improve the estates, which are managed by the state forest service.

Legislation governing forest use was enacted in the mid-20th century in municipal by-laws in most of the towns and villages in Urbión. The by-laws, which vary from one village to another, in certain cases have changed very little. All of the by-laws of the mountain towns and villages contain two conditions for the use of pastures and pine trees: one of roots (being a descendant of parents or grandparents who had the right) and one of permanence (having a house in use year-round in the corresponding town or village). Between the 13th and 21st centuries, the by-laws that regulate the use of forest resources have evolved according to the changing circumstances and social relations.

A survey and case studies were conducted by Urbión Model Forest in 2007 to systematise and share knowledge on the benefit-sharing system, which is managed in a quite secretive way by its managers due to the existing pressure against common arrangements in Western societies. Seven of the main towns' arrangements were studied, covering more than half of the population. Its results and recommendations were provided to the managers in the form of a guidebook (Segur and Rebollo 2007). The survey's main results are presented in Table II 25.1.

25.3 Evolution of the use of forests

Wood (including timber, firewood, and charcoal) has been harvested from the area during the past thousand years. The evolution of the international context brought formulation of long-term management plans in the past century (the first of these, the Pinar Grande estate, celebrated a century of implementation in 2007). The planning process and its implementation encompass previously existing, recognised multi-functionality. More recently, vol-

Table II 25.1 Main features of selected local benefit-sharing arrangements in Urbión.

Feature	Town						
	Cabrejas del Pinar	**Covaleda**	**Duruelo de la Sierra**	**Navaleno**	**Palacios de la Sierra**	**Rabanera del Pinar**	**Vilviestre del Pinar**
Jurisdiction	Municipality	Corporation	Corporation	Association	Multiple (municipality, association, and other)	Municipality	Association
Decisive body (for minimum bid prices and awarding)	Comission, neighbours	Comission, local market	Comission	Comission	Local offer	Comission, local market	Comission, neighbours
Economic volume (earnings in thousand €)	<300	>300	<300	>300	n.d.	<300	<300
Benefit-sharing, mean annual payment (thousand €)	n.d.	≈1200	≈600	n.d.	≈300	≈300	≈600
Social volume (number of people holding rights)	≈100	≈600	≈1000	≈700	n.d.	n.d.	≈320
Accountability	n.d.	Audited balance, offers, prices, annual report	Income and expenses report, prices, annual report	n.d.	n.d.	Audited balance, offers, prices	Audited balance, offers

untary sustainable forest management certification (in 2004, under PEFC system) and a seal of guarantee (Pino Soria-Burgos) have been incorporated into both forest management and timber marketing; a study conducted in 2009 by the technical manager of certification, the CESEFOR Foundation, found no proof of enhanced timber prices, but it did find qualitative indications that certification is improving the quality of management.

As already mentioned, from the Early Middle Ages to well into the 18th century, cattle farming was the main economic activity in terms of number of users of the mountain area. Sheep products were exported to northern Europe with hardly any transformation or manufacture. Cattle farming was so intense that it became regulated: the areas that corresponded to the villagers were marked out, the rights that had been acquired were claimed (uses immemorial, charters of nature given in royal privileges, or monastic orders), and agreements were reached. The regulations were laid down in every detail. At the end of the 18th century, La Mesta, the medieval organisation that regulated and defended cattle and cattle farming within the overall society entered its decline. However, the forms of organisation it left in the territory influence the feasibility of solutions proposed for environmental problems even today, evidenced in the mycology regulations set up in the 21st century. It was found that use, freely available to the public, of mycological resources created a conflict between the sustainability of the resource, the rights associated with its collection, and the economic impact. Mechanisms were put in place to find solutions: meetings of owners and managers to reach agreements and clarify the rights of the owners, inventories and designation of observation areas, and, finally, drafting of appropriate legislation suitable to the needs. A present-day use thus benefits from cultural capital produced during the previous millennium.

The extraction of conifer resin, especially from *Pinus pinaster*, is another important use of the woodlands in the Urbión Model Forest (Hernandez Muñoz 2011). Spain's first distilleries were in Quintanar de

la Sierra and Hontoria del Pinar (Gil Abad 1986), both within the present territory of the Urbión Model Forest; the resin industry grew for several decades and by 1950, 87 distilleries were registered in Spain. This growth led to an increase in investments in social services and improvements to the quality of life in towns and villages that owned the raw material. The need for local labour fostered social stability and helped the local economy. As a result, the resin industry became a strategy for maintaining the rural population and generated wealth and prosperity, strengthening ties between people and the territory. This can be seen in folklore and traditions, architecture, and artistic motifs.

However, from the 1980s, the resin sector went into deep recession. With Spain's entry in the then European Economic Community in 1986, the protection from duties was removed and the high cost of national production became evident. In 1987, the Junta de Castilla y León sought to revitalise the sector by fostering creation of cooperatives and establishing prices for the raw material. This boost helped maintain a certain level of activity until 1990, after which disagreements between owners (industry) and worker co-operatives and the circumstantial drop in export prices accelerated the sector's decline. However, resin-gathering activity has seen a come-back since 2010 in forest estates in the towns of Cubilla, Espeja de San Marcelino, Espejón, and Santa María de las Hoyas.

During the present millennium, marginal economic interest has shifted towards mushrooms (Esteban et. al. 2010), including both semi-cultivated truffles (*Tuber nigrum*) and high-value Basidiomicetes (*Boletus* sp, *Suillus* sp, and others), which are said to generate more value than timber in some of the management units in the area. The collection of mushrooms is regulated in the publicly managed units, thus producing traction for the regulation of the whole market in the area. A multidisciplinary, long-term effort concerted between the regional government, municipalities, universities, and the private sector is today producing economic activity around a low-intensity, high-added-value activity that generates EUR 8 of economic activity over the territory for each euro paid for mushrooms at their forest of origin (Esteban et al. 2010).

Extensive cattle-farming, resin-gathering activity, or mushroom-picking are all sustainable activities that have been successfully added to wood-oriented forest management and provide positive externalities and associated environmental benefits (high landscape and cultural value, compatibility with other uses, such as leisure, hunting, and energy production). The maintenance of this multipurpose nature of the woodlands is a priority objective of forestry planning.

25.4 Commons in the 21st century: Sustainable forest management in the Urbión Model Forest

As mentioned, when the current forestry administration was created (1854), the conditions for a multipurpose approach and a focus on various interests were brought together and institutionalised, remaining valid today. Enabling the technical management of the woodlands (provided by higher public institutions at no cost to the municipalities) in benefit of the local population ensured a form of management that, first and foremost, provides owners and inhabitants with direct and indirect economic benefits from their forests. The lots (minimum forest unit for the sale of standing timber) have bonded the towns and villages to their woodlands to a detailed level. Even so, the system is not always sufficient: 2773 ha of pine grove were burned in the Pinar Grande estate in 1868 (García Martino 1869); however, one century later, that estate is an example of good management.

The forest management plans of the Urbión Model Forest were first drawn up in the 20th century, especially at the beginning and in the 1950s. The planning integrates local values with planning on a larger scale. Today, 67 management units encompassing 104 454 ha of forest are in place (see Figure II 25.4), by far the most widespread land use in the area. Possibilities for employment grew. With the rise in timber prices, prosperity increased in every municipality and reduced migration. The productivity of the woodlands multiplied: for example, in the Navaleno estate, the number of trees felled grew tenfold from 900 pine trees by privilege (1000 cubic meters with bark, m^3wb) before the planning to 10 000 m^3wb, with no compromise for the sustainability of the forest mass. In Talveila, the increase was elevenfold; in Muriel Viejo, thirteenfold; and in Cabrejas, eighteenfold (Lucas Santolaya and Ciriano García 2001; Lucas Santolaya 2011); see Table II 25.2.

An analysis (Pinillos et al. 2007) conducted on 65 490 ha of managed forest estates in the area showed mean standing volume of 98.12 m^3wb (see Figure II 25.5), mean growth of 2.10 m^3wb and mean potential (capacity of the estate to sustainably support tree-cutting) of 2.54 m^3wb, the latter a result of the accumulation of un-realised harvesting potential during the decades and in line with global trends (FAO 2010b, Pan et al. 2011).

The improvement that came with the planning affected both quantity and quality: the felling moved from isolated, disperse actions, removing the best trees and leaving masses that were dominated and regressive, to group felling designed to regenerate and improve the forest mass. The Forestry Plan of Castilla y León, an example of this integral planning,

Figure II 25.4 Evolution of the area under forest-management plan in the territory of the Urbión Model Forest in the 20th century. Source: Authors' own work.

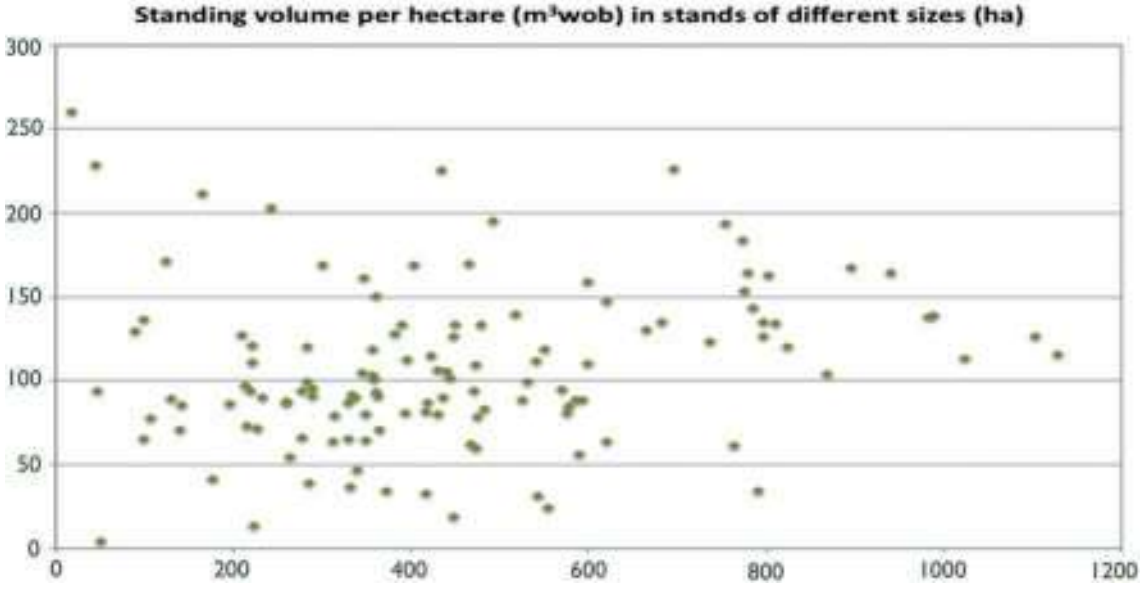

Figure II 25.5 Current standing volume in 124 uniform stands in Urbión forests (Pinillos et al. 2007).

has led to new, significant revenue, especially from hunting, the use of industrial timber from clearing operations, and mycology, as well as the associated tourism (Junta de Castilla y León 2007). This has stabilised income from the forests, which is the best guarantee for their conservation. The publication of the new *General Instructions for the Planning of Tree-Covered Woodlands in Castilla y León* in 1999 includes concepts of biodiversity conservation and sustainability, together with the application of new technologies for forest-mass inventories and monitoring. The certification of 104 454 ha of woodland in the Programme for Endorsement of Forest Certification (PEFC) system in February 2004 and the development of the Soria-Burgos Pine seal of guarantee provided the market with an indication of correct implementation of the plan through audits performed by an independent third party.

Finally, the system in place effectively incorporates the components of the sustainable development paradigm (Torre Antón 1999). The Urbión Model Forest has evolved in a positive and balanced way (as recognised by Joaquin Araujo and Maurice Strong[1], among other renown observers). It is also

[1] Joaquin Aruajo is a renowned environmental journalist and author in Spain. Maurice Strong is a former under-secretary general of the United Nations and the founding executive director of the United Nations Environment Programme.

Table II 25.2 Evolution of harvest potential in selected management units in Urbión.

Town (management unit)	Area (ha)	Potential before planning (m^3 wb)	Year of first management plan	Potential in first management plan (m^3 wb)	Current potential (m^3 wb)
Abejar (104, 117, 119)	1033	1500	1968	n.d.	n.d.
Abejar (119)	408	n.d.	1955	1022	1027
Cabrejas del Pinar and Abejar (117)	1131	240	1961	3792	4388
Cabrejas del Pinar (118)	1140	170	1954	1649	2347
Cabrejas del Pinar and Talveila (114)	763	n.d.	1952	1702	3249
Casarejos	1634	476	1957	2500	2758
Covaleda	9987	4000	1945	15553	21780
Cubilla	532	145	1953	919	1230
Duruelo de la Sierra	4230	1747	1953	6968	9720
Molinos de Duero	2610	210	1962	400	n.d.
Muriel de la Fuente	168	400	1960	542	n.d.
Muriel Viejo	674	86	1953	1188	n.d.
Navaleno	2437	1000	1961	10248	9576
Salduero	244	215	1962	295	n.d.
San Leonardo de Yagüe (88, 90)	3486	1400	1951	5860	10816
Talveila	1005	345	1955	2473	3906
Vadillo	890	177	1952	2027	2429
Vinuesa	2507	n.d.	1955	4343	n.d.

demographically healthy and unemployment levels are comparatively low (Instituto Nacional de Estadística 2009). The quality of the forests has increased in the 20th century (Valbuena-Carabaña et al. 2010): they produce timber, quality meat, and mushrooms, and intentional fires are no longer an issue despite the accessibility of the forests and the number of visitors they receive. The inhabitants identify with their forests in a unique way. This is demonstrated by the stability of the rural population, as opposed to a decline during the 20th and 21st centuries across all developed countries. Though displacement has occurred in the Urbión Model Forest, it is only from the smaller to the biggest towns – the population as a whole remains stable (see Figure II 25.6). Other indicators, such as the GDP, the level of literacy, and longevity, for which there are no breakdowns on a suitable scale, appear to indicate higher levels in the Urbión Model Forest than the European average.

The Urbión Model Forest Association was incorporated in 2007 to provide a local forum for the discussion of internal issues and a platform for external outreach, advocacy, and networking. It applies the following Model Forest principles (http://www.imfn.net/?q=node/22):

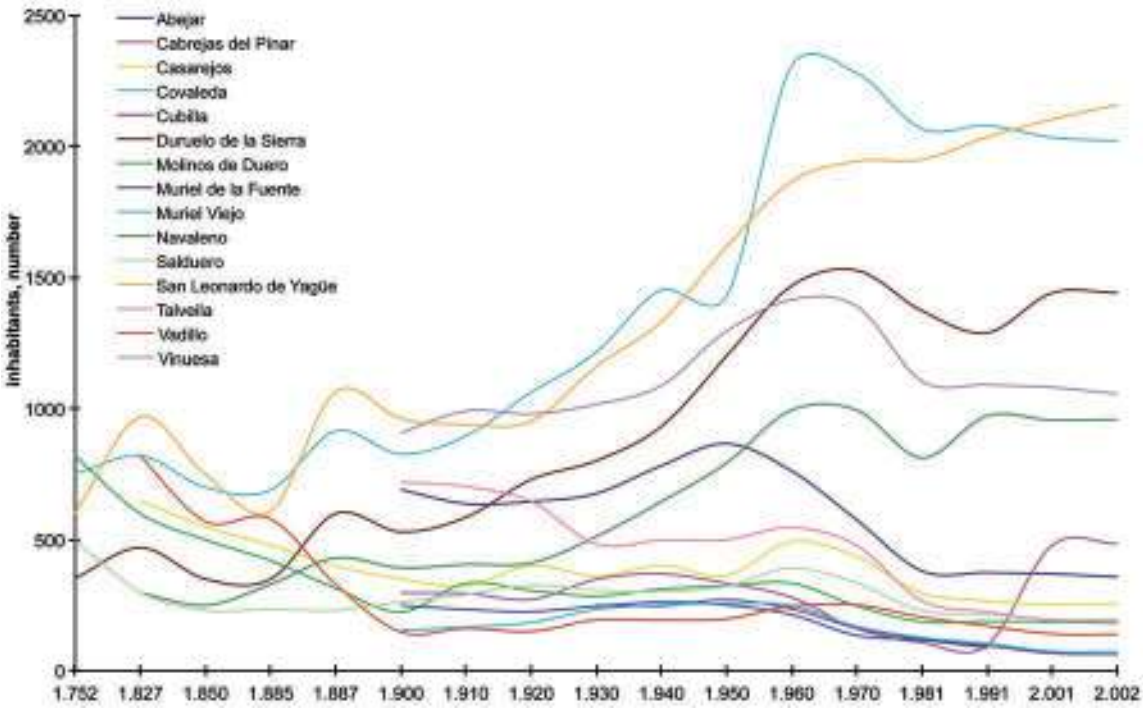

Figure II 25.6 Evolution of population by town (limited by data availability), 1752–2002.

1. Broad-based partnership: 60 institutions, ranging from the 35 municipalities and the regional and provincial governments (public sector) to industry associations, unions, and civil associations take part as partners in the Model Forest Association.
2. Large landscape: the Urbión area encompasses 175 000 ha in which a multiplicity of ecosystems, interests, and management systems are in place.
3. Commitment to sustainability: stakeholders are formally committed to the conservation and sustainable management of natural resources and the forested landscape.
4. Good governance: the association reports to its members on a regular basis, makes decisions in a General Assembly where each member has a vote, and systematically promotes collaborative work.
5. Broad program of activities: the association runs participative diagnosis through commissions, then establishes working programmes that respond to these, and opens its implementation to all interested members (see Box II 25.2 for an example).
6. Commitment to knowledge-sharing, capacity-building, and networking: one of the main exclusive duties of the association has been to provide opportunities for its members to engage in international cooperation activities, even beyond the IMFN mandate: it is the only Model Forest in the world to formally belong to two regional networks (the Ibero-American and the Mediterranean Model Forest Networks).

This case study shows the sustainable-development benefits that can be achieved from a high level of local-stakeholder participation in forest management (FAO 2010a, Porter-Bolland et. al. 2011). Since equity and gender issues are considered in the functioning of Urbión Model Forest, Sonia Martel, Urbión Model Forest Association manager, was awarded the 2010 Yves Rocher Foundation's Tierra de Mujeres (Women's Land) Prize. Similarly, corruption is systemically made difficult by the inhabitants' participation in the system. Legality is still an issue in non-timber forest products (mushrooms, hunting trophies, and others), for which a traceability system is being developed, once again benefitting from the high participation of people, which also puts a human face to locally originated produce. As for timber, the system in place is one of the most monitored, reported, and verified in the world. Almost half of the population receives monetary benefits (Segur and Rebollo 2007), which although of diminishing relative value, still account for more than the commonly accepted poverty-line income.

Box II 25.2 The information and support system for timber sales

Project started in 2011

Situation

- Local timber industry has been affected by the Spanish construction crisis since 2009.
- Most of the management committees maintain the timber as standing trees.
- The population prefers traditional extraction methods (skidder) for small industrial production.
- Hurricane Klaus flattened the French Landes forest and reduced prices.

Consortium

Local industry representatives, representatives of the local resident timber committees, representatives of the Burgos-Soria Pine quality seal, local authorities, and Forest Service.

Agreement

Measures for strengthening the timber market in benefit of industry, residents, and local authorities:

- Improvement in information: a web-based system that publishes the batches of timber as they are put up for auction. Information on geo-referenced location, working maps, information on tracks, etc.
- Volume use: unification of the date and place of sale of the pulpwood to favour access by timber companies, maintaining the independence of the competent bodies for the sale of timber and excluding sawn timber.
- Registration of bidders: simplification of the administrative procedures for access to auctions by timber companies and management entities; unified documentation.

After the adhesion document has been agreed, it is reviewed and valued by the local authorities and residents committees. Seven local resident timber committees have now approved their inclusion in the system.

25.5 Conclusions

Forest is life for the area's inhabitants (please see http://vimeo.com/29084697 for inhabitants' testimonies; the video starts with the phrase – in Spanish – "forest, here, is life," said by a local leader). Fifty percent of employment is directly related to forest management (Instituto Nacional de Estadística 2003). Cultural links and the inhabitants' opinions are taken into account at every step of the forest management process. The Urbión Model Forest Association does not substitute or challenge any current form of government but adds a space where an important part of the system, which is the cultural bond between people and forest, is expressed and vindicated. Remarkably, that empowerment expresses itself in the form of reinforced cooperation with others: because of its incorporation in the IMFN, nearly 2000 practitioners from the five continents have exchanged, learned, and taught in the Urbión Model Forest Association.

Economic globalisation, the European financial crisis and other factors have dealt a deep blow to traditional timber-based small and medium enterprises in the area. Nonetheless, this crisis of the traditional businesses (furniture at a moment, resin at another, and so on) has led to new greener businesses such as those involving mycology, rural tourism, a resurgence of resin activity, and others. The Urbión Model Forest Association makes efforts to render technical assistance fully available to all stakeholders, also by supporting mutual, self-originated capacity-building through courses, exchanges, and other activities. The delicate balancing, cross-checking, and incentives system involving municipalities, communities, and the forest service that has been presented seems to lie at the core of what can be understood as a successful sustainable forest management. The incorporation of Urbión Model Forest Association in 2007 has opened an important means of participation for this territory as a whole in the national public opinion and policy-making, a role that it has performed with remarkable effectiveness.

The association was created with the aim of enhancing landscape-level consensus building; it is not yet the moment to evaluate whether it has fulfilled this aim. The Urbión forests and the system with which its inhabitants and governments have managed it for the last millennium were created to provide the most good to the most people, which the association is committed to continue.

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Forest monitoring in Europe and its importance to clean air policies and sustainable forest management

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Abstract: Forest monitoring in Europe provides information relevant to clean air policies, political processes related to sustainable forest management (SFM), and regional forest policy-making. This holds true in particular for the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) of the Convention on Long-range Transboundary Air Pollution (CLRTAP) under the United Nations Economic Commission for Europe. ICP Forests reveals effects of air pollution on forests, conducts risk assessments, and assesses the effectiveness of air pollution abatement measures. Its results contribute to the scientific basis for clean air policies under CLRTAP. CLRTAP is a particular success story. Since 1980, emissions of SO_2 have been reduced by 80% to 90%. Since 1990, emissions of NOx and VOCs were reduced by about 50%. One of the reasons for the successful implementation of CLRTAP is the close connection of monitoring, science, and policy. A driving factor has been public awareness of the threats of air pollution to human health, ecosystems, and materials. ICP Forests also develops models describing relationships between air pollution, carbon fluxes, climate change, and biodiversity and substantiates the positive effects of clean air policy on SFM. It provides information on several SFM indicators to the report *State of Europe's Forests* that, together with the outlook studies on the forest sector, contributes valuable input to forest policy-making.

Keywords: Forest monitoring, Europe, air pollution, sustainable forest management, forest politics

26.1 Introduction

Several international processes of environmental and forest policies are relevant to sustainable forest management (SFM) with respect to forest health, forest growth, forest biodiversity, climate change, carbon fluxes, and air pollution. Air pollution is known to affect the structure and functioning of forest ecosystems in many parts of the world. In Europe air pollution was among the first environmental challenges to SFM to be recognised as requiring international scientific and political action due to its transboundary impact. Symptoms of forest decline reported from many parts of Europe from the late 1970s onward were largely attributed to sulphur (S) and nitrogen (N) compounds transported through the atmosphere over long distances (Schütt 1979, Manion 1981, Ulrich 1981). The forest decline became one of the main drivers for negotiations for Europe-wide air pollution control within the Convention on Long-range Transboundary Air Pollution (CLRTAP). Established in 1979 under the United Nations Economic Commission for Europe (UNECE) as a response to the threats of acidification to aquatic and terrestrial ecosystems, CLRTAP agreed on the terms for air pollution control throughout Europe based on scientific information and evidence. It has adopted a series of legally binding protocols on the reduction of emissions of S, N, ozone (O_3), heavy metals (HM), volatile organic compounds (VOCs), and persistent organic pollutants (POPs). During the past three decades CLRTAP and related air-pollution-control policies of the European Commission (EC), have succeeded in improving air quality and reducing pollutant deposition (EMEP 2004).

In 1985, in order to facilitate the collection of policy-relevant forest information, CLRTAP established the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) (Lorenz 1996). In 1986 the European Union (EU) adopted Council Regulation (EEC) No. 3528/86 on the Protection of the Community's Forests Against Atmospheric Pollution. This triggered a close cooperation between the EU and ICP Forests for about two decades. Long-term monitoring by ICP Forests revealed that damage symptoms not only developed less dramatically than originally feared but also could be – across all Europe – explained mainly by tree age, insects, fungi, weather conditions, and other natural factors (e.g. Lorenz 2004). Also, the increasing forest growth in many parts of Europe did not support the thesis of large-scale forest dieback across Europe due to air pollution (Spiecker et al. 1996). Research on forest damage as well as results from the long-term intensive monitoring, however, provided evidence that some hypotheses on the effects of air pollution held true in many forest ecosystems in Europe (e.g. De Vries et al. 1995, Augustin et al. 2005, Elling et al. 2007). Results from ICP Forests showed that critical loads of air-pollutant deposition were exceeded at the majority of the forest monitoring sites and that implementation of legally binding protocols under CLRTAP would lead to a recovery of forest soils from acidification (Lorenz et al. 2008). The attention of politicians and the general public to the effect of air pollution on forests has decreased as the first signs of recovery of forests soils and improvements of the condition of trees became evident. This lack of attention to air pollution and forest damage is risky since both are closely related to carbon fluxes, climate change, biodiversity, and SFM (Lorenz et al. 2010).

The forest decline observed in Europe from the late 1970s also raised concerns in other forums about forest ecosystems not being able to fulfill their ecological, economic, and social functions. These concerns stimulated the establishment of the Ministerial Conference on the Protection of Forests in Europe (MCPFE) in 1990, now Forest Europe (FE). FE facilitates high-level cooperation among the 47 signatories in Europe, including the EU. Under the leadership of the responsible ministers, FE works to strengthen SFM in order to maintain the multiple benefits that forests provide to society.

The aim of the present chapter is an analysis of the relevance of

- forest information for-clean air policy and SFM processes
- clean-air policy to SFM
- SFM monitoring and reporting to regional forest policy-making

Section 26.2 describes the political and scientific accomplishments of CLRTAP and highlights observed and predicted benefits of clean-air measures to forest ecosystems. Section 26.3 provides an overview of the international SFM processes and their implications for regional forest policy-making. Section 26.4 draws conclusions and provides recommendations on the further implementation of monitoring, clean-air policy, and SFM in Europe.

26.2 The Convention on Long-range Transboundary Air Pollution

26.2.1 Background and aims of CLRTAP

Transboundary air pollution was recognised as a problem deserving international attention about 1970. Acidification of lakes and streams and the extinction of fish in Scandinavian countries attracted international interest, and the problem was addressed within the Organization for Economic Co-operation and Development (OECD). The organisation also conducted the first survey of the new phenomenon, leading to the conclusion that atmospheric pollutants were transported across borders to such an extent that coordinated action of several countries was needed (OECD 1977). This led to the establishment of an international treaty – CLRTAP, signed in 1979 under UNECE (UNECE 1979). Initially, some countries envisaged firm commitments as part of the convention but negotiations resulted in a framework convention where commitments had to be added as protocols.

Provisions on scientific research, monitoring, and other scientific and technical support to CLRTAP were already an integral part of the convention text. Atmospheric monitoring had started under the European Monitoring and Evaluation Programme (EMEP) umbrella a couple of years earlier and cooperative monitoring of effects was also mentioned in the original text of CLRTAP. One year later, in 1980, the Working Group on Effects (WGE) was established under CLRTAP in order to address monitoring and assessment of air pollution effects on "human health and the environment, including agriculture, forestry, materials, aquatic and other natural ecosystems, and visibility, with a view to establishing a scientific basis for dose/effect relationships designed to protect the environment."

Table II 26.1 Protocols under Convention on Long-range Transboundary Air Pollution.

Protocol	Signed	Entered into force	Revisions
Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)	1984	1988	
Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent	1985	1987	
Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes	1988	1991	
Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes	1991	1997	
Protocol on Further Reduction of Sulphur Emissions	1994	1998	
Protocol on Heavy Metals	1998	2003	2012
Protocol on Persistent Organic Pollutants (POPs)	1998	2003	2009
Protocol to Abate Acidification, Eutrophication and Ground-level Ozone.	1999	2005	2012

26.2.2 The protocols under CLRTAP

Adoption of first protocols

Under CLRTAP, eight protocols have been signed and adopted (Table II 26.1). All but the first protocol, which was an agreement on the financial support from EMEP, address the reduction of emissions of atmospheric pollutants. It took considerable time to agree on the need for costly action to reduce air pollution exposure and effects. Acidification of lakes and streams, which mainly was considered to be a Scandinavian problem, was not considered reason enough to justify action in the rest of Europe. However, forest damages on the European continent, in particular those observed in Germany, changed the opinion of policy-makers. A change in position of the West German government opened the way for constructive negotiations on common reductions. *Waldsterben* (the German word for forest dieback) became well-known all over Europe at this time as a synonym for complex forest damages due to air pollution.

Discussions on reductions were initiated within CLRTAP and resulted in the first sulphur protocol in 1985. The agreement was to reduce 1980 sulphur emissions by 30% by 1993. Though the protocol was signed by a large number of countries, a few, such as Poland and the United Kingdom, did not sign. The United Kingdom in particular strongly argued at this time against the control of sulphur emissions. The protocol was also seen as a first step towards further emission reductions.

The 1985 sulphur protocol was followed by similar protocols: for nitrogen oxides ($NO_{x)}$ in 1988 and volatile organic compounds (VOCs) in 1991. The NO_x protocol was essentially an agreement not to increase emissions, while the VOCs protocol stipulated a 30% reduction in emissions by 1999.

Protocols and the critical loads concept

When the sulphur protocol was signed in 1985, there was a general understanding that proposals for further reductions should be based on scientific evidence. One step in this direction was the development and inclusion of critical loads and levels as a basis for effects-based emission control. Critical loads were defined as "a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge" (Nilsson and Grennfelt 1988). The concept was applied primarily to forest soils and surface waters and Parties to the Convention were asked to map the sensitivities of their ecosystems, i.e. the critical loads. From these maps and corresponding deposition maps it was then possible to derive maps of the exceedances on critical loads. The methods, criteria, and indicators used are given in the ICP modelling and mapping manual (ICP Modelling and Mapping 2010).

The critical loads concept was accepted as a basis for further protocols in 1988 and, together with cost-effectiveness of abatement measures, it paved

the way for the second sulphur protocol, signed in 1994. The protocol reflected a completely new way of thinking in international environmental control; parties signed up for emission reductions based on cost efficiency and on the critical loads concept. Thus, the protocol resulted in reduction requirements – emission ceilings – that varied among countries.

The signing of the second sulphur protocol was intended to be followed by a new protocol for NO_x. While acidification was the only effect to be addressed by the sulphur protocols, the use of the critical loads concept for the control of NO_x became much more complicated. Emissions of NO_x contributed to many effects such as acidification, eutrophication, and formation of tropospheric O_3. Moreover other compounds contributed to these effects, in particular sulphur for acidification, ammonia for eutrophication, and VOCs for O_3 formation. Instead of a new protocol for NO_x, however, CLRTAP further developed the structure for the second sulphur protocol to include several compounds and several effects. This extended structure was the basis for implementation of the Gothenburg Protocol signed in 1999. This new protocol took into account acidification of surface waters and soils, eutrophication of terrestrial ecosystems, and vegetation effects from tropospheric O_3. In addition to NO_x the Gothenburg Protocol required control of sulphur dioxide (SO_2), ammonia, and VOCs. The target year for this protocol was set to be 2010.

Within CLRTAP, the scientific support to policy is organised through the Task Force on Integrated Assessment Modelling (TFIAM). Through this body, dose-effects data (e.g. critical loads exceedances) and source-receptor relations are linked with emission control options in order to form optimal solutions for emission control.

Even if the achievements of CLRTAP were substantial, there were still needs for further control of air pollution in Europe. Critical loads were still exceeded in many areas, especially with respect to nitrogen deposition; if ecosystems damaged from acid depositions were to be recovered within a reasonable time, further emissions reductions were necessary. The protocols needed therefore to be renegotiated to attend to additional requests on control. The Gothenburg Protocol was therefore renegotiated, and in May 2012 a revision of the protocol was signed. This time, however, the main driving force shifted from ecosystems to health effects – it became evident that several hundreds of thousands people die every year in Europe from air pollution effects. The protocol included updated requests on emission reduction on the main compounds of the protocol with 2020 as the target year. As a consequence of the increased interest in health effects, particles ($PM_{2.5}$) were included for the first time in an international agreement. Though ecosystem effects are still important, due to significant progress in emission reductions for SO_2, the main interest has become eutrophication effects due to nitrogen deposition. Another main component of the revision is that it can be signed by countries that did not sign the original protocol (e.g. Russia and Belarus). Even if the new emission ceilings for most countries are significantly lower than those in the original protocol signed in 1999, committed levels for 2020 are in line with what is already achieved with present legislation. This means that countries are not willing to agree on more stringent commitments than those already decided through national and EU legislation.

Implementation of protocols by countries

Over the 30 years the CLRTAP has been in force, emission reductions have been considerable. Emissions of SO_2 from land-based sources in Europe are today 80%–90% lower than in the 1980s, and those of NO_x are about half of what they were at their peak about 1990, as are emissions of VOCs. Limited progress was recorded only for ammonia (Table II 26.2).

Large emission reductions are achieved through several measures. Emission standards at the EU and national levels have probably been the most important factor for emission reductions of S and NO_x so far. However, the political and subsequent economic changes in Europe after 1989 were also important factors leading to considerable reductions in sulphur emissions. The first significant European standards were agreed upon under the Council of the European Communities (CEC) at the end of the 1980s and were directed towards large combustion plants and motor vehicles. These standards in many cases required installations of flue gas purification systems (e.g. desulphurisation equipment in coal-fired plants, and catalytic converters on gasoline cars). Later these standards were improved and introduced into many other areas.

In addition, emission reductions have been achieved through changes in energy and industrial production means and processes, such as conversion from coal to natural gas and use of nuclear power. Energy conservation and efficiency have also contributed to emission reductions. Process-related emissions from industry have also been reduced substantially – the pulp and paper industry is a point in case. Until the 1970s, many plants for production of chemical pulp were based on non-recoverable chemicals. The conversion to recoverable chemicals and introduction of energy efficiency measures reduced emissions in many areas to only fractions of previously recorded emissions. After the year 2000, legislation on emission reductions expanded into new areas such as emissions from off-road vehicles and

Table II 26.2 Emission reductions of SO_2, NO_x and ammonia within EU27 between 1990 and 2010. Data from EEA 2012. Emissions of nitrogen oxides expressed as NO_2.

	1990 1000 tonnes	2010 1000 tonnes	% change
Sulphur dioxide	24857	4575	–82
Nitrogen oxides	17143	9162	–47
Ammonia	5018	3799	–24

the marine sector.

Emission reductions are to a large extent also observed in the downward trends in atmospheric concentrations and deposition. Atmospheric deposition of sulphur has been reduced by more than 70% since 1990 over large areas in Europe, and the deposition of oxidised nitrogen (from NO_x emissions) declined by about 30% over the same period.

26.2.3 The value of a science-based approach

Scientific research, monitoring, and modelling, as pointed out earlier in this chapter, are a requisite part of CLRTAP. This is manifested by the existence and role played by its two scientific bodies, EMEP and WGE. The link between these two bodies and the policy body, Working Group on Strategy and Review (WGSR), is of great importance. One example of these interactions is the development of "blame matrices" through which the transboundary transport of pollutants between countries were quantified. Transboundary transport of atmospheric pollutants was both a scientific and a policy issue in the early phase of international cooperation. It was important not only to demonstrate that air pollution was transported across boundaries but also to quantify the exchange of pollutants between countries. Quantitative estimates on transport were used in the international negotiations to show the transboundary nature of pollutants as well as the benefits to be gained by common actions. Another such example is the critical-loads concept. The concept was easily accepted by policy-makers as a way to quantify the long-term needs for control, but it was also of interest to the scientific community since it pointed to the importance of differentiating natural processes from those that are human induced. Within the CLRTAP framework, much scientific work was carried out to search for and quantify critical thresholds for environmental effects (Posch et al. 1999).

Science has evolved to encompass new considerations, for example, air pollution effects on biodiversity and the need to take into account recovery of damaged ecosystems. In all new scientific work, monitoring of the effects has been of utmost importance and the establishment of monitoring programs under WGE in the mid-1980s was therefore one of the most important decisions of the convention. These so-called International Co-operative Programmes (ICPs) cover various media such as forests, water, and materials and include a centre for coordinating the inventories of critical loads. Forests and forest issues are covered not only by ICP Forests but also partly by ICP Integrated Monitoring, which is directed towards integrated analyses of ecosystems processes and effects; by ICP Vegetation, which mainly covers ozone effects to vegetation; and by ICP Modelling and Mapping, through which data from mapping critical loads are collected and compiled for policy purposes.

The monitored time series, now covering more than 25 years, have been used for the development and validation of new models and in particular for the verification that reported emission reductions result in expected ecosystem improvements.

26.2.4 The importance of public awareness

Public awareness has been crucial to the success of air pollution control in Europe. The obvious signs of damage, in particular fish extinction in Scandinavian lakes and rivers about 1970 and the forest damages on the European continent about 1980 have been important drivers. Both the fish extinction and forest damages triggered alarming headlines and political debates that brought the issue to the attention of the highest international political levels. Acidification was mainly seen during the 1970s as a phenomenon limited to some lake areas in Northern Europe. After the warnings from continental scientists on the forest

situation, the concern extended to the rest of Europe, making international negotiations on control easier. At about the same time, North America faced a similar development, as both the acidification of lakes and forest damages were problems that received a great deal of attention both from the public and at the highest political level.

At the end of the 1980s, public interest decreased and other environmental problems such as the depletion of the stratospheric O_3 layer became a priority. After 2000, public interest has focused more on air pollution effects on human health than the need to control air pollution for its effects on nature.

26.2.5 The International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests

Approach of ICP Forests

ICP Forests has implemented a standardised forest monitoring system in the pan-European region that addresses two different scales by means of two different levels of monitoring intensity. Level I addresses large-scale monitoring of the spatial and temporal variation of forest health and vitality. It also includes the assessment of foliage chemistry, soil condition, and species diversity. As large-scale information alone is difficult to interpret with respect to natural and anthropogenic changes in environmental conditions, Level II addresses monitoring on the forest-ecosystem scale to determine cause-effect relationships and to quantify processes. In this way thresholds, i.e. critical limits, can be found, above (or below) which forest ecosystems are expected to react to air pollution and environmental stress. This information permits risk assessments and scenario analyses of future development of forests in Europe. Cause-effect relationships identified at the ecosystem scale may in some cases be applied to data assessed at the large scale. This scaling up allows comprehensive large-scale scenario analyses. With its more than 6800 large-scale and more than 760 ecosystem-scale plots in 39 countries of Europe, and with Canada and the United States of America contributing national reports, ICP Forests constitutes one of the largest forest monitoring programmes in the world.

Towards the monitoring of SFM indicators

ICP Forests has benefitted greatly from large-scale forest-monitoring data assessed by EC under Regulation (EC) No 2152/2003 (Forest Focus). Under that regulation, the EU Member States had assessed soil and biodiversity data on the Level I plots using ICP Forests methods. Moreover, assessments of cause-effects relationships and the building of models became possible by a revision of the monitoring system that was financially supported by EC under Regulation (EC) 1655/2000 and Regulation (EC) 1682/2004 (LIFE+). According to its Green Paper on Forest Protection and Information in the EU (SEC 2010, 163 final), EC has recognised the need for harmonised, reliable, and comprehensive information on forests. The paper acknowledges that such information is needed to ensure that forest policy-making brings greatest benefits in socio-economic and ecological terms. It also refers to the reporting obligations of EU towards the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CDB).

Because of its multidisciplinary approach, the monitoring system of ICP Forests provides information beyond air pollution, also addressing the relationships between forest health and vitality, air pollution, carbon fluxes, climate change, and biodiversity. Transnational results relevant to SFM are also used in reporting by FE (Forest Europe et al. 2011). FE defines SFM as "stewardship and use of forest lands in a way and at a rate that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfil now and in future, relevant ecological, economic, and social functions at local, national, and global levels, and that does not cause damage to other ecosystems." This definition considers the long-term ecological, economic, and social functions as well as the biodiversity, productivity, regeneration capacity, and vitality of forests. Compliance of forest management with that definition of SFM is validated against a set of six pan-European criteria endorsed by FE. Fulfilment of these criteria is evaluated through a set of 35 quantitative and 17 qualitative indicators (Forest Europe et al.2011). ICP Forest is the international data provider for SFM Indicators 2.1 (Deposition of air pollutants), 2.2 (Soil condition), and 2.3 (Defoliation).

Data assessed by countries under ICP Forests are often useful to countries for meeting national reporting obligations towards international conventions and processes. This is the case, for instance, for data on carbon pools in forests (above-ground and below-ground biomass, deadwood, litter, and soil organic matter) provided to UNFCCC under its inventory of greenhouse-gas emissions and removals resulting from human-induced "land use, land-use change, and forestry" (LULUCF). Information on forest species diversity (tree species and ground vegetation species) is reported to CBD. The large-scale annual harmonised assessments of damage types (e.g. biotic damage such as pests and diseases) as well as damages of unknown origin can be seen as an early

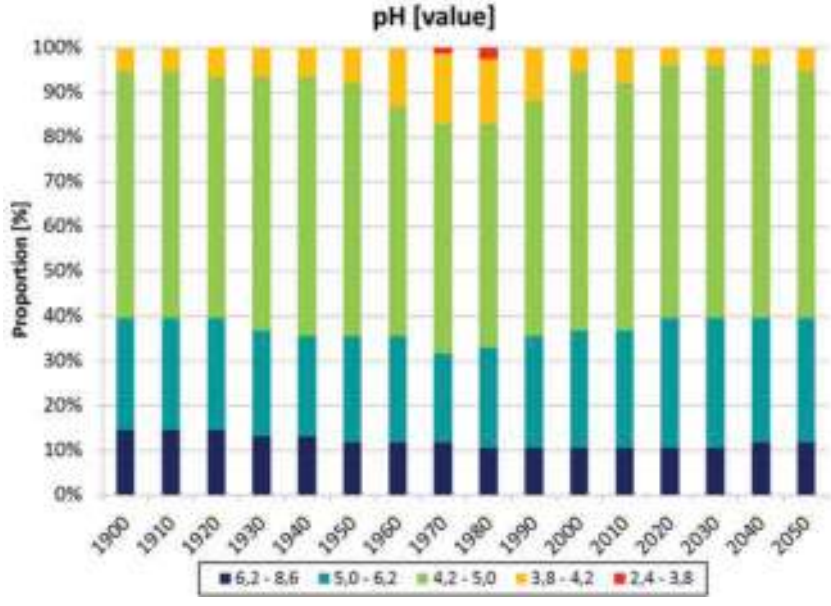

Figure II 26.1 Trend of pH value in soil solution on 77 Level II plots in terms of buffering classes (Nagel et al. 2011).

warning system. Also relevant to the understanding of threats to SFM are model calculations based on ICP Forests data. The data permits the description of nutrient, carbon, and water cycling in forest ecosystems and contributes to assessing risks from, for example, nutrient imbalance and exceedances of critical deposition loads as well as climate change and drought. Analyses of these data contribute to a better understanding of carbon fluxes as well as the development of forest health and species diversity under different scenarios of forest management, climate change, and atmospheric deposition. Results of these analyses enable ICP Forests to verify the effectiveness of clean air policies and of some aspect of forest management.

Policy-relevant monitoring results

The results collected by ICP Forests provide evidence of the negative effects of air pollution on forest ecosystems. For instance, in 2004, through fall of acidity exceeded the critical loads (see 26.2.2) on one-fourth of 186 Level II plots and of N on two-thirds of the plots (Lorenz et al. 2008). The critical limit of N for nutrient imbalances was exceeded in the soil solution in 50% of the measurements (organic soil layer of Level II plots) on all 173 plots assessed (Iost et al. 2012). Augustin et al. (2005) found high S contents in needles and leaves on German Level I plots, weakly correlated with defoliation. The plant biodiversity model BERN (Schlutow and Huebener 2004) was applied to 20 Level II sites for estimating probabilities for the growth of different plant communities depending on present geo-ecological site conditions. The adaptability of existing vegetation to future site conditions was calculated assuming a deposition scenario with full implementation of current national emission legislation in all countries of the EU. Even under this scenario, there are eight plots (of 20) on which the present main tree species would not be adapted to the site conditions under the deposition situation to be expected (Schlutow et al. 2011).

There is also, however, evidence of the positive effects of clean air policies on forests. For instance, the reduction of air pollution emissions (see 26.2.2) is reflected by decreasing through fall deposition under the forest canopy in several studies (e.g. Lorenz et al. 2010). For 106 Level II plots in 17 countries, critical loads for acidification and eutrophication as well as their exceedances were calculated, using the simple mass balance approach (ICP Modelling and Mapping 2010). By means of the VSD+ model (Bonten et al. 2011), the future development of soil parameters was calculated for different pollution scenarios on 77 Level II plots. Results show widespread soil acidification in the year 1980, with nearly 60% of the plots affected by critical load exceedances. A continuing positive trend is expected until 2020, leading to full protection at least under the most ambitious deposition-reduction scenario. Critical loads for nutrient N were exceeded also on 60% of the plots in 1980 and will continue to exceed by 2020 on 10–30% of the plots, depending on the deposition scenario. While the C/N ratios will decrease, soil-solution pH can recover to pre-industrial values on all 77 plots (Figure II 26.1) (Nagel et al. 2011). There

are also signs of recovery of trees. There is a correlation between the decrease in defoliation of *Pinus sylvestris* in Europe since 1994 and the decrease in S deposition. This holds true particularly in regions of previously high S deposition and defoliation in parts of Poland, the Czech Republic, the Slovak Republic, and part of the Baltic States (Lorenz 2004).

26.3 Regional processes for SFM

26.3.1 International processes and their networks

Forest policy and management in Europe are under the direct or indirect influence of a significant number of processes and organisations. Within the EU, forestry matters are addressed, for instance, within the council Working Party on Forestry and the Standing Forestry Committee of the European Commission. However, many Directorates General (DGs) have a stake on forest issues: DG Energy with biomass, DG Environment for issues related to forest biodiversity and its conservation, and DG Agriculture and Rural Development and DG Enterprise for the productive side of forests, in particular regarding wood industries. All of them touch upon, address, and certainly contribute to SFM in the region. However, those processes and organisations pursue their own agendas based on different understandings of SFM. At the pan-European level, a series of other organisations and processes also exert influence.

First, UN bodies such as the Food and Agriculture Organization (FAO), European Forestry Commission (EFC), and the UNECE Committee on Forests and the Forest Industry (COFFI) have a long history of deliberating on how to assess and improve SFM in the region. According to its mandate, the EFC is to "advise on the formulation of forest policy and to review and coordinate its implementation at the regional level; to exchange information and, generally through special subsidiary bodies, advise on suitable practices and action with regard to technical and economic problems, and to make appropriate recommendations in relation to them foregoing." Together with COFFI, whose mandate is, among others, to "provide member countries with the information and services which they need for policy- and decision-making as regards their forest and forest industry sector, formulate recommendations addressed to member governments and interested organisations," the EFC provides a solid platform for policy advice at the pan-European level.

Over the years other processes have contributed to SFM worldwide and regionally under the aegis of UNEP (United Nations Environment Programme). Biodiversity conventions, for instance, such as CBD and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), have specifically addressed forest biodiversity or species whose habitats are found in forests. Their legally binding character and outreach has contributed to a wide understanding of SFM practices and their positive effects on the conservation of biodiversity.

In the case of COFFI and EFC, the proximity of policy advice to information gathering and sharing has allowed policy dialogues very much based on scientific evidence and data. A recent example pertains to wood energy. Detailed data and information collected through the Joint Wood Energy Enquiry, *Forest Products Annual Market Review*, and outlook studies for the European and North American Regions have fed into a policy dialogue on the suitability of using wood as a source of energy. Such a debate would have been merely theoretical if data had not been able to provide a reliable platform on which to base policy recommendations. This debate also included data for and information from CLRTAP.

Key documents such as the *State of Europe's Forests*, outlook studies, and various reviews allow the pan-European processes to benefit from the most up-to-date information and base their recommendations on them. The link between data and recommendations in these studies is direct.

Other non-UN pan-European processes have an important role to play in defining policies and supporting SFM in the region. FE is a case in point. In the past 20 years this process has demonstrated the willingness of European governments to engage in cooperation on SFM and provided the definition of principles and criteria for SFM that most countries have embraced, although on a voluntary basis. The process has also evolved into the negotiation of a legally binding agreement, which is expected and meant to further strengthen the role of SFM in the pan-European region.

The role of the European Forest Institute (EFI) is also significant. Information compiled, assessments, and research performed by the institute are a primary source of knowledge on forests in the region and likewise feed into policy processes and decisions. The link between the research role of EFI and its policy capacity has been enhanced with the creation of ThinkForest, a policy think tank stimulating several debates and exchanges of opinion in the region.

26.3.2 SFM monitoring and reporting in regional forest policy-making

The majority of forest-related international economic or policy agreements include an element of reporting; however, the role that information plays varies among processes. In general, data collected for the purpose of international statistics is not directly linked to forest-related policy commitments. The increasing amount and complexity of information gathered have required their interpretation, thus statistical datasets are often accompanied by thematic reports providing an analysis and interpretation of collected data (e.g. *UNECE/FAO Forest Products Annual Market Review* or FAO's *Global Forest Resources Assessment*). Most of the policy processes and conventions use reporting for monitoring the status and trends of variables related to their provisions (ICP Forests, FE, United Nations Forum on Forests (UNFF), and CBD). For instance, s specific information system for direct reporting on compliance at the national level with the undertaken commitments was developed by the Kyoto Protocol of UNFCCC.

In Europe regular activities on international forest cooperation were undertaken by FAO, in collaboration with UNECE, soon after the Second World War. Activities included the collection of forest information, which was based on data generated in individual countries. The first international statistics and assessments of forests in Europe focused on basic forest-related variables (e.g. forest area, growing stock) predominantly linked with economic activities (e.g. exploitable forests, removals, forest products). With time, the scope of information collected was enlarged to include information on other functions and aspects, which resulted in the comprehensive sets of data covering practically the whole scope of forest management that exists today (e.g. Criteria and Indicators for SFM).

Countries' information systems were primarily designed to address national issues, while the provision of information for international databases and reports was seen as an additional function. This resulted in high variability of national forest information systems that is reflected in the different scopes, frequencies, and methodologies of collected data. The first international statistics were a mere compilation of raw data collected according to national standards; in consequence, the level of comparability of data in international systems was low. Attempts to improve information comparability were undertaken with the increased interest and demand for forest-related information, partly resulting from the development of policy agreements (CLRTAP, criteria and indicators processes, Rio processes) in the last two decades of the 20th century.

The initial method applied for the improvement of the comprehensiveness of international information was the harmonisation of data, which transforms information reported according to the various national standards into a form responding to internationally agreed-upon definitions. The advanced method of harmonisation uses ground data collected through national forest inventories (NFI). An alternative approach is the standardisation of data collection, where countries collect data on the ground according to the same internationally agreed-upon methodology in all participating countries.

The majority of international statistical systems improve the integration of information through the harmonisation of national data (e.g., FAO, UNECE/FAO, EU Eurostat, EC Joint Research Centre, and OECD. FE defined the scope of required information (through the criteria and indicators for SFM) but does not define the method according to which information should be collected. As a result, the related reporting (Forest Europe/UNECE/FAO *State of Europe's Forests*) includes a combination of information coming from harmonised and standardised systems. Standardisation of the data collection is the main approach, which was applied by CLRTAP for the purposes of ICP Forests. The majority of the relevant reporting systems in the EU rely on the harmonised national data. However some information, such as on forest fires, is collected through a standardised system thanks to the European Forest Fire Information System (EFFIS).

The collection of information generated at the national level, harmonised to various extents, is the main reporting approach applied for the purpose of global conventions and processes such as UNFCCC, CBD, and UNFF.

26.4 Conclusions

CLRTAP is a particularly successful experience, especially when compared to other international processes. Clean-air policy in Europe was greatly promoted by concerns that forests could no longer fulfil their ecological, economic, and social functions due to the impact of air pollution. Considerable emission reductions were reached under CLRTAP. Since 1980 emissions of SO_2 from land-based sources have been reduced by 80%–90%. Emissions of NO_x and VOCs were reduced by approximately half since 1990. The success of CLRTAP stems from several factors. A driving force for the implementation of CLRTAP policy was public awareness of the threats that air pollution poses to human health and to all kinds of ecosystems, including forests. Moreover, there is probably no other environmental problem for which policy, monitoring, and analysis have been so closely connected to science as that of air pollution.

The overall impression is that the close involvement of science in the policy process for CLRTAP has contributed substantially to its success.

Scientific information provided by ICP Forests has on one hand revealed effects of air pollution on forests, thereby promoting clean-air policy. On the other hand, it has contributed positively to clean-air policy for SFM, as shown for several FE indicators. For instance, deposition of air pollutants (Indicator 2.1) on forests has been reduced for many years. This has induced a recovery of forest soil condition (Indicator 2.2) from acidification. Scenario analyses reveal that if protocols adopted by CLRTAP are implemented, the recovery of forest soils will continue and exceedances of critical loads will be reduced. This in turn is assumed to be of benefit for forest vegetation. Defoliation (Indictor 2.3) was shown to have decreased, especially in parts of Central Europe and Eastern Europe, where air pollution had been notably reduced during the political and economic transition in these countries.

However, none of the symptoms of forest decline are due solely to air pollution. For instance, defoliation attributed to existing air-pollution loads may be partly caused by such factors as tree age and drought, while seemingly natural damage by insects and fungi may be a result of predisposition caused by air pollution. For this reason it remains impossible to estimate both the exact extent to which air pollution is responsible for forest decline and the extent to which clean-air policy prevents forest decline or causes forest recovery. However, the positive effects of clean-air policy revealed by forest monitoring and the related benefits to the ecological, economic, and social functions of forests and hence of benefit to SFM cannot be denied.

The monitoring system of ICP Forests is not only useful for assessing effects of air pollution and the effectiveness of clean-air policy. It also assesses relationships between forest health and vitality, air pollution, carbon fluxes, climate change, and biodiversity. It may provide harmonised information for further FE indicators such as carbon stock (Indicator 1.4), forest damage (Indicator 2.4), deadwood (Indicator 4.5), and threatened forest species (Indicator 4.8).

The methodologies for the collection and processing of information for international processes have been evolving with the increased reporting capacity and governmental interest in the forest-related issues. Despite efforts aimed at the coordination of these developments, individual processes/organisations often decide to construct their own information systems. Due to different modalities endorsed by the individual processes, the final data reported by these bodies is often not comparable. This results in a variety of systems and approaches to collection of forest information, confusion in data interpretation, and duplication of efforts.

In addition to an increased reporting burden for countries, the situation leads to diverse results and assessments, which do not always reflect real differences, and intricacies are not easy to explain to the general public. Thus citizens and policy-makers may receive confusing, if not contradictory, messages despite tremendous investment in communication and pedagogics.

The concept of SFM with its set of criteria and indicators, which covers the whole scope of aspects related to forest management, should prevent biased and partial assessment, given its consistent and holistic nature. The *State of Europe's Forests* publication (Forest Europe et al. 2011), the most comprehensive and up-to-date review in the pan-European region, is based on this approach. It provides an objective picture of European forests, underlining progress and shortfalls, and highlights threats and challenges that forests and the forest sector face. Together with the outlook studies on the forest sector (UNECE and FAO, 2011), it provides a valuable input to forest policy-making.

However, it must be acknowledged that the findings of the *State of Europe's Forests* report do not seem to directly influence regional forest policy, let alone national forest policy-making and forest management on the ground. Policy processes in the region have not yet addressed or have dealt poorly with some of the crucial issues identified in the report: robust and harmonised monitoring systems throughout the region, the increased wood mobilisation needed to meet the greater demand, uncontrolled pests and diseases, and rural depopulation leading to an aging and shrinking workforce, among others. If the forest sector wants to develop and make the best contribution to a green economy, these issues need to be put on the table and dealt with through a cross-sectorial strategy.

International activities on forest information remain essential to regional and national policy-making. Nevertheless, they should not be selectively used as a tool to validate a certain point of view on forests or justify projects or processes. They should be based on scientific methods and backed by the best available data. In any case, intergovernmental bodies should make sure that the main conclusion of the reports that they commission or sponsor are discussed and, when appropriate, included in their agendas.

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Water-related ecosystem services of forests: Learning from regional cases

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Abstract: Forests are widely recognised as recommended land cover for protection of water resources. It is commonly understood that forests control erosion, improve water quality and regulate water flows in catchments to some extent. Less-well understood are aspects of the so-called green water flow: biomass production in forests has a price locally in terms of evaporative water losses though it can provide rainfall elsewhere. In this chapter, we discuss the complex and sometimes contra-intuitive issues that emerge when trying to optimise forest management for water-related ecosystem services. We analyse three cases in very different geographical and socio-economic settings where the water-related ecosystem services of the forest have been a driver for forest management transition. In the first example from Ethiopia, forests are restored for soil and water conservation purposes related to green water, while in the second case in South Africa, plantation forests are removed with the intention of ecological restoration and increase in blue water availability. In the last case from Italy, we discover that schemes for payment for ecosystem services (PES) make a change with respect to water-related ecosystem services. The case studies show that such transitions can follow very different pathways, determined by the biophysical, socio-economic, and institutional contexts. But despite these differences, the case studies show patterns in common. The success or failure of management policies is highly scale-dependent (extension and intensity of the intervention). Changes aimed at improving an ecosystem service always show trade-offs with other ecosystem services. Often, measures in catchments are based on a correct interpretation of hydrological knowledge but fail to optimise for the range of upstream and downstream ecosystem services at stake. The main challenge for the future is to further foster the ongoing paradigm shift in the way water-related forest ecosystems services are considered, with a change from supply-side policies to demand-side policies and supply-demand linkages and from purely technical solutions to green infrastructure solutions.

Keywords: Blue water, green water, South Africa, Ethiopia, Italy, water tax, exclosure, payment for ecosystem services

27.1 Introduction to water-related ecosystem services

Fresh water is becoming a scarce global resource of strategic importance (Duda and El-Ashry 2000). In this context, the regulating role of forests has been recognised (de Groot et al. 2010), although the sponge model – the general belief that forests store water in the rainy season to slowly release it in the dry season (e.g. Hamilton 1985) – is not much supported by available data. Forests may increase low flows but in most cases they decrease them (Jackson et al. 2005, Birot et al. 2011). For a better understanding of the hydrological cycle, distinguishing between blue and green water (Falkenmark and Rockstrøm 2005, Birot et al. 2011) is very useful. Blue water resources are formed by the rainfall fraction that reaches rivers and lakes after percolation into the aquifers or directly as surface run-off. Humans strongly value the quantity and quality of blue water, as it forms the main source for drinking water,

Table II 27.1 Overview of the main water-related ecosystem services of a forest.

ECOSYSTEM SERVICES (ES)	MAIN WATER-RELATED ES OF A FOREST (**Green water services** in bold, *blue water services* in italic, green/blue water services underlined)
Supporting services (S)	**Canopy interception**, **Evapotranspiration**
Provisioning services (P)	*Irrigation water provision*, *drinking water provision, fish production,* **wood production**
Regulating services (R)	**Flood regulation**, **climate regulation**, erosion control, water purification
Cultural services (C)	Recreation, ecotourism

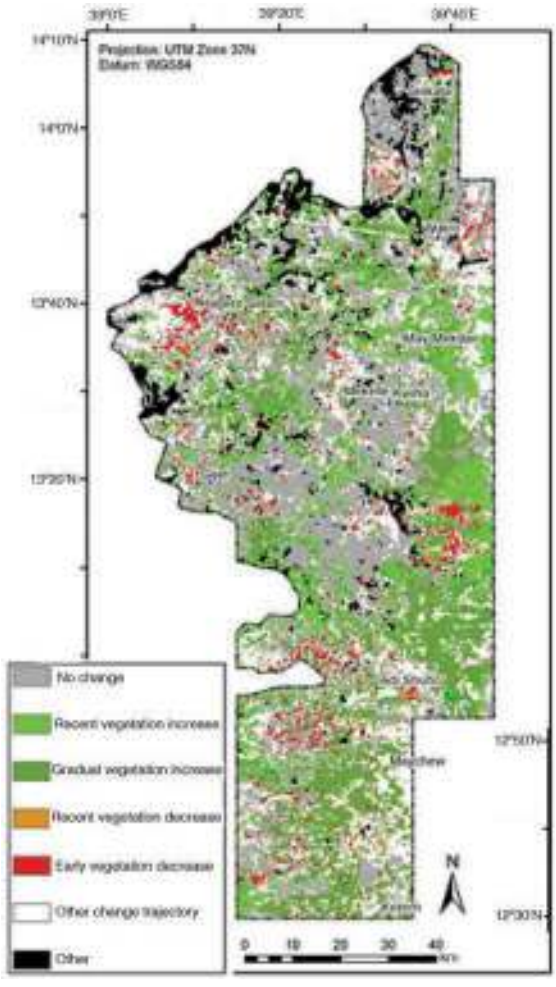
irrigation water, hydropower, and recreational activities. Green water resources are formed by the fraction of rainfall that does not leave the ecosystem through percolation or surface run-off. It may infiltrate into the soil and become available for uptake by plants. The green water flow is the evapotranspiration of this green water resource into the atmosphere. Precipitation water intercepted by vegetation canopies forms part of green water resources, and its evaporation is a green water flow. The green water flow includes the evapotranspiration from blue water resources as well, such as irrigation water used by crops and the so-called virtual water incorporated in imported and exported products like wood, food, and feed (Allan 1998).

Compared with other land uses, forests typically have larger green water and smaller blue water fractions, which means that afforestation generally decreases blue water quantities and deforestation increases them. Today there is a dominant blue water paradigm that considers green water flows and thus the very existence of forests as a water loss. But this paradigm largely ignores the important ecosystem services related to green water flows, including biomass production, erosion control, and nutrient retention (Birot and Vallejo 2011). Recent research has quantified the essential function of green water flows for precipitation recycling and relocation over continents (Keys et al. 2012).

Both blue and green water flows are essential for sustainable catchment management. There is a direct trade-off between green and blue water use, and development in either direction (blue water maximisation by, for example, impeding forest restoration, or green water maximisation by establishment of fast-growing exotic tree plantations) has tangible effects on the other. For this reason sustainable management of river catchments must take an integrated approach in which the ecosystem services of upstream (terrestrial) and downstream (aquatic) ecosystem services are considered together (Maes et al. 2009).

To consider trade-offs between green and blue water use, the ecosystem services framework proposed by the Millennium Ecosystem Assessment (MEA 2005) can serve as an excellent basis. MEA (2005) considers supporting, provisioning, regulating, and socio-cultural services. Table II 27.1 shows the water-related ecosystem services in each of these categories. Based on the aforementioned blue and green water definitions, we can now distinguish between blue water services of the forest (here defined as ecosystem services provided by the forest, related to the availability and quality of blue water resources), green water services (here defined as ecosystem services provided by the forest, related to the availability of green water resources or the existence of green water flows), and green/blue water services providing both (Table II 27.1). As a supporting ecosystem service, evapotranspiration is the driving process behind green water flows, but water interception by vegetation canopies is also an important process that will, for example, diminish the erosive power and influence the quality of precipitation water. Wood production is a provisioning service of the forest typically linked to green water flows, except when the water transpiration by the plant originates from irrigation water. Water purification is both a green- and blue-water regulating service, as both vegetative processes by canopies and roots and filtering processes in the lithosphere and surface waters can have a purifying effect.

In this chapter we discuss the complex and sometimes contra-intuitive issues that emerge when trying to optimise forest and land management for water-related ecosystem services. To do this, we analyse three cases in very different geographical and socio-economic settings where the water-related ecosystem services of the forest have been the driver for a transition in forest management or conservation. In the first example from Ethiopia, forests are restored for soil and water conservation purposes related to green water, while in the second case in South Af-



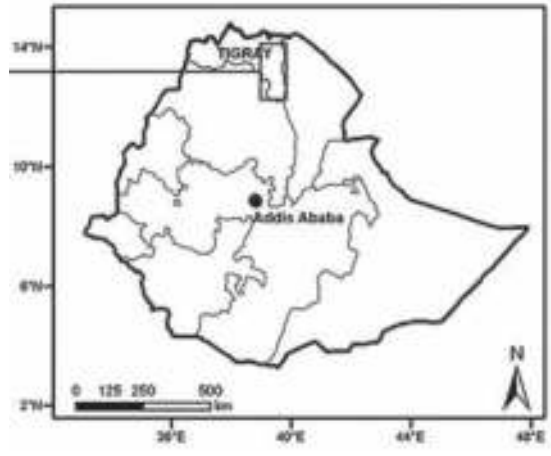


Figure II 27.1 Map of the study area in Tigray, Ethiopia showing the six major land-use and cover-change trajectories for 1972–2000, indicated by different colours (after de Mûelenaere et al. 2014. ©Reprinted with permission from John Wiley & Sons, Inc.

rica, plantation forests are removed with the intention of ecological restoration and increase of blue water availability. In the last case from Italy, payment for ecosystem services (PES) schemes make a change with respect to water-related ecosystem services.

27.2 Soil and water conservation: the case of exclosures in Tigray, Ethiopia

27.2.1 Biophysical setting and relevance

In the highlands of Tigray, exclosures (areas closed for animal grazing and biomass harvesting, see Aerts et al. 2009) have been established on former degraded lands (barren lands including communal grazing lands on steep slopes) with the aim of forest restoration and land conservation. Tigray lies in the north of Ethiopia between 11° and 14° N (Figure II 27.1), and much of the land has an elevation between 2000 and 2800 meters above sea level, which offers a more temperate climate than would normally be associated with the latitude. Average yearly rainfall ranges between 500 and 900 mm/year, with a uni-modal pattern. Time series analysis of annual precipitation shows that although the succession of dry years in the Ethiopian highlands between the late 1970s and late 1980s produced the driest decade in the previous century, there is no evidence for a long-term trend or change in the region's annual rain regime (Nyssen et al. 2005). The dominant land use is small-scale rain-fed subsistence agriculture, for which the main constraints are inadequate soil water and excessive soil erosion. Exclosures are forests under development but, at present, in terms of tree height and crown cover density, they may not all meet the requirements of the forest definition of the Marrakech Accords of the United Nations Framework Convention on Climate Change (UNFCCC) (Verchot et al. 2007). The current character of exclosures ranges between open savannah and bushland (Figure II 27.2), depending on the time since exclosure establishment and the vegetation status at establishment.

By 1980, forest resources had strongly decreased in the area, and only two large forests remained (Desa'a and Hugumburda) (Kassa 2013). At a re-

Figure II 27.2 Exclosures dominated by *Juniperus procera* (left) and eucalyptus plantation (right) at Amba Alage pass. ©Jan Nyssen

Figure II 27.3 Riverine trees have been allowed to grow and eucalypts planted in the upper Ilala gorge, between 1973 (left) ©Larry Workman **and 2008 (right)** ©Jan Nyssen**.**

gional scale, the supply of forest ecosystem services had come to a very low level, but the large-scale establishment of exclosures has given a decisive impulse to forest restoration. Interpretation of satellite imagery shows that between 1972 and 2000 there was an increase in vegetation cover in 16% of the area and a decrease in 7% of the area; the vegetation cover may, however, mainly be qualified as bushland (43% in 2000), compared to 2% forest and 4% eucalyptus plantations (de Mûelenaere et al. 2014). Not only in the formally established exclosures but even elsewhere, trees are now much better respected than before (Figure II 27.3), and it is generally considered socially unacceptable to cut a mature tree. Multipur-

Figure II 27.4 An exclosure located on earlier marginal farmland in Dogu'a Tembien (Tigray).
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pose trees outside forests have a major ecological and socio-economic role in northern Ethiopia. Some of the main functions they have are erosion control, provision of wood and non-wood products, and a seed source for forest rehabilitation (Reubens et al. 2011).

In terms of water relationships, exclosures significantly decrease surface run-off and increase water infiltration in the soil. Reports from villagers and observations also suggest re-emergence of springs, offering opportunities for irrigated vegetable gardens and improved drinking water supply, which would suggest increased percolation and improved baseflow. Translated into water-related ecosystem services, exclosures mainly support forest biomass growth, drinking and irrigation water, and improved erosion control.

27.2.2 Socio-economic setting

The extreme degradation of the Ethiopian environment, including soil erosion, is the consequence of drought, war, and famine (Stahl 1990). The establishment of exclosures is one of the major initiatives of post-war relief and rural reconstruction. A land tenure regime introduced in the 1980s has led to an approximate equalisation in size of landholdings among households (Hendrie 1999). The establishment of exclosures was made possible by this important land-tenure change in which large feudal agricultural lands in the valley bottoms and other lower-level areas were shared among local farmers. It decreased the pressure on hillslopes, where exclosures could then be established (Lanckriet et al. 2014) (Figure II 27.4). Activities related to the management of exclosures (guarding, forest management in rare cases, and economic activities such as beekeeping, cut and carry of grass, etc.) generate income for community members. Equity is considered when the villages establish rules on sharing harvested grass from these areas – in some cases, all the grass is harvested collectively and shared; in others, every household may send one person to harvest or the livestock owners may do so.

27.2.3 Institutional setting

After the terrible episodes of war and hunger in the 1980s, the northern Ethiopian highlands were left more degraded and deforested than ever. The regional government then compelled local communities to set aside degraded grazing lands for restoration purposes. It should be noted that international policies and institutions have been of minor importance in the development of exclosures and their management. The essence of exclosures is the implementation of new local laws (*serit* in the local Tigrinya language) over a piece of land that makes its free use illegal. Guards paid by the community, or sometimes by NGOs, enforce these local laws, fining trespassers or sending them to local courts. In order to decrease pressure on these newly available wood resources, there is a ban on wood transport between districts,

Figure II 27.5 Partial view of the Mesebo escarpment in 1973 (left) ©Larry Workman **and in 2008 (right)** ©Jan Nyssen**.**

though there is pressure from urban politicians to soften such restrictions. Forest products such as firewood cannot be collected; permission to collect dry wood tends to be abandoned since this led to intense illegal debarking of trees. Trapping of wildfowl is illegal but is sometimes carried out. Collection of wild edible fruits or medicinal plants is generally discouraged since it can easily be used as a pretext for illegal cutting of grass. The major non-timber use is the installation of beehives, either by cooperatives, individuals, or private companies in or at the edge of the exclosures.

Ethiopian national and regional governments invested large amounts of money in land rehabilitation, mainly through building of erosion-control structures called stonebunds, inside the exclosure areas. Most of the work is done by farmers through food-for-work programmes. The effectiveness of these investments has been proven (Descheemaeker et al. 2006a, 2006b). Further, through the Bureau of Agriculture and the Relief Society of Tigray (REST), a relief organisation supported by regional politicians, there is quite an impressive structure of extension workers, training initiatives, and such. The main topics addressed in these initiatives are both technical and managerial. Main policy lines have been food security, poverty reduction, soil and water conservation, and land management. At the regional level, the policies concerning exclosures for soil and water conservation and the idea of commercial forestry in exclosures are not well-matched and are not consistent. Community exclosures are initiated by the Bureau of Agriculture and commercial forestry is an initiative of REST. Also, the policies for exclosures and those for management and conservation of national forests, such as the Desa'a remnant forest on the Rift Valley escarpment, are not really coordinated, since protection of exclosures seems to cause increased pressure for woodfuel harvesting in the national forest.

27.2.4 Changes to landscapes and livelihoods

An evaluation of environmental changes using repeat landscape photographs taken in the dry seasons of 1975 and 2006 concluded that the overall situation has improved with respect to vegetation cover on non-arable land, as well as grass and shrubs between cultivated farm plots. Whereas the population of Ethiopia has increased from 35 to 87 million between 1975 and 2012 (FAOSTAT 2013), overall vegetation cover (Figure II 27.5) has improved in the study area. These changes are not climate-driven but instead are the result of human intervention (Nyssen et al. 2009).

The interventions leading to these changes incorporate an implicit landscape-level approach, but there is little conceptual background available or published. A few studies (e.g. Balana et al. 2010) tried to optimise exclosures and other land use at the landscape level, but there is so far little implementation of such land-use optimisation exercises. Socio-economic studies using large randomised questionnaires over all social layers of communities revealed that grazing lands and exclosures play a significant role in the rural livelihoods of northern Ethiopia (Balana et al. 2008). Exclosures support the survival of traditional uses by avoiding local extinction of tree and shrub species. Environmental benefits exist in terms of soil and water conservation, in particular gully erosion control and downstream protection from flooding, which has been quantified by Nyssen et al. (2008) and Balana et al. (2012).

The improved marketing of non-wood forest products from exclosures, such as honey or frankincense, has been promoted and supported by governmental and non-governmental initiatives. Other values, such as the soil and water conservation value, have been scientifically quantified (Descheemaeker et al. 2006a, 2006b, 2006c, 2009; Balana 2012) but remain unconsidered externalities. This should change since

the government and the electric company have a huge vested interest in decreased siltation of reservoirs used for hydropower production. Exclosures are a very cost-effective measure for erosion control and soil fertility restoration.

So far, most exclosures are closed for wood harvesting and as such have not faced the challenge to develop wood markets. Illegal harvesting from exclosures has a certain impact on the firewood and charcoal market, but this is difficult to quantify. About 2000, there were attempts from the regional government to link exclosure activity to commercial forestry development. Enrichment planting and even monocropping with commercial (mostly eucalyptus) trees in exclosures was initiated with food-for-work programmes. The long-term goal was to produce industrial roundwood for construction poles and a local chipwood factory and hence contribute to industrialisation. This project created, among other results, uncertainty among commoners concerning the ownership of the trees and the land tenure. Today these trees are being harvested for the first time, and the wood is transported to a chipwood factory in Maychew (see Figure 27.1). Trees were taken without payment to local communities, which only benefited from labour opportunities and from the opportunity to buy branches at a cheap price.

27.2.5 Monitoring and research

There is no formal monitoring of exclosures by the Ethiopian government. A monitoring programme combining remote-sensing approaches with ground inventory would be very relevant. Limited remote-sensing exercises have shown the feasibility and relevance of this approach. Participatory monitoring on the ground has not been implemented so far but is an interesting option for engaging and empowering locals in the restoration and sustainable use of their resources. Though there was not an official scientific follow-up of the exclosure programme, many scientific studies, largely involving the Forestry Department of Mekelle University and often in the framework of international academic cooperation programmes, have been produced. Some focused on the vegetation dynamics and the role of silvicultural intervention (Aerts et al. 2007, 2008a, 2008b; Aynekulu et al. 2009, Reubens et al. 2011). Others focused on the improved erosion control and water infiltration (Descheemaeker et al. 2006a, 2006b, 2006c, 2009) and still others on the socio-economic impact of exclosures on livelihoods and related governance issues (Balana et al. 2008, Lanckriet et al. 2014).

27.2.6 Lessons learned and recommendations

Although centrally imposed, the establishment and implementation of exclosures is rather bottom-up. Participation is enhanced by the implementation of remunerated soil and water conservation (SWC) and plantation works. Location, area, local laws related to restrictions and management, and instalment and payment of guards are most often decided by the local village (*kushet*) authorities, who follow guidelines set by the local Bureau of Agriculture. Such land management decisions are then included in local laws. Overall, villagers are convincingly participating in reforestation and other conservation activities (Kumasi and Asenso-Okyere 2011).

Pressure on the land remains high. Exclosures occupy only part of the communal land, and there is generally no competition with cropland because sites are marginal, but competition with grazing land remains. There is also illegal wood harvesting. This is the reason why there is interest in and pressure to identify new types of income from exclosures such as cut and carry, haymaking for stall feeding, grass for thatching roofs, beekeeping, restricted wood harvesting, or even payment for ecosystem services such as reduced sediment flow to dams or carbon sequestration (not operational so far). Another option would be a rotational system where new parts of the communal land sequentially go through this phase of ecosystem restoration, to be released later for regulated sustainable use. The potential (legal or illegal) harvest levels and the dimensions of harvestable wood increase as exclosures mature. If managed well, they can provide sustainable wood harvest in combination with extensive levels of grazing or cut and carry of grass.

Local communities invested long term in this large-scale restoration project. Restoration effects become visible, and communities' expectations are rising as they see some benefits returning to the community. Local authorities now face the challenge of moving from strictly closed areas to areas with certain use rights, remaining within the limits of sustainable use. In the current phase there is tension between stakeholder expectation and authorities' fear of a new tragedy of the commons. At this stage, developments are too recent to establish whether the Tigray highlands are undergoing a forest transition, meaning that changes in population density are no longer inversely coupled to changes in tree cover. The shift from deforestation to reforestation is still patchy in nature, but several elements inducing the forest transition are present in the study area: increasing population, increasing food production, forest scarcity, zoning of forestry land (exclosures), and expansion of forest (eucalyptus) plantations (Nys-

sen et al. in prep.). In any case, this future depends on the type of management rules and management plans that result from ongoing discussions between government and local communities. The challenge is to find the balance between sustainable use and protection. Experiments of self-organisation with bottom-up participatory management plans should be welcomed.

27.3 Trade-offs between blue and green water ecosystem services: the case of forest plantations in the Western Cape, South Africa

27.3.1 Introduction and relevance

South Africa is a dry country sparsely endowed with forests. It has a hydrological regime that is extremely variable among seasons and years, and the annual run-off coefficient varies between 0.1% and 11.4% for the major catchments, with a country-wide average of 8.6%. It is clear, then, that South Africa is a country where blue water resources are under pressure. As a consequence, water use has become strongly regulated, particularly with regard to industrial afforestation activities. Large parts of the Western Cape Province have a Mediterranean climate, where the rainfall seasonality provides additional challenges with regard to water supply for urban use and for irrigated agriculture. The climate and associated fire regimes also place limits on the size, extent, and growth rate of forests. The south-eastern section of the province enjoys more abundant rainfall in all seasons and this is where the largest concentration of natural forest patches and planted forests occur, in a mosaic pattern in the landscape.

The population in the Western Cape Province is approximately 5.3 million people (Statistics SA 2011) and is still growing. The steady increase in the population and in the economy is a concern with respect to available water in the area. Unemployment in South Africa is high compared to developed countries, with official estimates of about 25±1% for the past two years (Statistics SA 2011). Agriculture is a very important land use and employment provider in the Western Cape. The main agricultural products (in decreasing order of value earned) are fruit, winter grains, white meat, viticulture, and vegetables. The province contains 12.4% of South Africa's agricultural land and it produces 23% of the country's agricultural gross domestic product (GDP) (WCDA 2005), despite challenges posed by drought, rainfall seasonality, and irrigation water supply. In the four major river systems of the province, irrigated agriculture consumes approximately 87%, 42%, 68%, and 61% of the total water supply, respectively (DEA and DP n.d.).

In terms of water relationships of the Cape forest resources, there is scientific evidence that forests reduce stream flow in this semi-arid environment. The stream flow reduction resulting from the historical pine afforestation of about 80 000 ha of some of the wetter scrubland (known as fynbos) areas in the province was calculated to be 1.96% of the total run-off in the province's catchments (Scott et al. 1998). Calculations based on the work of Gush et al. (2002) estimate the stream flow reduction as 1.06% of the annual total before afforestation. This number would fall to a value of between 0.8 and 1.3% of the total run-off following deforestation of approximately 30 000 ha of plantation forest (based on work by Scott et al. 1998 and Gush et al. 2002) – i.e. if the Cape conversion process is partially reversed, thus allowing some 50 000 ha of plantations to remain. So in terms of water-related ecosystem services, plantation forests provide wood production as a major green water service, with stream water reduction as a relevant but regionally limited blue water disservice.

27.3.2 The extent and condition of forest resources and their contribution to livelihoods

Only a small portion of South Africa (approximately 0.5 million ha, or 0.4%) is covered by closed canopy forests, in addition to the 29.3 million ha of woodland in the northern and eastern parts (24% of the country). The plantation forest industry covers 1.26 million ha and is responsible for the bulk of the country's commercial roundwood production (19 million m^3/year), mainly from stands of exotic *Pinus* and *Eucalyptus* species (FSA 2010). There are three large categories of tree and forest cover in the Western Cape Province: indigenous forests, exotic tree plantations, and invasive thickets of introduced trees. Their main features and their contribution to livelihoods follow.

The indigenous Western Cape Afro-temperate forest type is confined to very small pockets along river valleys and on south-east facing slopes with relatively high precipitation, surrounded by scrubland (fynbos) vegetation. The Southern Cape Afro-temperate forest (south-eastern part of the province, extending into the adjacent Eastern Cape Province) is made up of a mosaic of fairly large blocks of forests, roughly situated in a strip between the ocean and the mountain ranges. The extent of the Western and

Southern Cape Afro-temperate forests is 4700 ha and 68 600 ha, respectively (DAFF 2011). In addition, the Western Cape has about 2500 ha of coastal milkwood forests (DAFF 2011). Natural forests thus occupy a mere 0.4% of the land area in the Western Cape Province. All indigenous forests in the province have very low growth rates (less than 1 m^3/ha/year) and are managed primarily for conservation and biodiversity purposes. The forests are also extensively used for recreation and the provision of non-timber forest products – such as ferns, medicinal bulbs, tubers, bark, etc. – to local communities (Vermeulen 2009).

Industrial plantation forests in South Africa have decreased from 1.4 million ha to 1.26 million ha during the past decade (DAFF 2011). Plantations (mostly pines) in the Western Cape covered more than 79 000 ha during the 1990s, diminishing to fewer than 50 000 ha in 2013 due to government policies (the Cape Conversion Process, see section 27.3.3). The current industrial plantation cover in the province constitutes less than 0.4% of the land area, and the mean annual increment of individual plantations averages from 10 to 15 m^3/ha/year, depending on the sub-region. The industrial forest sector is responsible for more than 95% of the timber volume purchased by the wood processing industry in the country and is therefore an irreplaceable component in the local wood value chain. One of the major benefits of the industry is job creation in rural areas. Forestry in the Western Cape Province supplies approximately 2600 direct jobs and 16 300 indirect jobs and is tied to the livelihoods of 56 000 people. Small-scale tree planting of mostly exotic species on farms (for pole production, windbreaks, fodder, firewood, general utility timber, shade provision, and honey bee forage) is common in all but the driest parts of the province. Products from these forests are seldom sold commercially but rather used locally. For example, woodlots with specific eucalyptus species are essential providers of honey bee forage in the Western Cape Province (de Lange et al. 2013). The small fragments occupied by woodlots are not included in the industrial forestry area estimates previously cited. Trees also play an important role in recreational areas of cities and peri-urban areas.

Australian *Acacia* species originally introduced to stabilise coastal sands have become invasive in several parts of the province. In particular, large concentrations of *Acacia* thickets can be found on the West Coast plain and the Agulhas plains, with dense thickets spread over an area of more than 26 500 ha (van Laar and Theron 2004a, 2004b). Several zones of less dense infestation (< 10% crown cover) also occur. These invasive tree thickets have been and are currently being used extensively for fuelwood in the urban and peri-urban areas around Cape Town (du Toit et al. 2010). In addition, biological control of these plants by introduced insects is well-established and teams of people have been employed in the government's Working for Water (WFW) programme to systematically eradicate these invasive plants from riparian zones and other areas of infestation. A combination of very effective biological control, intensive utilisation, and efforts of the WFW programme mean that this wood resource will be strongly reduced over the next two decades.

In summary, the Western Cape's natural forests are fairly well protected, but commercially used timber resources are shrinking rapidly – the current landscape setting of forests in the Western Cape is illustrated in the aerial photo in Figure II 27.6. The most productive forests (pine plantations) have been greatly diminished and this will lead to large structural timber shortages in the area from 2018 onward. It will also strongly affect the economy of scale and the processing sector that relies on these forests. A fuelwood shortage is also forecast if concerted efforts are not made to establish woodlots for fuelwood production.

27.3.3 Forest policies and governance

During the past two decades, several changes in forest land-tenure regimes have taken place as a result of new government policies and legislation. However, evolution has also come about through voluntary management decisions at a strategic level in commercial timber companies. Key examples of both types are briefly discussed below.

The Afforestation License System (National Water Act, Act No. 36 of 1998) replaced the afforestation permit system that was in place since 1972. No afforestation may be done without a license, and water use and ecological impact studies are needed to obtain a license. In addition, licensed forest growers must pay for stream flow reduction caused by commercial afforestation. This process began in 1999 and the current payment cost is relatively low, on average ZAR 0.42/m^3 (EUR 0.04/m^3), compensating for the water loss caused by converting indigenous vegetation to plantation forestland. Although industrial forestry is the only land use that has been classified officially as a stream flow reduction activity, the forest industry has absorbed this cost and has largely maintained business as usual (in areas where it was not limited by other policies).

The Restitution of Land Rights Act (Act No. 22 of 1994) entitles a person or community dispossessed of property after June 19, 1913, as a result of past racially discriminatory laws or practices, either to restitution of that property or to equitable redress. A complication is that current owners of forest estates often own land that has been legally and legitimately

Figure II 27.6 Aerial photograph showing land-use patterns near the town of Grabouw, Western Cape Province (34°9'5 S, 19°0'54 E). Note the productive plantation forests planted outside of the riparian zone (bottom left), irrigated fruit orchards (bottom right), mountain land with indigenous fynbos vegetation that had been recently burned (top right), and formerly productive plantation forest currently clear-felled and not replanted because of the Cape Conversion Process (top left). ©Anton Kunneke

bought (willing buyer and seller) between 1913 and the present day on which such land claims are now being made. To date, the land redistribution process has progressed slowly because many landowners are not willing to sell. This has moved the government to consider other possible avenues such as expropriation of the land, although this has not been implemented.

The Cape Conversion Process, which calls for the partial cessation of commercial forestry activities in the Western Cape Province on state-owned land, was approved by the cabinet of the South African government in 2001; it applies to some 45 000 ha of plantations in the province. After implementation, reforestation following clear-cutting was thus prohibited in these commercial plantations, which led to large-scale deforestation in the Western Cape. The main driver in this conversion process was the relatively low productivity of these forests (approximately 10 m^3/ha/year), compared to other plantations in the high rainfall zones of the country and the notion that these forests may not be commercially viable in the future. A report (VECON 2006) has subsequently shown that the original assumptions were inaccurate and that many of these plantations are in fact economically viable. In 2006, on the strength of this report, the cabinet made a decision to partially reverse the Cape Conversion Process decision and to allow renewed planting of approximately 22 500 ha of the original 45 000 ha earmarked for conversion. The bulk of this land is largely unsuitable for other intensive land-use activities such as fruit or wine production. However, no reforestation has been done in these areas to date because no decision has been made on who should be allowed to do the reforestation.

During the past two decades, many forestry companies have embarked on a voluntary process to obtain third-party forest certification and to demarcate wetlands on their landholdings by permanently removing all plantation trees that had been established in such areas. These wetlands are thus converted back to indigenous vegetation to ensure minimum impact on the county's water resources – it has been established that trees in riparian zones and wetlands use disproportionately large amounts of water.

The Conservation of Agricultural Resources Act (Act No. 43 of 1983) targeted invasive plants. It allowed for the categorisation of exotic plants in terms of their invasiveness, among its other regulations. This paved the way for large-scale clearing of thickets of invasive plants through the Working for Water programme since 1995. In South Africa as a whole, more than a million ha of invasive plants have been cleared to date, providing jobs to 20 000 people (WFW 2012). Approximately one-tenth of this effort was focused on the Western Cape. This has produced more stream flow from rivers and supplied harvested biomass during the clearing operation. Strict follow-up measures are in place to prevent invasive plants from re-colonising the cleared areas.

27.3.4 Antagonistic consequences from changes in policy and governance

Processes that led to business uncertainty or undue delays in decision-making have caused the commercial forest industry to stagnate or even shrink slightly during the past two decades, with negative consequences on the livelihoods of people in the forestry and forest products value chain.

The first example is the Cape Conversion Process. More than 20 000 ha of plantation land that had been clear-felled since 2001 is currently still unplanted, despite the fact that the cabinet approved partial reversal of the process and that the international investment company that bought the major shares in the local lease holding for this land offered investment money and a partnership with the government for the reforestation. This process is currently leading to unemployment in the Western Cape rural areas (De Beer 2012) and it has created a gap in the normal forest age class distribution of at least 12 years – up to 20 years in some areas. This means that the next leaseholder of the land will effectively have to start a "green fields" afforestation programme from scratch if forestry is allowed to continue to be practised on this land.

The second example is the afforestation license system (on a national level). It is recognised that afforestation cannot be allowed to increase in catchments that are already threatened by severe water shortages. However, in catchments where significant volumes of unused water is available, afforestation licenses could be granted, as assessments showed that more than 100 000 ha of land is suitable for afforestation in the Eastern Cape Province alone. However, during the past decade, there has been no significant growth in new afforestation in South Africa. In fact, the industry has shrunk in size due to a lack of new afforestation coupled to the conversion of some areas out of timber for environmental reasons (DAFF 2011). Poorly prepared applications as well as some administrative bottlenecks delayed the processing of afforestation licenses.

The third example is the Restitution of Land Rights Act, which aims to redress inequalities from past regimes but which has potentially disastrous long-term consequences for forestry, agriculture, and the country at large if not managed well. There are many southern African examples showing that few beneficiaries of land claims on agricultural land have to date managed to continue with economically sustainable farming or forestry practices (Dardagan 2012). Many forced land transfers have led to subsistence agriculture, which is much less productive than the commercial farming or forestry that it replaced. As such, the Land Restitution Act is perceived by the commercial forest processing industry as a threat because it could strongly compromise the long-term security of raw material supply in the forestry value chain. The privately owned forest industry has therefore embarked on a voluntary land redistribution scheme, which is structured as follows: land ownership is voluntarily transferred to local communities but leased back to the industrial forestry grower-processor for two crop rotations, along with strong technological support and extension services made available to new landowners. In return, 1) industrial forestry is allowed to continue on the land for at least two rotations, and 2) the industrial partner has the first option to buy both the first and second rotation of timber produced from plantations on such estates (at market-related prices). The owner can sell the timber on the open market if the industrial company that transferred the land does not exercise its right to buy the timber. Pilot-scale land transfers under this scheme have already taken place (SA Forestry 2010) and it appears to be a more workable solution than forced land redistribution. This land-transfer process, coupled to the out-grower schemes that are already in place (i.e. technical assistance and support for previously disadvantaged tree growers – see Cairns 2000) is starting to make an impact on redressing inequalities from past discriminatory laws.

27.3.5 Positive consequences from policy and strategic management decisions

The consequences described in this section stem from a mixture of government policies and strategic decisions by industrial forestry growers-processors including voluntary forest certification, the government's support to the WFW programme, and the creation of ecological corridors in the landscape.

The strategic (voluntary) decision by many private forest growers to certify plantation forests as being managed under sustainability criteria has led to a more conciliatory management style that is more in harmony with nature, while at the same time opening up new potential markets. Examples of positive management outcomes are strong restrictions on the use of intensive fires during slash burning, voluntary conversion of land out of timber where trees were planted in places that encroached on wetlands or riparian zones, improvements in the working conditions and safety of employees, and strong restrictions on the type and use of chemicals in plantation forests.

The WFW programme, where unemployed people are trained to assist with clearing of invasive thickets, has been a successful policy. It has created many temporary jobs and provided training for people while also leading to improved stream flow in cleared areas. The clearing of invasive thickets has a much greater effect on stream flow than limiting industrial plantations. This is because plantations are not allowed (by law) to be planted within 20 m of any perennial stream, whereas invasive thickets often occur in riparian zones, wetlands, and the upper reaches of non-perennial streams. The Conservation of Agricultural Resources Act has had mostly positive consequences, but there have been some notable exceptions. The legislation categorises introduced plants as category 1 (declared weeds), category 2 (invasive plants with economic potential that can be grown in demarcated areas), and category 3 plants (invader plants that can be left to grow where they exist). The spirit of the legislation was to place non-invasive exotics in category 3, therefore the labelling of these plants as invaders rather than introduced plants or exotics is unfortunate. Secondly, category 2 plants cover a very wide spectrum, from aggressively invasive (but with economic potential) to effectively non-invasive (but still exotic) with economic potential. Virtually all introduced commercial plantation species have been lumped together in this category. A reclassification of several species is needed and more specifically, a classification of the hybrids of these species (which appear to be mostly non-invasive) needs to be done.

The creation of ecological corridors in the landscape ensures that indigenous plants and wildlife continue to prosper. Ecological corridors are large networks of natural vegetation that are linked with each other like a web in order to maintain biodiversity and ecological processes. They are usually constructed around water courses, where legislation dictates that no commercial afforestation may take place closer than 20 m from rivers courses. However, in many cases these riparian zones are widened over and above what the law stipulates (especially around wetlands), and these areas are also linked to additional patches of natural vegetation for biodiversity conservation, gene flow, and maintenance of ecosystem services. These networks are also important for livelihoods and spiritual well-being and water quality (Samways et al. 2010). Approximately 30% of South African plantation forestry estates consist of natural vegetation in the form of ecological networks.

27.3.6 Synthesis and recommendations

South Africa is a water-scarce country that has limited areas of natural forests with generally very low growth rates. These forests are well-protected, so that the country is very reliant on industrial plantation forests (and to a lesser degree on agroforestry and woodlots) to provide sufficient fibre and timber for the country's commercial needs. If the industrial forestry sector is disadvantaged, it thus has immediate and serious implications for the economy (in particular the wood processing sector), employment, and foreign revenue earnings. During the first decade of the newly elected democratic government, 1994–2004, industrial forestry interests have not been well-nurtured by the (then) Department of Water Affairs and Forestry, causing the industry to stagnate or shrink in certain regions. From the examples given, it appears that many of these negative consequences are reversible if the government allows private industry to work in partnership with them. The movement of the entire forestry portfolio to the newly formed Department of Agriculture, Forestry, and Fisheries (DAFF) has brought some hope of a better dispensation, but much still remains to be done to ensure growth and prosperity in the forestry sector, particularly in industrial forestry. The following issues should be addressed through strong partnership between government and private industrial forestry companies:

- Land restitution should proceed in a way that ensures a continued supply of timber from plantation land. Alienation of the industrial forestry sector in this process by relying on forced land redistribution could have severe socio-economic drawbacks.
- Government agencies would need to become more sensitised to the fact that industrial forestry provides sustainable livelihoods and economic stimulation in rural areas and does this while having a relatively small impact on stream flow reduction. For example, removing all industrial forests would hardly contribute to the run-off in the Western Cape's streams but would have major consequences for employment, timber processing, and wood supply in the province. It would also impact negatively on carbon sequestration and soil conservation. The water gains from clearing of invasive thickets and the regulation of wasteful water use in some irrigation and urban usage areas is potentially much larger than water gains from phasing out plantation forestry in the Western Cape Province.
- Further improvements in speed and efficiency of the afforestation license procedure are essential to create a favourable investment climate for forestry. It is striking that several licenses allowing large-scale surface coal mining and exploratory fracking of sedimentary layers for shale gas have been issued in South Africa during the past five years (both unsustainable enterprises with heavy carbon footprints), while afforestation licenses (a green investment) have been stagnating partly due to administrative bottlenecks.
- A more relaxed view on tree planting on farms is necessary. Allowing the establishment of small-scale woodlots for fuelwood, bioenergy, poles, honey bee forage, and all-purpose timber, by using land with low potential for agriculture, holds a lot of promise for relieving the looming shortage of timber, fibre, insect pollinator, and energy. To do this, the licensing system for afforesting small areas (e.g. less than 10 ha) has already been made simpler, and this initiative has been very positively received. Such afforestation could be done using fast-growing species that use water efficiently and that do not pose an invasive threat.
- Reforestation of economically viable industrial plantation land is strongly recommended to avoid large-scale timber shortages in the future, unless there are other compelling reasons not to do so.

27.4 Drinking water provision from the forest: a case from northern Italy

27.4.1 The institutional setting

Water quality and quantity have been a core issue in European environmental policies of the past few decades. Although policy-makers have considered tap-water use as a priority with regard to other uses, it has not been clearly addressed in the legal system implemented among the European countries. Nevertheless, efforts coordinated by the European Commission have posed a kind of hierarchy on water uses, in which water for human consumption has been considered essential, together with the environment, in the water catchment (Aubin and Varone 2004). This has been formalised in the European Water Framework (WFD) 2000/60/EC, as the final result of a long conceptual process related to water use. Since then, several European countries have started to adapt their legislative systems based on the main principles of the directive. The planning of water service costs and the principle of full recovery of the cost of water service have been two major economic changes pushing policy-makers to consider the cost of environmental conservation in the catchment areas. Despite the traditional top-down approach, where a set of legal constraints were implemented, the aim of the WFD was the active promotion of market-based mechanisms to enhance the provision of high water quality though particular land management practices. Basically, the need to move from command-and-control approaches to market-based mechanisms has been the formal recognition of the concept of equality along the tap-water supply chain. This has brought the landowner into the picture as the first, though weakest, actor in the chain.

In Italy, the concept of environmental cost along the tap-water supply chain was introduced by Galli's Act (Law 36/94). Instead of implementing new legal constraints based on a command-and-control approach, policy-makers anticipated some of the WFD principles, introducing the concept of environmental cost compensation, as a positive economic tool aimed to stimulate the improvement of the water cycle between the spring and the river mouth. Galli's Act suggests the adoption of an extra payment on the water bill (from 3% to 8% of the water bill) to compensate directly for maintenance of the upstream area (mainly forest land). But due to the high fragmentation of private land and the historical incapability to coordinate or associate landowners, the law highlighted the potential role of public authorities as the only players able to manage a sufficient land surface to stimulate forest environmental services like water filtering, hydraulic regulation, or soil conserva-

Table II 27.2 Soil erosion and forest management practices.

	year 1	year 2	year 3	year 4	Average
Silvicultural practice	Erosion (kg/ha)	Erosion (kg/ha)	Erosion (kg/ha)	Erosion (kg/ha)	Erosion (kg/ha)
Coppice with clear-cut	92.2	80.5	1.1	5.6	44.8
Coppice conversion to even-aged forest	62.7	24.1	0.8	4.4	23.0
Natural evolution	5.2	2.9	1.0	1.5	2.6

Source: Bagnaresi et al. 1999.

tion. In fact, the application of some particular forest management practices at the scale of a cadastral land unit (generally a few thousand square meters) would not allow this approach to achieve tangible results. These can only be achieved if the targeted forest management is extended over a whole water catchment area. Despite the law's intentions, market-based mechanisms have only been introduced formally in two Italian regions – Piedmont and Veneto – where an extra charge on tap-water bills has been implemented (Pettenella et al. 2012). Both regions have used the fund, approximately 3% of the extra charge on water bills, to compensate mountain areas in terms of projects or infrastructure aimed to improve local forest management practices, but so far the relatively small investments upstream have been insufficient to result in a significant change in water quality or quantity.

27.4.2 Romagna Acque, a success story on payment for drinking water services

Apart from these large-scale regional schemes, Galli's Act has not had a wide implementation on the Italian peninsula, but it inspired Romagna Acque S.p.A., a multi-utility company in the central Apennines. It became a success story – a historical case in which a specific forest service was stimulated through a set of annual payments to cover the cost of specific forest management practices undertaken by landowners. Begun as a consortium of municipalities to reduce the cost of the supply of drinking water in 1966, it was able to cover the distribution of water to the entire Romagna area in 1989; only a few years later, in 1994, Romagna Acque S.p.A. was founded, becoming owner of the water resources in 2004. The principal mission of the company has been to provide high-quality water in sufficient quantity to cover the demand of the Romagna in a context of ecological sustainability and financial optimisation. While this last aspect has been achieved through planning of a water tariff to meet the WFD requirements of the full-cost recovery of the water service, the ecological aspects were thoroughly studied before deciding on the strategy to be implemented in the field.

The most important company water source is a dam basin located in the central Apennines (Ridracoli area – municipality of Bagno di Romagna), which covers 50% of the entire Romagna tap-water demand (108 million m^3/year). Especially during the summer season, the basin is fundamental to the supply of high-quality water to the coast, densely populated by tourists. Since its construction, the biggest problems have been dam sedimentation and maintenance of high-quality water. In 1993, the company invested in research to understand the link between different forest management practices and soil erosion as well as water quality stabilisation. In terms of water-related forest ecosystem services, four years of research have demonstrated the clear impact of forest management systems such as coppice with clear-cut and forest conversion from coppice to high forest on soil erosion, while minimising silvicultural treatments or natural stand evolution markedly reduced the degree of soil erosion (see Table II 27.2).

In Table II 27.2 the large variability between years can be attributed to inter-annual variability in rainfall patterns but management effects are consistent over the years, except in a year with few torrential rainfall (year 3), where erosion is near zero for all management types. Moreover, conversion to high forest and natural stand evolution have proved to have a positive influence on nitrogen reduction and pH stability. The translation of these effects into a price for water was done by calculating the difference between the annual traded water and the cumulated changes of water level in the dam. Based on this evidence, an extra payment, 1% to 3% of the water-bill has been used to compensate landowners who convert their coppice forest in even-aged stands within the catchment areas, helping them to cover the cost of changes

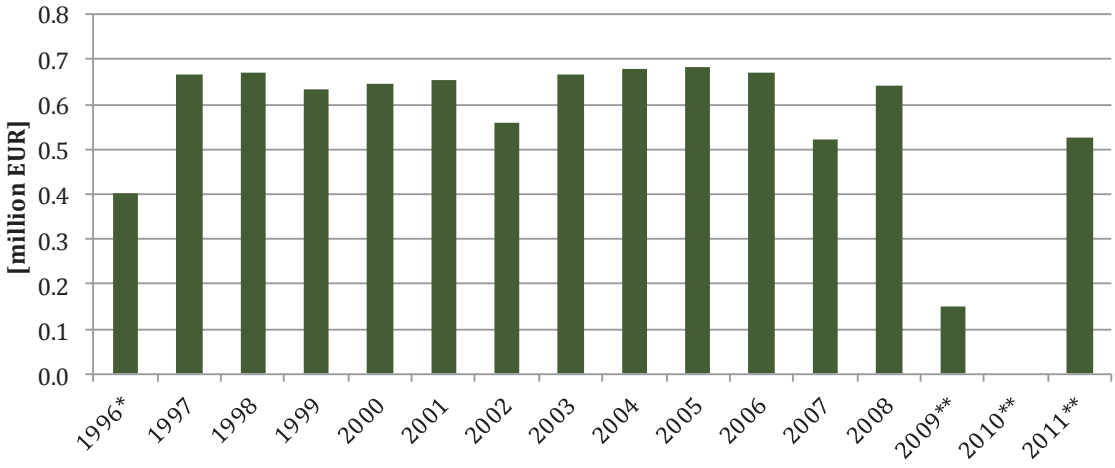

Figure II 27.7 Environmental cost to limit soil erosion and enhance water quality: A single-starred year, 1% of extra payment; double-starred years, years after water-tariff reform. Source: Romagna Acque S.p.A

in management practices and land opportunity cost (relatively low due to the scarce access). In general, more than EUR 0.6 million (see Figure 27.7) have been delivered in the water catchment area (37 km^2), where all but a few landowners decided voluntarily to be part of the payment scheme. However, in the year 2009 a new water tariff mechanism stopped the company's environmental investment due to an erroneous interpretation of the accounting law – it was re-established in 2011. So far, the average payment to forest owners has varied from EUR 108/ha in the first year, to about EUR 170/ha in 2008.

The positive impact of the payment scheme was a general decrease of the initial soil erosion in the catchment of 20% (originally 42 000 m^3/year versus 33 600 m^3/year today) and a consistent reduction in nitrogen as well as pH stabilisation. In terms of performance, both Romagna Acque S.p.A. and the landowners have increased their benefits: on the one hand, the company has reduced its water purification costs and increased the life expectancy of the dam (due to the lower soil erosion); while on the other, landowners have maintained or even increased their annual forest revenue. Though other options were considered, such as mud and sand removal with hydro dredging, the limited access to the dam basin and the technical difficulties of dredging in deep water led the company to opt for forest investment. Due to the complex bureaucratic process, the company decided to acquire the land wherever possible. Moreover, part of the water tariff has been invested in programmes to inform water users on the tap-water use as well on the effects of the positive management practices adopted in the catchment area.

27.4.3 Lessons learned

Romagna Acque is a positive example of the environmental services trade. The case study has highlighted both the powerful effect of the market-based mechanism and the fragility of the mechanism due to the unclear or fast-changing legal systems in force. The results, though they may seem relatively small, represent an innovation in the forest sector, traditionally managed for wood production. In this case, the object of the contract was simply the adoption of a new management practice in a water catchment area, ensured financially by a monopsony market – a market similar to a monopoly, where a large buyer instead of a large seller controls the market.

27.5 Conclusions

In this chapter we focused on the water-related ecosystem services of forests. In general, these ecosystem services are considered very important, but misunderstandings persist about the role of forests in their delivery. With a selection of revealing cases, we have shown how initiatives are taken to improve water-related ecosystems services through a transition in the management of forests, such as combatting water erosion by installing exclosures free of grazing, decreasing the forest cover to increase the availability of blue water for irrigation agriculture, or improving tap water quality by continuous-cover silviculture.

The case studies show that such transitions can follow very different pathways, determined by the natural, socio-economic, and institutional context. In Ethiopia, a rather top-down approach had the advantage of being widespread and having measurable impact at a regional scale but the next challenge is

to motivate the commoners for the longer term. In South Africa, a complex mixture of top-down and bottom-up storylines is resulting in rather confusing policies and lock-ins between actors. In Italy, a voluntary market-driven process has led to an interesting win-win situation.

But behind these differences in process, the case studies also show some patterns in common – for example, that success or failure is very dependent on scale (how much intervention and where in the catchment). They also clearly show that provoked changes always have effects on other ecosystem services (see Muys et al. 2011).

Also, changes of paradigm can be recognised in the way water-related ecosystems services are considered, with a shift from supply-side policies to demand-side policies and to supply-demand links, and from purely technical solutions (for example, building stonebunds or dredging of dams) to green infrastructure solutions.

The role of science has been quite distinct in the cases. In the Ethiopian case, science did not play a major role in the top-down restoration decisions taken after the civil war but researchers entered in a later stage, first as independent observers, now participating in efforts to improve the schemes (e.g. Muys et al. 2006). In the South African case, science has been one actor in a complex set of drivers leading to the phasing out of the forestry sector in the Western Cape and it has been a decisive driver in the creation of a water tax on forest plantations and the eradication of exotic bush vegetation. One could say that these measures have been based on a correct interpretation of hydrological knowledge, but failed to add other ecosystem services such as wood provisioning and long-term employment into the balance. In the Italian case, scientific understanding has been the main driver of the installed payment scheme, but even in this case, trade-offs with other ecosystem services, for example the long-term effects of the measures on catchment biodiversity have yet to be considered.

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PART III

Prerequisite conditions for SFM: Findings from the case study analyses

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Introduction to Part III and summary of the findings from the case studies

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1.1 Introduction to Part III

Part III provides a synthesis of the case studies included in this volume. Following this introductory section, section 1.2 presents a concise summary of the results and findings from the case study analyses, including reflections on important implications of these findings for future efforts seeking to further sustainable forest management (SFM). The summary section ends with final reflections on the way forward, suggesting measures that might be taken to improve the effectiveness of SFM. More detailed information on the prerequisite conditions across cases and the interactions among them can then be found in the chapters 2, 3, and 4.

Chapter 2 presents a more comprehensive synthesis of the cases, focusing first on the cases from the perspective of the primary outcomes sought by SFM: the contribution of forests (including plantations and trees outside forests) to livelihoods and to forest extent and condition. The authors of each case study were requested to provide an informed assessment of their cases from the perspective of these outcomes – specifically perceived trends – and a synthesis of this information is presented.

Chapter 3 focuses on an analysis across the cases for each prerequisite condition included in the analytical framework. These analyses provide invaluable insights into measures being taken in different contexts around the world to address processes and issues inherent to each of the prerequisite conditions. In addition to understanding the diversity of measures and approaches being pursued, the across-cases analyses shed light on the prerequisite conditions that have been the most challenging to address and that, as a consequence, pose frequent threats to SFM.

Chapter 4 analyses interactions among prerequisite conditions within the case studies, making it clear that measures taken related to each prerequisite condition do not act in isolation. Rather, outcomes depend on complex interactions among them. Attention is also focused on the influences of regional and global processes on forest-related policies and behaviour in the case studies. This part of the analysis illustrates that forces and inputs influencing conditions for SFM originate from global to local scales.

Part III ends with a short section on methodological and analytical considerations, especially in relation to the availability and quality of information (chapter 5). Throughout this part the case study chapters to which we refer are indicated by the corresponding number of the case study chapter in Part II in square brackets.

1.2 Summary of findings

By definition, SFM seeks to balance the provision of society's growing demands for forest products and services while conserving forests, biodiversity, and other ecosystem services that forests and trees provide. In this volume, diverse case studies examine the implementation of SFM, utilising a common framework built on what have been identified as important prerequisite conditions for SFM, with corresponding guiding questions (see Part I, chapter 3, for the analytical framework). The case studies were not selected in an arbitrary fashion: preference was given to cases where considerable efforts have been made to achieve SFM over an extended period of time. The cases range from forest-based situations to mosaics of agriculture and forests, agroforestry, and secondary forests. The achievement of "success" was not a criterion for case study selection. Once the authors applied the framework, assessing measures taken to address issues intrinsic to each of the different conditions, they were asked to provide an informed assessment of perceived trends in forests' contributions to livelihoods (including enhanced income through commercial transactions) and to forest condition. A summary of the major findings of Part III is provided, ending with a brief discussion of challenges and limitations inherent to this type of exercise.

1.2.1 Prerequisite conditions across the case studies

Chapters 2 and 3 synthesise the efforts made across the case studies related to each prerequisite condition for SFM included in the analytical framework. This synthesis contributes to an understanding of conditions where significant progress has been made and others where meaningful progress is ongoing or has eluded efforts to date. A brief summary of the principal findings follows:

- More than half of the cases report changes in land tenure and/or use rights, generally favouring local actors, including in some cases the recognition of customary tenure and efforts to resolve conflicts associated with overlapping claims.
- Virtually all case studies indicate that forests and trees continue to make important contributions to local livelihoods. However, more than half report that the extent and condition of forest resources are either in clear decline due to deforestation and forest degradation or at risk, implying that these contributions may be jeopardised over time.
- Approximately half of the case studies report efforts to improve public administration related to SFM, while a number of cases refer to the counterproductive imposition of complex bureaucratic regulations, problems of transparency, and other unfavourable administrative practices that constrain local involvement in SFM.
- In more than half of the case studies, progress is reported in promoting stakeholder cooperation and participation. In others, however, local actors have not been empowered to take part in crucial decisions regarding forest management and use. In some cases, unequal power arrangements subject local producers to corruption and lack of transparency.
- The enforcement of laws and regulations continues to be a major challenge in nearly half of the case studies (e.g. control of illegal logging).
- The reconciliation of different land uses is one of the principal challenges facing SFM. In some cases, local actors seek to convert forests to other, more economically attractive land uses. In others, governments have invited foreign investment in agricultural and extractive ventures, directly impacting forest areas where efforts are underway to further SFM. The lack of reconciliation of different land uses reflects, at least in part, the absence of long-term societal commitment to SFM.
- Increasing the economic benefits derived from forests and forest resources is crucial to consolidating SFM. In more than half of the cases studies, however, the improvement in commercial opportunities for forest products and services continues to be weak, and very few examples are provided on efforts to integrate primary producers into more lucrative value chains. In many cases more attention has been placed on the services forests provide (e.g. water provision, ecotourism, and carbon sequestration), but to date this has generally not resulted in tangible economic benefits for local actors.
- Capacity-building and technical-assistance activities have been carried out in most cases, but these efforts vary widely. Few cases indicate success in consolidating an approach to address rapidly evolving capacity-building needs. As a result, capacity-building efforts tend to be fragmented, with important gaps. Continuity has also been a challenge, since capacity-building and technical assistance have often been dependent on external sources of funding. However, cooperation among stakeholders appears to have reduced this dependency on outside sources of funding.
- Where available, sources of capital for investment in forestry operations and rural enterprise development tend to be from informal channels, and in a number of cases, lack of access to capital is seen as a major impediment to progress. The case studies point out that several forestry-sector characteristics diminish its attractiveness as a candidate for formal sources of capital.
- Problems of security and conflict appear to have a strong negative influence on efforts to move towards SFM. In case studies where such problems are reported, trends for the contribution of forest and forest resources to livelihoods are perceived as negative or at risk.
- Although a few of the cases imply landscape management over very broad areas, as an explicit approach, landscape or ecosystem management has not been pursued in most case studies. The shift in focus, however, from traditional products (e.g. timber) to ecosystem services (e.g. biodiversity, water, and carbon sequestration) and ecotourism is gradually resulting in more attention being placed on landscape and territorial processes.
- In some cases, the production of tree products is being shifted to areas outside of forests (tree planting on agricultural land and agroforestry) to increase production efficiency and mitigate environmental impacts within forests. This has also been necessary where restrictions have been placed on the harvesting and commercialisation of timber and wood for charcoal production from forests.
- The effort devoted to research across the case studies, in general, does not correspond to the broad knowledge and information demanded by SFM.
- In many of the case studies, monitoring to track the implementation and emerging outcomes of SFM, while recognised as important, is not pursued in a systematic fashion or the information

gathered is not effectively used. In some cases, monitoring programmes are incipient or in process of development; in others, forest cover is monitored but socio-economic indicators are monitored to a lesser degree. In cases where forest certification has been pursued, certification standards are monitored in a periodic fashion. Finally, the case studies do not report efforts to implement participatory monitoring approaches.

The preceding overview provides a sense of the overall progress made across the case studies with regards to the conditions included in the analytical framework and challenges that persist in addressing issues related to each condition. As can be seen, in general terms, the case studies indicate more progress in some conditions than others. Conditions like "enforcement of laws and regulations," "reconciliation of different land uses," "commercial opportunities, linkages to markets," "security and conflict," and the creation of a "public administration" that facilitates participation in SFM are still fraught with major challenges.

1.2.2 Interactions among prerequisite conditions

Though this overview across the case studies of each condition is informative, the application of the analytical framework within individual cases makes clear that these conditions do not operate in isolation; rather, they interact among themselves in complex ways. Implicit in the analytical framework is the hypothesis that if adequate efforts are made to address crucial issues related to each of the conditions, tangible progress towards SFM would be expected. In a few exceptional case studies, authors did report significant institutional efforts related to nearly all of the conditions in the analytical framework. At the other extreme, however, one finds case studies in which major deficiencies and/or problems were identified for many of the conditions, and in these cases, less favourable outcomes were to be expected.

This section focuses attention on interactions that appear to be influencing outcomes associated with livelihoods benefits and forest conditions. Both synergistic interactions that seem to favour positive outcomes and negative interactions constraining progress or undermining it altogether are of particular interest. A brief summary of the principal findings related to interactions among conditions within the case studies follows:

- Alignment among different sectoral policies and policy implementation favours positive outcomes, as do policies that recognise and build on strong communal institutions based on long-term cultural and economic links with forest resources. Conflicting policies result in negative interactions. For example, policies that promote large-scale investment in agriculture and mining are incompatible with the goals of SFM and often fail to take into account eventual impacts on local livelihood strategies.
- While formal recognition of local rights to land and forests has taken place in most case studies, this has not been implemented in a systematic fashion. In cases where formal rights have not been recognised, the unclear and/or insecure rights to forest and trees still undermine the effectiveness of policies put in place to promote SFM. Lack of empowerment and/or exclusion from deliberations on forest management and decision-making further curtail participation in SFM.
- Policies to promote small-scale and community-based forest management are often rendered ineffective when arbitrary restrictions are placed on timber harvesting and commercialisation. Onerous bureaucratic processes for approval of management plans and harvesting permits also discourage participation in SFM. High transaction costs and inconsistencies in the way forest regulations are applied negatively impact the effectiveness of policies meant to promote SFM.
- Even in case studies in which considerable efforts have been made to establish favourable policies for SFM and encourage community involvement, corruption and illegality greatly diminish progress towards SFM. Weak and ineffective institutions often undermine policies seeking to promote SFM.
- In various case studies, negative impacts resulting from the lack of alignment among policies and between policies and their implementation are exacerbated by deficient technical and managerial capacities and lack of linkages between producers and attractive market opportunities.

As previously noted, in some case studies comprehensive efforts have been made to implement measures related to a wide range of conditions in the analytical framework, among others. These invaluable examples – Acre, Brazil [1]; Quintana Roo, Mexico [7]; India [13]; Canada [9]; Indonesia [14,15] – mostly report positive outcomes related to both contributions to livelihoods and forest condition. However, in the case of Quintana Roo, the positive outcomes result largely from past sectoral alignment and synergies rather than current policies. Other examples of synergistic interactions among conditions that contribute to positive trends in community forestry (CF) can be found in chapter 8 of Part II (summarised in 4.3.2. of Part III). These

conditions include: policy reform and alignment to create an enabling environment favourable to SFM; empowerment of local actors and respect for their cultural identity and tradition; capacity-building, including attention to capacities related to rural enterprise development; competent forest management; diversification of forest uses through technological innovation; and access to financial resources.

What becomes apparent in this analysis is that meaningful progress towards SFM requires a holistic approach that focuses adequate attention on all the conditions included in the analytical framework and that seeks to encourage synergistic interactions among them. Since conditions included in the analytical framework encompass aspects related to policies, institutions and governance, livelihoods, capacities, cultural and socio-economic aspects, and biophysical conditions, an interdisciplinary approach is necessary, with careful attention to the interactions among conditions for SFM and how these interactions favour or limit desired outcomes.

In some cases, interactions among conditions have resulted in mixed outcomes. Policies that restrict forest use for environmental reasons have in some cases favoured forest conditions while diminishing opportunities to increase economic benefits to local communities and contributions to their livelihoods. Policies that encourage foreign investment in industrial agriculture may result in enhanced economic opportunities while contributing to forest loss. In these cases, there are typically both winners and losers and trade-offs between economic and environmental concerns.

Considerable resources have been invested in creating and implementing policies; in capacity-building; and in many cases, in other aspects related to SFM. Some negative interactions cited, such as those caused by cumbersome bureaucratic processes, are a common drag on efforts to further SFM, making it difficult to achieve meaningful progress. Other interactions exercise an even greater negative impact on SFM, for example, restrictions on timber harvesting and commercialisation and lack of control of illegal logging. Finally, interactions that result from policies that encourage land-use change (e.g. concessions for industrial agriculture) induce change but, from the perspective of SFM, in an undesirable direction. For this reason, when analysing interactions among conditions, it is important to consider the magnitude of their likely impact on the viability of SFM. Taking into account the importance of the interaction among conditions, research and monitoring should explicitly focus more attention on these interdisciplinary processes and how they impact desired outcomes.

According to Newell (2001), complex systems (such as SFM) can be understood as dynamic networks of interactions and relationships, not simple aggregations of static entities. An important attribute of interactions in complex systems is that they are non-linear in nature. In other words, changes induced in one condition may lead to responses greater or lesser than what would be expected or hoped for in the context of SFM. In more explicit terms, the efforts and resources invested in initiatives seeking to further SFM may or may not result in meaningful progress towards the underlying objectives of SFM since these inputs interact in a non-linear fashion with other attributes of the system.

Within the analytical framework, case study authors were also asked to report on "influences of regional/global processes on forest-related policies and behaviour in your region of study." SFM has figured prominently in international forest-related policy processes and discourses for about 30 years. These processes include legally binding forest-related agreements (such as the Convention on Biological Diversity and the United Nations (UN) Framework Convention on Climate Change) and non-legally binding instruments aiming at instituting SFM, such as the UN Forum on Forests. Wider discourses around decentralisation and participation have also supported the transfer of forest management authority and related decision-making from central government towards lower levels in the administrative hierarchy. Support has also been directed to different community-based and/or participatory forest management models. The increasing visibility of the rights of indigenous and other local communities in the global discourses and conflicts between legal and customary access to resources has led to efforts that to a certain degree have integrated community rights into national policies. It is possible to conclude that the various influences of the international processes and discourses are to some degree discernible in the different case studies.

At present, REDD+ seems to be the most visible and potentially influential of the international processes affecting forests in the case studies. Several report REDD+ related strategies and policy development and pilot projects; however, the perceived implications of this international process are not all positive from the perspective of SFM. On one hand, REDD+ is seen as offering a potentially important opportunity to enhance local forest-related development and SFM. On the other hand, risks and challenges inherent to the development of REDD+ schemes are also recognised, including the lack of clear linkages between REDD+ and community contribution to sustainable management of land and forests. In addition, there are risks that the perceived increased value of forests may lead governments to exclude communities or restrict their participation in forest management, shifting benefits from REDD+ in favour of large-scale investors (e.g. Cambodia [11], Nepal [16]).

Some case studies highlight international, mar-

Figure III 1.1 For advancing SFM it is important to strive to gain a more holistic understanding of the conditions shaping the local context for SFM and the non-linear interactions among these conditions.
©Grid-Arendal/Wenzel Prokosch (http://www.grida.no/photolib/detail/farming-in-the-gorkha-region-nepal_c4cc)

ket-based approaches, for example certification and legality verification, as a means to advance SFM. Unfortunately, the scope of these initiatives remains restricted by the limited demand for certified products at the global level. Voluntary certification schemes, such as Forest Stewardship Council (FSC) certification in Indonesia, have been linked to better forest management, but they cannot address issues like unclear forest tenure and inconsistent policies.

EU FLEGT (European Union Forest Law Enforcement Governance and Trade)[1] and the Lacey Act in the United States seek to ensure that wood imported to the European Union or United States, respectively, is from legal sources and produced according to the exporting country's legislation. These initiatives are rather recent and, especially in the case of the instruments under EU FLEGT, not yet fully operational. However, they show some potential for motivating the development of national legality verification systems and encouraging governments to address some of the main drivers of forest degradation and deforestation.

It becomes clear from the case studies that the globalisation of markets and investments is a strong force steering forest-related development in many countries. In some cases, it is leading to large-scale land concessions to the detriment of local forest-related development and livelihoods. In other instances these processes could potentially lead to employment creation that engages local actors in forest-related production and/or the provision of ecosystem services and their integration into value chains. This potential is, however, often restricted by the limited opportunities for communities and small-scale forest enterprises to access markets and generate income from forests. How the effects of globalisation impact the local level and whether they support or are antagonistic to sustainable forest-related development is and will largely be shaped by the different conditions for SFM analysed in this volume.

[1] The EU Timber Regulation and Voluntary Partnership Agreements (VPAs) are part of the EU's FLEGT Action Plan. VPAs are agreements made between the EU and timber-producing countries that export timber and timber products to the European Union. A country that has a VPA and an operational licensing system can issue FLEGT licences for legally produced timber and timber products. The EU Timber Regulation prohibits operators in Europe from placing illegally harvested timber and products derived from illegal timber on the EU market. All timber and timber products with a FLEGT licence automatically comply with the EU Timber Regulation (http://www.euflegt.efi.int/about-flegt).

1.2.3 Reflections on the way forward

The diversity of cases included in this volume illustrates that the forces and inputs influencing and shaping important conditions for SFM originate from different scales – global to local. As also discussed, the complex, non-linear interactions among these forces lead to varied outcomes in different contexts. Understanding these interactions and how they influence outcomes is of crucial importance for designing and developing policies and measures to advance SFM (Figure III 1.1).

These important conclusions make it evident that the advancement of SFM requires that careful attention be focused on how influences originating from different scales interact and how these interactions lead to desired outcomes (or not) in local livelihoods and forest extent and condition. It is especially important to track outcomes since, as has been pointed out, measures related to prerequisite conditions in the analytical framework may be taken without meeting the underlying objectives of SFM. This reflection, perhaps, encompasses the most important conclusion of this volume: that outcomes of SFM should be monitored on a continual basis to detect trends associated with the contributions of SFM to local livelihoods and to forest extent and condition and that this information should be used in further adapting policies and management practices for achieving desired outcomes. This tracking of outcomes would reflect a serious commitment to the underlying objectives of SFM and would indicate to stakeholders when measures are collectively achieving a certain degree of success or when they are falling short. Unfavourable trends would send a strong signal that additional efforts are required to achieve SFM objectives, implying the need to better understand the complex underlying causes of undesirable outcomes.

One may conclude from a review of the case studies that there is no recipe for success and that a certain degree of flexibility is required to respond to varying situations in different contexts. The prerequisite conditions, however, are useful since they serve to direct attention to aspects that have been observed to be important for progressing towards SFM. Since it is clear that these aspects interact in complex ways, stakeholders should be encouraged to strive to gain a more holistic understanding of the context in which SFM is being pursued and the interacting processes and emerging trade-offs affecting SFM.

Overview of the case studies and their diversity

Pablo Pacheco, Pia Katila, Gerardo Mery, and Glenn Galloway

2.1 Forests and livelihoods

Forest goods and services play an important role in the livelihoods of people living in or around forests and also contribute to broader economic development. However, there are important differences in the way in which forest goods and services contribute to local people's livelihoods: either by supplying subsistence goods or contributing to the income streams of smallholders and communities or by providing job opportunities and income to workers engaged along the value chain of timber and non-timber forest products (NTFPs). Services provided by forests, such as provision of clean water, are crucial for human well-being, and in some cases, they can also generate income to families that depend on activities such as ecotourism. This diversity is clearly reflected in the case studies (Part II). This chapter explores the different ways through which forests contribute to local livelihoods and the degree that smallholders and communities depend on forests resources for livelihood strategies, either for subsistence or cash income. The degree of dependency is to a large extent related to the access to and availability of forest resources to local populations, the role that forests play as part of broader livelihood strategies, and the development of large-scale forest-based industry that contributes to the generation of jobs and income at the local level as well as nationally, thus supporting broader economic development. The relationship between local livelihoods and broader national economies and forests is naturally shaped by the extent and condition of forest resources and the development of the forest products sector.

2.1.1 Forest contribution to local communities living in or around forests

A significant number of forest dwellers, particularly those living in tropical forest zones in the Amazon where important tracts of forests remain, tend to depend to an important degree on forests to satisfy subsistence needs for food, timber for construction, and energy as well as to obtain cash income to cover other social needs, mainly education. For example, in Acre [1] and northern Bolivia [5], smallholders and communities depend on cash income from the extraction and commercialisation of NTFPs such as rubber and Brazil nuts, which contribute in an important way to the local economies, although logging increasingly plays an important role in local people's incomes. To some extent, maintaining these forest-related sources of income has required important interventions by the state and private sector in order to build the value chains that link local producers with markets. Also, in the cases described in Cambodia [11], Thailand [17], Bolivia and Peru [8], and Madagascar [20], communities living in or near forests tend to depend in important ways on a wide variety of NTFPs and timber. In the cases from Cambodia and Thailand, however, forests are part of relatively complex livelihood strategies related to quite diverse production systems that combine slash-and-burn agriculture with agroforestry practices and timber extraction.

In a different context, in countries with more developed economies, some indigenous people still tend to depend strongly on forests, which is often linked to cultural ties to the forests. This is the case in Canada [9], Finland [24], and the US Pacific Northwest (PNW) [10]. In Finland, forests have a major role in economics and local culture both historically and today, especially for traditional groups in northern Finland since forests are important for reindeer-herding. In Canada, many of the rural and remote communities rely heavily on forests for jobs and economic stability, and indigenous people still look to the forests for their livelihoods and their cultural and spiritual sustenance. In the US PNW, several tribes have treaty rights to fishing and hunting in national forests as well as rights to have sacred sites protected, and although the importance of forests in local livelihoods has decreased, it has increased in other forest-related uses, such as regulating water production.

2.1.2 Forest contribution to people with more diversified livelihoods

In locations where complex mosaics of forests and agricultural lands predominate, people tend to depend on more diversified livelihoods for subsistence and cash income. These livelihoods depend on forest resources, including timber and a diversity of NTFPs and also production derived from agroforestry systems and agricultural crops. In these cases, however, several situations tend to emerge. In some cases, forests maintain an important contribution to livelihood strategies, mainly as a safety net, such as in Nepal [16] and Thailand [17], where communities extract a large number of NTFPs in relatively small amounts (e.g. fruits, resins, fodder). In other cases, the contribution of forests tend to decrease over time in the face of expanding cattle ranching and/or agricultural production, often driven by the adoption of commercial crops. For example in the transamazon area in Brazil [4], smallholders tend to invest in cattle-breeding.

In some contexts, such as in the cases from Colombia [8], Thailand [17], Ethiopia [18], and Uganda [22], farmers still depend heavily on agroforestry systems on small landholdings for subsistence and cash income. Due to the more intense intervention on the landscapes, most forests are secondary forests, located on private lands or state-owned lands under customary use. Cultivation and harvesting of trees has a long history, and the income from planted trees constitutes an important source of revenue. An important process of forest conversion and dependence of smallholders' livelihoods on monocrops, with resultant higher vulnerability due to price oscillations, can follow when crop trees, such as oil palm in Indonesia, tend to reach a comparatively higher profit than other tree species.

2.1.3 Contribution to income through the provision of forest-related services

A few cases analysed in this volume suggest that though the contribution of forest goods as part of broader livelihood portfolios is declining, incomes originating from the provision of forest services tend to play an increasingly important role. For example, in the case in Finland [24], nature-based tourism has become an important economic activity. In Italy [27], there is a growing trend linked to the establishment of cooperatives aimed at the commercialisation of forest-based services (e.g. tourism, trekking, fishing) that contribute in significant ways to employment generation.

In some cases, the latter trend is related to conservation initiatives such as the one undertaken in the US PNW [10]. The PNW was a major producer of wood in the United States until the late 1980s, when the relative and absolute importance decreased significantly, though it is still an important sector. Many communities that were highly dependent on federal timber harvest for their well-being have still not recovered from this decline. In this context, drinking water for all of the major cities in Oregon originates on national forestlands, which are also important for species conservation and contribute significantly to recreation and tourism economies.

2.1.4 Forests, large-scale industrial production, and livelihoods

Forests contribute in varying degrees to national economic development, mainly through the large-scale timber industry and, in a few cases, industries based on NTFPs. In the countries of the case studies analysed, industrial forestry is important in Brazil, Indonesia, Mozambique, Canada, the United States, Finland, Bosnia and Herzegovina (BIH)[2], South Africa, and China. For example, in the case study from China [12], companies contribute to local economies through employment, technology transfer, and employee training and capacity-building. In Brazil, particularly in the states of Para and Acre [3], timber companies have been relatively active in partnering with smallholders and communities through different contractual arrangements in order to carry out logging operations that provide direct sources of income for local populations. In BIH [23], forest-based industry provides jobs and income and contributes significantly to livelihoods at the local level: more than 16 000 people (3.7% of total number of employed) work in forestry and the wood-processing industry. In northern Bolivia [5], the industry linked to Brazil nut extraction constitutes the main economic activity in this region, employing for about four months a year a significant number of people living not only in rural communities but primarily in the cities to collect Brazil nuts in the forests.

Local populations living in or close to forests are directly or indirectly affected by forestry operations. It is thus assumed that if timber companies with access to public forests or carrying out forestry operations in these forests improve their management practices, it will have positive implications on local populations. In this regard, the Indonesian case [15] suggests that while national-level legal frameworks generally disrespect local communities, the adop-

[2] The Federation of Bosnia and Herzegovina (FBIH) is one of three units within the country of Bosnia and Herzegovina (BIH)

tion of certification by some timber companies has encouraged greater recognition of the right of local communities to meet their livelihood needs. However, the interactions between companies and local communities are problematic due to conflicts over forest access and the inability of concessionaires to restrict access of local populations to these areas, which often are also attractive for farming.

2.2 Main drivers of change in forest extent and condition

In 2010 forests were estimated to cover 31% of the world's land area. While deforestation is decreasing in some parts of the world, it is still a serious problem in many regions; every year close to 13 million ha of forestland is permanently converted to other uses (FAO 2010). Deforestation and degradation especially continue in tropical regions (FAO 2010).

Natural expansion of forests and afforestation are significant in some regions of the world (particularly in Asia, Europe, and North America), reducing the net loss of forest area to 5.2 million ha per year at the global level. The planted forest area increased by 5 million ha per year between 2000 and 2010, making up about 7% of the total forest area today. The vast majority of planted forests are located in Asia. For more information about forest cover and deforestation, see chapters 2 and 3 of Part IV.

As the following discussion shows, parallel but opposite trends in forest condition and extent are evident in many countries. Forest degradation and deforestation are ongoing in some areas while, at the same time, forest extent and condition are improving in others.

Deforestation is reported in the case studies from Argentina [2], the Brazilian Amazon [1,4], Bolivia [5], Guatemala [6], Cambodia [11], Indonesia [14,15], India [13], Nepal [16], Thailand [17], Ethiopia [18], Madagascar [20], The Gambia [19], Mozambique [21], and Uganda [22]. In general, deforestation and forest degradation are related to unsustainable practices, natural disturbances, and climate change. Wildfires contribute to forest degradation in Canada [9], US PNW [10], Indonesia [14,15], The Gambia [19], and BIH [23] and pests in Canada and US PNW.

The expansion of the agricultural frontier is an important anthropogenic driver of deforestation in many case studies (Brazilian Amazon [4], Argentina [2], Bolivia [5], Guatemala [6], Cambodia [11], India [13], Indonesia [14,15], Thailand [17], Ethiopia [18], The Gambia [19], Madagascar [20], Mozambique [21], Uganda [22]). In some cases, for example in Madagascar, traditional slash-and-burn cultivation contributes to deforestation. In many countries the expansion of commercial large-scale agricultural production for crops such as soya, palm oil, sugar cane, rubber, and grains leads to forest clearing (e.g. Indonesia, Cambodia, Uganda). Cattle-raising contributes to deforestation especially in South America (e.g. Brazil, Argentina).

Fuelwood gathering and charcoal production are reported as drivers of forest degradation and deforestation in Cambodia [11], India [13], Ethiopia [18], The Gambia [19], Mozambique [21], Uganda [22], and Madagascar [20]. Infrastructure expansion is also causing deforestation in several case study regions such as Acre [1], the Amazon [3], Guatemala [6], Mexico [7], US PNW [10], Thailand [17], and Mozambique [21].

Unsustainable and illegal logging contribute to forest degradation and indirectly to deforestation because logged forests are often easier to access and clear for cultivation. Logging roads also open new areas for people in search of new land. Commercial logging is reported to contribute to degradation in the case studies from Bolivia [5], Cambodia [11], Indonesia [14,15], Thailand [17], Mozambique [21], and Uganda [22].

Inadequate law enforcement and corruption have prejudiced wider introduction and implementation of SFM and subsequently caused increased forest degradation, for example in Cambodia [11], The Gambia [19], Mozambique [21], and central Uganda [22].

Positive changes in the extent and condition of forests are linked to the implementation of specific forest programmes such as forest rehabilitation in Ethiopia [18] and afforestation projects in China [12]; enactment of forest laws and implementation of forest protection activities (Acre [1], Mexico [7], Guatemala [6], US PNW [10], Uganda [22], South Africa [27]); local cultural values, and traditions that support sustainable use of forests as in Quintana Roo, Mexico [7], and Urbión, Spain [25]; certification (Indonesia [15]); and forest protection activities, which allow the natural regeneration in forest areas (Acre [1], Guatemala [6], US PNW [10], Uganda [22], South Africa [27]). The case studies from Mexico [7], Guatemala [8], and India [13] also show how CF efforts have preserved the extent of forest resources and prevented additional degradation.

In many of the cases study countries, industrial forestry is important and is based on natural forests (e.g. Canada [9], Mozambique [21], BIH [23]) or intensively managed natural forests (Finland [24]), while plantations are important in Indonesia [14,15], China [12], and US PNW [10]. In some cases, there has been a change from natural forests to plantations, as in the US PNW, where industrial forestry has moved from utilising old-growth forests on federal lands to plantations on private land. Industrial enterprises in Indonesia conduct business in both natural forests and plantations. In Mozambique [21],

Figure III 2.1 Intercropping of bananas and oil palm by small holders. ©Marko Katila

industrial forest plantations are being established and could become dominant in the future. In South Africa [27], industrial forestry plantations are the drivers of forest industry and without them, exploitation of natural forests would be much higher and wood imports much greater.

2.3 Agroforestry and trees outside forests

Since most case studies in Part II focus on regions where considerable forest cover still exists and SFM generally focuses on managing and conserving natural forests, less emphasis has been placed on trees outside forests in this volume, with some notable exceptions. The case studies from Argentina [2], Mexico [7], India [13], Thailand [17], Ethiopia [18], Mozambique [21], Uganda [22], and South Africa [27] stress the importance of trees outside forests for local uses such as fuelwood, poles, fruit production, apiculture, shade, boundary demarcation, and in a small number of cases, as components of silvopastoral systems. In Cambodia [11], trees are integrated into traditional agroforestry practices, though generally without systematic management in relation to other farm components. In Ethiopia, small woodlots of primarily *Eucalyptus* spp. serve as a source of wood in a landscape that has been subjected to widespread deforestation. In northern Ethiopia and in Thailand, multipurpose trees play major ecological and socio-economic roles. In Madagascar [20], trees outside forests, notably the breadfruit tree and cashew and fruit tree plantations, are important production systems. In Uganda, tree cover in home gardens for multiple purposes, including shade and boundary demarcation, is increasing. Clearly, trees outside forests often form part of local livelihood strategies (Figure III 2.1).

In Quintana Roo, Mexico [7] and Acre, Barzil [1], efforts are being made to establish and manage tree species outside forests that traditionally have been harvested or have produced NTFPs within natural forests. For example, in Quintana Roo, some farmers are planting Spanish cedar and mahogany in agricultural fields in order to augment timber production of these highly valued species; natural regeneration and recruitment of these species into higher diameter classes has been problematic in selectively logged forests (Snook and Negreros-Castillo 2004). In the case of Acre, agroforestry systems have been promoted by local and national NGOs and the state government's extension agency.

As indicated in the Acre [1] and Quintana Roo [7] case studies, the establishment of forests species outside of forests to augment and make the production of desired products more efficient is important and will most likely increase in the future. Even in areas with considerable forest resources, a compelling case can often be made to establish invaluable species outside the forests where conditions favouring tree growth (rate and uniformity) can be fostered.

As forests are valued more for the environmental services they provide, the production of products derived from trees may shift to areas outside the forest to reduce impacts caused by harvesting operations in the forest.

Prerequisite conditions across cases

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This chapter presents an analysis across the cases for the prerequisite conditions included in the analytical framework. Sections 3.1–3.7 focus on the prerequisite conditions relating to policies, institutions, and governance; sections 3.8–3.12, on those relating to livelihoods, capacities, and socioeconomic aspects; and section 3.13, on research and monitoring.

3.1 Land tenure and rights to forests and trees

The situation with respect to land tenure and rights to forests and trees varies considerably among the case studies analysed. Most of the world's forests are publicly owned. This is also the case in a majority of the case studies. However, several assessments show that there is a shift towards formally recognising customary rights in some countries and a trend to allocate forest rights to communities, individual landholders, or private companies (White and Martin 2002, Sunderlin et al. 2008, FAO 2010, Blaser et al. 2011). However, a recent report indicates that the pace of this tenure change is slowing despite the fact that tenure issues have received considerable attention in REDD+ discussions (RRI 2014). The following discussion is structured according to the main types of forest-tenure change observed in the case studies.

3.1.1 Shift towards recognising customary rights

In many tropical forest countries, customary tenure systems are not formally recognised, and overlapping, but often incompatible, customary and statutory tenure systems have led to unsustainable practices and conflicts (e.g. Cambodia [11], Thailand [17], Madagascar [20]). However, some countries, such as Argentina [2], Bolivia [5], and Uganda [22], have, to varying degrees, formally recognised customary rights to forests. In India [13], the constitution supports community tenure in upland tribal areas, but implementation of the forest legislation that aims to strengthen the rights of tribal communities has been slow and is frequently resisted by state forest departments, leaving the problem of forest-tenure conflicts among communities, forestry agencies, and the private sector unresolved. In Mozambique [21], customary and statutory rights to land have an equal legal status, but the rights to forest resources, other than for subsistence use, are based on a licensing system (Figure III 3.1).

Despite the statutory changes in some countries, the forest areas of community and indigenous lands acknowledged by statutory tenure laws is still considerably smaller than the forest area managed under customary tenure without legal recognition (Sunderlin et al. 2008).

In some countries such as Indonesia [14,15] and Thailand [17], the discussion on customary tenure rights has been ongoing for decades, but no real changes in clarifying and securing forest tenure have been accomplished. In Indonesia, conflicts related to overlapping claims are common. Private companies are issued concessions in areas claimed by local communities, largely driven by failure to properly register state forestlands, which has left boundaries unclear. However, the important ruling of the Constitutional Court in Jakarta on 16 May 2013 opened the door for clarifying forest tenure in Indonesia and for wider recognition of the rights of indigenous peoples. Before the ruling, all customary forests were treated as state forests within which concessions could be granted. The 16 May ruling stated that customary forests belong to local indigenous people and are not state-owned. This ruling has paved the way for a potential major change in forest tenure: it has been estimated that customary forests in Indonesia amount to about 40 million ha (Jakarta Post 2013).

In Thailand [17], CF and the related legislation have been in the political agenda for decades, but the issue is still open. Since the early 1960s, the forest

policy in Thailand has focused on forest conservation, mainly in response to widespread deforestation. Legislation regarding protected forest areas originates from that time and manifests state control over the country's forest areas. The current constitution (1997) supports local communities' participation in the management and sustainable use of natural resources. In addition, a later cabinet resolution allows local communities living in the area before the establishment of a national park to remain in the area, but it prohibits further expansion. These two provisions enable local communities to stay on the land where they have lived for generations and to participate in forest management, which had been prohibited by the National Park Act (1961). However, the communities still do not have secure tenure or legal rights to the land.

Figure III 3.1 Land use certificate from Zambezia province, Mozambique. ©Almeida Sitoe

3.1.2 Allocation of forest rights from the state to smallholders and communities

Several different schemes have been adopted to allocate forest rights to communities and smallholders. These include extractive reserves and community concessions and different community-based or collaborative (joint) forest management models.

Overall, the extent to which the different components of rights (access, withdrawal, management, exclusion, and alienation) have been devolved to the local level varies considerably across the cases, but in most countries forests remain state owned and their use regulated and controlled by forest authorities. In principle, the devolution of rights could lead to privatisation of forests when extensive rights are devolved to smallholders or legally recognised community entities. However, the devolution of rights has to date mainly focused on the use of NTFPs, allowing only limited access to and commercialisation of timber resources. There is also considerable variation in the duration of the periods for which rights are granted.

In Guatemala [6,8] the state has granted concessions that give communities forest-use rights for 25 years. The majority (64%) of the community concessions have been registered as non-profit concessions; the rest, as for-profit concessions. In Acre, Brazil [1], local people and communities have been granted collective rights to land and forest resources by the establishment of extractive reserves (RESEX), through which rubber tappers were granted formal rights to forests where they had traditionally lived and worked. This new form of land and forest tenure expanded to diverse areas across Amazonia and throughout Brazil as a way to keep large areas under forest cover while supporting local livelihoods, often based on gathering of NTFPs. Other schemes adopted in order to grant local tenure rights have been through agro-extractive settlements or sustainable development settlements in regions still having large continuous forested areas and clear potential for CF [3].

As in the previous example, in many cases community rights to forests are in principle based on the law and operationalised through contracts or forest management plans that define management and harvesting operations (e.g. in Bolivia [5], Nepal [16], The Gambia [19], Madagascar [20]). Of the case studies analysed, in Bolivia and The Gambia, the devolution of forest rights has been more complete than in the other cases. In Bolivia, peasant and indigenous people have legal property rights to land and the exclusive right to use forest resources on those lands, including the right to commercialise forest products according to approved forest management plans. Forest communities control 40% of forestlands in Bolivia. In The Gambia, management agreements are made after a preliminary phase during which the community demonstrates its abilities to manage forests sustainably. Currently, 6% of the country's forest area is under CF. In Nepal, community-forest management plans are oriented towards subsistence use of forest resources; acquiring permits for timber harvesting and sale is quite difficult. In Nepal, more than 1.6 million ha of forests in the hills are under CF, involving about 35% of the population. However, the government has not handed over the valuable forests in the lowlands (Terai area) for community management, which partly reflects the priorities of CF in the country.

Different collaborative forest management models are common in Asia and Africa. In these schemes

forest management is based on the sharing of rights, responsibilities, and benefits among management partners, usually the community and the state forest administration. The state authorities remain the stewards while the community is a management partner. For example, in Uganda [22], communities are engaged in forest management activities such as patrolling the forest and they benefit from access to forest products.

Despite the progress in recognising community rights and formal devolution of forest-related rights, insecure titles and non-enforced use rights often lead to de facto open access to forest resources. In most cases the state retains the rights to cancel allocated rights if communities violate contractual terms or management plans. In some cases (e.g. in Cambodia [11]), the state has granted land concessions to non-local actors for agricultural, forest, or mining purposes, ignoring the rights of communities.

3.1.3 Shift towards restitution of private rights

In some countries, forest tenure change is related to the restitution of private rights to forests in order to correct former policies that had annulled private property rights, for example the socialisation of property rights in BIH [23], or to redress inequalities of past racially discriminatory laws, such as in South-Africa [27].

In BIH [23], the restitution concerns currently state-owned forests. However, the tenure change has been minor and it has been concluded that the share of private forests will not significantly increase as a result of the restitution process.

In South-Africa [27] the land redistribution process has progressed slowly because many current landowners are not willing to sell land that they have bought legally. The forest industry perceives land restitution as a threat because it could strongly compromise the long-term security of raw material supply; therefore it has embarked on a voluntary land redistribution scheme in which land ownership is voluntarily transferred to local communities, with the land leased back to the company for two crop rotations. Companies provide technological support and extension services for new landowners. Pilot-scale land transfers under this scheme have already taken place and it appears to be a more workable solution than forced land redistribution.

3.1.4 Shift from communal tenure towards privatisation

Mexico [7] has a long tradition in communal land tenure (*ejidos*). Communal property regimes were originally established between the 1930s and 1980s. The 1992 Agrarian Counter Reform Law allowed parcellisation and privatisation of non-forested communal ejido lands. However, forested land has also been privatised and sold in some ejidos. In some cases, as in Quintana Roo, most ejidos have not formally entered into this process. However, a range of informal land-tenure regime changes have been observed in different communities since 1992. While some communities have maintained a strict common property regime, some have informally divided and sold land. The changing social and economic conditions seem to affect the future of communal ownership. Forestry-oriented ejidos or communities closer to tourism and urban settings tend to sell land and change strict communal property regimes to a combination of communal and private property landholdings. Mayan ejidos with greater forest dependence tend to retain communal ownership.

3.1.5 No change in tenure

The case study from Spain [25] demonstrates how a communal tenure regime rooted in long traditions has been able to persist in the face of social and economic developments and has remained viable until today, keeping the forests under sustainable management and providing for the livelihoods of local inhabitants. Communal woodlands are registered under the local authority whose town or village benefits from the use of the resource. Local authorities and/or a board consisting of local residents manage the commercialisation and sharing of the profits from forest products. Together with foresters, they are responsible for the protection and sustainable use of the resource. Under the established rules, people who are considered local have use and access rights to the resource.

The case studies from Canada [9] and Finland [24] offer a different viewpoint from countries where, in principle, property rights are secure and clearly defined and where no tenure changes have occurred but increased demands for integrating different land uses on state-owned lands has led to conflicts. The Canada case exemplifies how the conflict was solved by reaching a non-binding voluntary agreement between nine environmental organisations and 21 forest companies. The agreement called for a three-year suspension of logging in an area of 29 million ha and introduced FSC certified forest-management practices in the remaining 43 million ha. However,

First Nations, with historical claims to large parts of these forests, were not included in the agreement and claim that it undermines their rights.

In northern Finland [24] the rights of indigenous Saami conflict with logging in state-owned forests. Reindeer-herding is an essential part of Saami culture, and in the Saami region (four municipalities), subsistence use of forests includes rights to reindeer-herding. But since logging of old-growth forests evidently diminishes ground and arboreal lichens and reindeer access to food resources becomes difficult, the question of the Saamis' right to maintain their own culture is closely related to the management of state forests.

3.1.6 Change in the tenure on agricultural lands

The case studies from Ethiopia [18,27] show how tenure change in agricultural lands can support forest rehabilitation. The establishment of exclosures (areas closed for animal grazing and biomass harvesting) for forest restoration was made possible by land-tenure change in the 1980s, in which large feudal agricultural lands in lower level areas were shared among the local farmers. This decreased pressure to use hill slopes for cultivation, enabling the establishment of exclosures. Most of the forest rehabilitation projects are managed by communities organised into various forms of community-based organisations. However, there is no legal transfer of land management and user rights from the state to the community.

3.1.7 Ecosystem services and new types of property rights

The chapter on water-related ecosystem services illustrates how new initiatives and policies can create the need to establish and clarify new types of rights, such as rights related to ecosystem services. This is illustrated by the initiative in Italy [27] where forest owners are compensated for the costs of maintaining continuous forest cover in the water catchment area, which contributes to water quality and quantity. With REDD+ there will be an increasing need to clarify the rights to forest carbon and establish who holds those rights. The case studies analysed in this volume suggest that this issue has not yet received much attention at the local level.

3.2 Public administration

Since the 1990s, profound changes have taken place in the public administration of many tropical forest countries, and these changes ultimately affected forestry administration. A common trend that started in the late 1980s is that countries embarked on a process usually referred to as decentralisation. In short, this implied the devolution of authority from the central government to lower tiers in the administrative hierarchy, i.e. to states, regions, provinces, districts, or municipalities. The forestry administration eventually also followed suite, although in many countries this started later than the general decentralisation reforms.

Twelve of the cases in Part II suggest that the reforms in public administration have positively influenced SFM in general or that they have positively influenced conditions that allow communities and producers to practice SFM. In the majority of these cases, the positive impacts are attributed to particular regulations or policies. Examples of this are Acre, Brazil [1] and Petén, Guatemala [6], where the entire administrative apparatus was reformed to focus more on forest-based development. The government took measures to actively promote CF and facilitated private sector investments in SFM. For instance, active support has been provided to develop forest-product market chains or to promote payments for environmental services. These specific SFM and CF support measures were accompanied with ecological-economic zoning efforts. Another example of significant public administrative support to SFM relates to the definition of environmental standards, as took place in Argentina [2], which are specified for different zones that differ in environmental values.

SFM is often promoted through financial incentives, commonly applied through tax breaks and less often through subsidies that target specific activities, such as in the case of Italy [27]. Until the early 2000s, many bilateral cooperation programmes between donor countries and tropical-forest developing countries financed CF and forest and biodiversity conservation activities. Other important public administration measures, however, focused more on transferring forest responsibilities to lower tiers of governments or private actors (communities and companies) or on increasing the voice of multiple stakeholders to participate in forest or environmental decision-making. For instance, in BIH [23], pressure from local communities contributed significantly to the transfer of management rights from the state to local communities; similar processes have taken place in Canada [9] and Ethiopia [18].

A close analysis of some cases demonstrates that public administrative reforms have led to important outcomes. In the case of the US PNW [10], for instance, 1970s legislation that was intended to foster

forest protection and endangered species protection has subsequently made it possible for activists to challenge and modify forest policies that were detrimental to specific species. This case demonstrates the challenges of trade-offs and that public administration reforms create winners and losers. Subsequently US legislation was modified to better address contemporary societal forestry needs.

Seven of the cases studies present a more negative view on how public administration reforms have influenced SFM. A common issue in many cases is conflicting policy objectives among different policy sectors, as for instance in Mexico [7], Cambodia [11], Thailand [17], and Madagascar [20]. In some cases, while objectives have at least partly been aligned, policy measures are poorly designed and implemented and still have contradicting effects. This may also be exacerbated when a public administration pursues official national or regional legislation and policies that weaken or endanger customary forestry practices, as is, for instance, the case in the northeast of India [13]. The problems are often worsened by inept, slow, bureaucratic, and often-corrupt public administration.

3.3 Participation and stakeholder co-operation

Increasing participation by different stakeholders is an essential element in the gradual global shift related to decision-making on natural resources, from government-led hierarchic top-down regulation to power-sharing by the state with civil society and regional or local stakeholders. The increasing recognition of different forest values and the related competing demands on forestlands from a growing numbers of stakeholders have contributed to the increasing importance of stakeholder participation in decisions on forest policy and management and as an important condition for sustainable resource management.

Participation aims to ensure that all stakeholders are included in the development, formulation, and implementation of forest-related policies, plans, and activities that affect their interests. It is a continuous process of negotiation and decision-making that occurs from local to global scales (Evans et al. 2006). Changes in participation are closely related to the devolution of rights and associated powers to local actors. These changes have led to different community, joint, and participatory forest management models, which are discussed in section 3.1. Cooperation between forest industries and communities or small-scale farmers is addressed in section 3.9. This section focuses mainly on strategies related to participation and stakeholder cooperation in relation to forest-related land-use planning and policy-making at broader spatial scales.

Based on the analysis of the case studies presented in Part II, participation and stakeholder co-operation on broader spatial scales are rather underdeveloped. There are, however, some examples of more encompassing initiatives, most notably the case study from Acre, Brazil [1] and the Model Forest case studies from Argentina [2] and Spain [25].

Demands for increasing participation in decision-making that affects local actors' living conditions, livelihoods, and culture are also part of the discourses on human rights, human development, and democracy. This is illustrated by the case study from Acre, Brazil [1], where the concept of "forest citizenship" captures the state government's commitment to democracy and human development. In Acre, participatory governance was first put into practice through a state-wide zoning initiative guided by a commission with broad representation from the government, private sector, and civil society. In the PROACRE -programme (Program of Social Inclusion and Sustainable Economic Development) which began in 2007, the state cooperates with six local NGOs to support extension outreach with rural communities on agroforestry and forest management. A participatory approach was used to develop community development plans in remote and vulnerable regions. Participatory processes were later employed during the development of the SISA (State System of Incentives for Environmental Services, 2010) programme.

An important feature of the Model Forest concept as described in the case studies from Argentina [2] and Spain [25] is the involvement of a wide range of stakeholders in decision-making processes related to forest landscape planning and sustainable local development. The Model Forest governance structures involve stakeholders from the public sector, producers, academia, civil society, grassroots organisations, and indigenous peoples.

Cooperation between stakeholders can develop to strengthen the local stakeholders' position against common threats. In the case study from India [13], threats to culturally important forest ecosystems under customary tenure catalysed 62 villages and 10 indigenous governments to establish a federation to coordinate the protection and restoration of their community forests.

Similarly, to strengthen its position, the National Council of Protected Areas of the Mayan Biosphere Reserve (MBR) in Guatemala [6] has developed cooperation among concessionary organisations, Municipal Councils for Development, and other stakeholders from the state and regional forestry sector, local and international NGOs, buyers of forest products, and service providers. These organisations make up a network for sharing information and create awareness about the technical, administrative, and

market standards/regulations and mechanisms to address internal and external threats. Community concessions in MBR are represented by an association that liaisons between the concessions and external cooperation agencies and certification groups. This association also works with government organisations in developing forest management strategies and integrated community development.

In Mexico [7], efforts to empower ejido residents and increase economic returns from forests, led to establishment of intermediate-level forestry organisations (forest civil societies) to empower ejidos, endow them with political credibility, and fight for community rights.

The case studies also present some examples of engaging stakeholders in planning and decision-making related to forest resources. For example, public consultation (Italy [27]) and somewhat more ambitious forms of participation are employed in many developed countries. Finland [24] has introduced public participation in natural resource planning on state-owned forests, but it has been criticised for being merely consultation without resulting in effective participation. In the US PNW [10], community involvement in national forest management has increased, mainly through the rise of collaborative groups that work at the local level to bring diverse groups together to build consensus on national forest management. However, the impacts of these efforts have been uneven since formal decision-making still rests with the state institutions.

The development of the Indonesian Legality Assurance System (TLAS) [14,15] provides a positive example of participatory policy development. It involved representatives from government ministries, the private sector, NGOs, and academia. The process was widely recognised as inclusive, transparent, and robust. In Ethiopia [18], new management approaches employed on exclosures attempt to combine participatory and decentralised approaches, including engagement of NGOs and the private sector.

In some cases the legal framework embraces support for more extensive stakeholder participation, but its proper implementation has been lacking. In Thailand [17], the law enables local government units to facilitate local people's engagement in natural resource management, allowing for assistance in developing management plans, accessing resources, and networking, and the government has undertaken some projects to encourage participation of local communities. In Mozambique [21], by law community consultation should take place before resource rights are allocated to outside interests, but this policy has been poorly implemented.

3.4 Power and representation

Power is quite an intangible concept, especially when it is subjected to analysis based on empirical evidence. Foucault (2003) considers power to be present in every aspect of life and reflected in who dominates public discourse and how. Arts and Leroy (2006) aim to operationalise power analyses by using as a proxy variable the resources that actors have at their disposal to influence policy decisions. The development literature commonly refers to empowerment as a process that institutionalises participation in policy decision-making for stakeholders who are affected by such decisions, hence it is similar to democratisation.

In 14 of the cases reviewed, there is evidence of empowerment of local stakeholders to take control of forest management. There is significant evidence that local stakeholders initiated this empowerment or did so with the help of support groups that helped local forest managers take matters into their own hands. However, governments or their agencies have also played important roles in fostering stakeholder participation in forest management. This process often appears to have been synergistic, involving efforts of local forest managers, their support groups, and other civil society groups.

For instance, in Acre, Brazil [1], local communities organised themselves as cooperatives, and through government efforts, local leaders became integrated into local and state government. Such self-organisation has also been reported in Mexico [7], US PNW [10], India [13], and Ethiopia [18,27].

The important role that civil society actors can play is demonstrated in Guatemala [6,8] where a local NGO initially provided support until ACOFOP (*Asociación de Comunidades Forestales del Peten*) was established and soon became a powerful grassroots organisation in the region.

An important number of examples demonstrate that state authorities have had an important role in empowering communities or implementing policies that contributed to empowerment. In Acre [1], the state pursued an active process of involving communities in decision-making or supported efforts to have communities manage their own affairs. In Argentina [2], the Model Forest created participatory governance structures and also undertook capacity-building to strengthen these structures. In Bolivia [5,8], legislation gave local forest actors wide-reaching decision-making autonomy. In The Gambia [19], capacity-building was complemented by support to local forestry business initiatives, including financial support. In Madagascar [20], the state established and granted authority to community-based associations.

Mexico [7,8] pursued important programmes to support and enhance community forest management,

oftentimes supporting existing communal organisational structures even prior to the 1980s. In Thailand [17], much of the empowerment took place via conflict-mediation efforts. In the US PNW [10], the government has focused on supporting grassroots initiatives during the transition period discussed.

Empowerment of the poorest and of women in local forest management is reported in the case studies, but not always specifically. In Acre [1], the government created a women's secretariat. Other case studies (e.g. Mexico [7,8], Bolivia and Peru [8], India [13], Ethiopia [18], The Gambia [19], Spain [25]) make reference to special attention paid to gender issues but with few specifics on the results of these efforts.

Three case studies report on the deficiencies in empowerment efforts. For instance, in Cambodia [11], local communities have minimal say in decision-making, in stark contrast to the powerful and rich. In Canada [9], while there is an important amount of funding for local groups in forestry related processes, others become marginalised because they were not included in the original agreement that was reached to combine conservation and industrial interests.

3.5 Enforcement of laws and regulations

Enforcement of laws and regulations has been notoriously weak in the forestry sector, especially in tropical-forest countries. This has in many countries led to a large gap between policy statements, legislation, and practice. For example, in Cambodia [11], weak enforcement of social and environmental safeguards when granting large-scale economic land concessions has led to granting concessions in forested areas contrary to the forestry law and regulations. Another example is Mozambique [21], where customary and statutory rules support local communities' participation in forest and land management, but, in practice, inadequate implementation of these regulations jeopardises effective community participation. In countries such as Indonesia [14,15] or Bolivia [5], forest concessions often served as payment for political allegiances until the 1990s. Political reforms have addressed the most blatant cases but forest law enforcement remains high on international political agendas.

Almost all the cases reviewed report on at least some efforts to enforce laws and policies – especially to reduce illegality in the forestry sector, including efforts to reduce illegal forest clearing and illegal logging; two major processes of concern. In Acre, Brazil [1], for instance, since the late 1990s, multiple government agencies began to implement legislation against forest clearing and illegal logging in a more consistent fashion. Elsewhere in the Brazilian Amazon [4], land-use regulation and compliance with forestry regulations began to be imposed to a greater degree. Two approaches that have been used include favouring certified forest companies and making use of forest cadastres. In Argentina [2], legislation and financial support were measures to support increasing legality in the forest sector. Financial support was allocated for institutional strengthening of forest administration, which is expected to improve the monitoring of capacity and effectiveness.

The case studies report on multiple government efforts to combat illegality. They include a Federal Action Plan in BIH [23] and adequate demarcation and central management of information in Canada [9] and Spain [25]. Measures, however, are not only imposed by central governments but may also emerge more locally, as for instance in Mexico [7], Peru [8], and Ethiopia [18,27]. In Uganda [22], illegality is being combatted through improved administration.

Corruption is mentioned as an issue in eight of the case studies, but in none of them does clear evidence emerge on effective measures to address the problem; even a logging ban is neither adhered to nor adequately enforced. In Madagascar [20], this is the case, in part, because the public sector is sorely underfinanced (Figure III 3.2). There is sometimes serious concern (e.g. Nepal [16]) that measures to enhance legality in the sector end up undermining the interest of small and community producers and can even lead small and community producers to turn to illegal activities. In some countries, such as India [13] and in northern countries (US PNW [10], Finland [24]), illegality is not an issue.

About half of the cases, present a sceptical view of efforts to improve legality or reduce corruption. In Cambodia [11] for instance, efforts to increase legality do not stand up against the magnitude of the problem. In Guatemala [6], illegal activities in concessions have declined but illegality remains a major issue in the forestry sector, especially outside concessions.

Voluntary Partnership Agreements (VPAs) under the EU's FLEGT Action Plan and related mechanisms are being developed to restrain illegal activities in a number of countries, but capacity is a constraint for their effective implementation (e.g. Indonesia [14,15]; see also section 4.4.4 for legality verification).

Figure III 3.2 Madagascar is one of the poorest countries in the world, and the public sector is sorely underfinanced and lacks resources to tackle the problems of poverty and resource degradation.
©Grid-Arendal/Peter Prokosch (http://www.grida.no/photolib/detail/madagascar-two-children-in-a-poor-country_2f7d)

3.6. Long-term societal commitment to SFM

There is clear division with respect to long-term societal commitment to SFM among the case studies analysed: it is clearly stronger in the cases in high GDP[3]/capita countries (Canada [9], US PNW [10], Finland [24], Spain [25], Italy [27]) when compared with the cases from low GDP/capita countries. In the former, forest resources have been important for national development and local livelihoods and have promoted industrialisation and economic growth (e.g. Finland, Canada). However, the meaning of SFM has changed over time from sustained-yield harvest to a broader concept of satisfying a number of societal needs that include ecosystem services, leisure, and nature conservation, as exemplified by the US PNW case study. The meaning of SFM is constantly being discussed and re-invented (see chapter 2 in Part IV for the changing meaning of SFM). This holds true also for low GDP/capita countries, for example Bolivia [5], where the integration of new actors in forestry has led to the need for a new understanding of SFM.

Case studies from China [12] and Ethiopia [18,27] show how in the face of severe deforestation and degradation, reforestation, and rehabilitation are raised to the national agenda and governments are actively pursuing programmes to increase forest cover for wood production, prevention of soil erosion, provision of water services, etc. In Nepal [16] and Thailand [17], severe deforestation and degradation have put forests high on the national agenda. In Thailand, the focus has been on top-down forest conservation with minimal human activity in protected areas and with an oblique view of SFM. In Nepal, CF has been an important programme, but it has also emphasised forest protection at the expense of income generation from commercial use of timber. Poor understanding of scientific forest management has undermined the long-term commitment to advance SFM in, for example, Mexico [7] and Nepal. In Indonesia [14,15], forests and forestry are also high on the national agenda. However, progress in advancing SFM has been hampered by conflicting interests, weak law enforcement, and corruption.

In many low GDP/capita countries SFM competes with other development priorities such as economic growth and poverty alleviation, and SFM is not seen as a primary strategy to improve local livelihoods and well-being. This is the case in India [13] and to some degree also in Brazil [1,3]. Other development

[3] Gross domestic product

strategies that provide employment and immediate benefits to communities have been favoured, even including activities that replace indigenous forests (e.g. Acre [1]). However, in The Gambia [19], CF and SFM have been seen as strategies for poverty alleviation and for improving local livelihoods.

In Mexico [7], the emergence of neoliberal policy in the 1990s and an increasing focus on agricultural and conservation policies shifted policy priorities and disrupted the focus on SFM. Initiatives to promote SFM are also often dependent on donor funding or the presence of international NGOs, which while important, can undermine the continuity of programmes and commitment to advance SFM (e.g. Guatemala [6], The Gambia [19]). Long-term commitment to SFM and forest conservation can also be undermined by political changes and unrest, as has happened in Madagascar [20]. Even when progress towards SFM is high on the national agenda, economic development priorities, together with conflicting interests, can constrain its implementation, giving in to high pressure from international investors or markets. In Cambodia [11], large-scale land concessions undermine commitment to SFM; in Mozambique [21], this process is caused by high demand for timber in Chinese markets.

Some international initiatives and processes such as certification and REDD+ have been reported to support commitment to SFM (e.g. Mexico [7], Canada [9], Spain [25]). In relation to certification, however, there are no guarantees for long-term durability. REDD+, on the other hand, still needs to confirm its widely declared potential.

3.7 Reconciliation of different land uses and landscape management

Even though it has been widely recognised that many of the problems facing forests and forest-related livelihoods originate from outside the sector (e.g. Galloway et al. 2010), policies to integrate different land uses and address competing land uses and inter-sectoral conflicts are still lacking in most of the analysed case studies. In developed countries land use planning is usually conducted at different levels, including e.g. national, regional, and municipal level land use planning. However, in developing countries comprehensive land-use policy and planning that would include different land uses are mostly lacking. This is also reflected in the case studies, where most attention has been placed on the reconciliation of different values and needs within the forests. Still, the case studies offer some examples of broader land-use policies and planning.

In the Brazilian Amazon [3], economic and ecologic zoning has been the macro-level mechanism for reconciling land uses at the state level, along with policies targeted to the needs of specific regions and sub-regions. State-level thematic maps and land-use plans have also been produced.

Mozambique [21] has had a National Land Policy since 1995. It provides strong potential for change towards more decentralised natural resources management and seeks to enhance partnerships between local communities and investors, in this way progressing towards an integration of local values and conflicting land-use priorities in rural areas. However, conflicts occur, for example, because of failures in the implementation of land and other sectoral policies. In Uganda, the government has developed a National Land Policy (2011) to address inter-sectoral issues and encourage appropriate and optimal land use. It is has yet to be publicised and implemented.

Landscape approaches, and landscape and ecosystem management are rather recent approaches for integrating different land uses within larger landscapes and managing the trade-offs between, for instance, forestry and agriculture and development and conservation (Figure III 3.3). Landscape or ecosystem management approaches are often connected to the provision of ecosystem services in addition to timber and NTFPs and to efforts to integrate conflicting values and different land uses across larger landscapes. These approaches are also related to developing institutions to facilitate participation and collaboration for planning and management of forest landscapes.

In Italy [27], a landscape approach is employed in a "payment for ecosystem services" scheme to provide hydrological services at the catchment-area level. In South Africa [27], concerns for future water shortages led to limiting afforestation in certain catchment areas, but sound, science-based planning for optimum land-use patterns at the landscape scale has basically been absent to date. However, the government has recently started to fund research on land-use planning at the landscape level.

In Canada [9] and US PNW [10], landscape management approaches resulted from efforts to solve intensive forest-related conflicts that originated from the stakeholders' different values and land-use priorities. A landscape approach provided a means to integrate different land uses within a large area, including species protection (caribou) and timber production, as in the case of the Canadian Boreal Forest Agreement. In the US PNW, there has been a significant emphasis on watershed-based and landscape-scale planning and management.

In some cases landscape management is connected to tenure changes that enable the managers (communities) to manage larger areas as single units (Bolivia [5]). Land-use zoning within ejidos in Mexico [7] has been noted to have enhanced SFM

Figure III 3.3 Traditional land management systems often integrate cultivation, agroforestry and collective forest patches as in Khola watershed in the middle hills of Nepal. ©FAO Photo ref FO-0072

and maintenance of forest cover. The federal government is now requiring land-use zoning as part of the management plans to extract timber. Some ejidos are integrating zoning for hydrological services, biodiversity conservation, ecotourism, and forest management on their forest lands. However, in general, a holistic landscape perspective and properly integrated management of ejido lands is still curtailed on both national and state levels by conflictive and contradictory agricultural, forest, and conservation policies.

Often, landscape management is introduced by donor-funded projects. The case study from India [13] demonstrates how a mapping process that strengthened community institutions and adoption of a landscape-level management approach can prepare local communities to address external pressures they confront.

Certification promotes the adoption of landscape and ecosystem management approaches in, for example, Indonesia [14,15], since the FSC's concept of high-conservation-value forests requires that conservation be carried out at landscape or ecosystem levels. Current forest regulations related to development of forest management units in India [13] also requires that management be carried out at watershed or landscape levels.

Model Forest initiatives pursue a landscape management approach, as demonstrated in the case studies from Argentina [2] and Spain [25]. The Model Forest concept includes the involvement of a wide range of stakeholders in decision-making processes related to land-use planning at the landscape level. It aims at integrating the different land uses in a sustainable manner. An ecosystem management approach is used in community-forest management plans in The Gambia [19].

Some programmes in Acre [1] have encouraged farmers to pursue a landscape approach in planning land use on their properties. The law in the Brazilian Amazon [3] requires that 50%–80% of the landholding is preserved or managed sustainably for timber and NTFPs and the remaining 50%–20% can be used for agricultural production. However, making community-based forest management plans financially viable in the Amazon region remains a challenge.

3.8 Commercial opportunities, linkages to markets, and value chains

The enhancement of economic and livelihood benefits from forests is seen as essential in efforts that seek to further SFM. However, there is marked variability and disparity among the case studies of Part II with regards to efforts made to enhance economic benefits accruing to local actors involved in SFM. At one extreme, no effort has been made to encour-

Figure III 3.4 Transporting cinnamon sticks extracted from the forest in Manompana, Madagascar. ©Aziza Rqibate

age the commercial dimension of SFM, while at the other extreme, rather sophisticated arrangements have been established to favour the functioning and transparency of market transactions. Numerous approaches have been pursued to make SFM more attractive from an economic perspective, including the introduction of different products and services into the market.

3.8.1 Marketing and commercialisation of forest products and services

Local markets for forest products and services

Several case studies emphasise the importance of local markets for forest products and services. Fuelwood is important in meeting energy needs in many countries, ensuring a robust demand for wood and charcoal (e.g. India [13], Ethiopia [18], Madagascar [20], Uganda [22], FBIH [23]). As an example, Mozambique meets 70%–80% of its energy needs with fuelwood, consuming an estimated 14.8 million tons annually. Fuelwood is used by households for cooking and heating and, in some cases, to meet the energy needs for industrial processes; in Madagascar, for example, large amounts of fuelwood are used in distillation and other industrial processes. In some countries (e.g. Uganda), prices for other local products such as poles, wood for construction, and fuelwood have increased markedly in recent years. In some cases, the scale of production targeting local markets is quite small. In Bolivia [5], for example, most producers in the northern Amazon are strongly linked to the market but harvest only a small number of trees from their lands; 60% earn less than USD 250 per year.

Processing of timber and development of products requiring more sophisticated manufacturing know-how, and infrastructure are quite limited in the case studies. Indeed, natural forest management requiring significant capital investments, the development of management plans, and the use of techniques for reduced-impact logging is often beyond the reach of rural communities (e.g. Nepal [16]), or these activities are undertaken with the support of companies (e.g. Brazilian Amazon [1,3]). Nevertheless, the case from Mexico [8] offers an example of where access to credit enabled the ejido of San Diego de Tezains to develop production, from supplying raw materials to independently producing and selling wood products.

In many case studies, communities are exploring alternative commercial opportunities that SFM might offer, for example: beekeeping (Guatemala and Peru [8], The Gambia [19]), branchwood sales and handicrafts (Bolivia [8], The Gambia [19]), copaiba oil and Brazil nuts (Acre, Brazil [1], Bolivia [5]), thatch and fodder collected from exclosures (Ethiopia [18,27]), polewood (Mexico [7]), and cinnamon (Madagascar

[20], Figure III 3.4) among others. The control of invasive *Prosopis juliflora* has created significant commercial opportunities for cooperative producers in Ethiopia, both for charcoal and animal feed, and has also created more than 200 000 man-days per year of employment. In Quintana Roo (Mexico [7]), the diversification of commercially important forest products (e.g. polewood, charcoal, and several sawtimber species) is related to the emergence of a strong regional market. Today, tourism development and major cities in the region absorb a large proportion of forest production. Plantations on private land or agroforestry have been developed in, for example, Guatemala, and Colombia [8]. In Bolivia [8], the community created a micro-enterprise to provide services for commercial inventories and reduced-impact logging techniques, capitalising on the knowledge acquired through technical assistance.

A number of the case studies illustrate efforts to diversify commercial opportunities, responding to evolving societal objectives. For example, several references are made to conserving or enhancing ecosystem services that the forests provide. In the Ethiopia [18] and India [13] case studies, reference is made to efforts to capitalise on carbon markets. Ecosystem services also create commercial opportunities related to tourism, especially ecotourism, and at the same time conserve the cultural heritage and spiritual links to forests (e.g. Argentina [2], Guatemala [8], and Mexico [7,8], India [13], Thailand [17], Mozambique [21], FBIH [23], Spain [25]). The case studies make clear that an array of objectives is being pursued in SFM beyond timber production for commercial purposes. For example, in the Argentina case, the Model Forests aim to conserve water quality and quantity, create opportunities for ecotourism, manage areas for grazing cattle and goats, produce fuelwood and fodder, protect biodiversity, and favour carbon sequestration. The diversification of commercial and livelihood strategies is viewed as a strategy to reduce pressure on forest resources.

Examples of industrial forestry

Although most of the case studies focus on community-based initiatives, reference is also made to efforts to increase industrial forestry operations. In Acre, Brazil [1], for example, considerable emphasis has been placed on industrial forestry, utilising different business development strategies. The state government has sought to attract investment from outside Acre to foster industrial development based on certified timber. In this case, public and private timber companies established links with rubber-tapper communities to secure wood for furniture, flooring, doors, and windows for export markets and furniture for local markets. An Export Production Zone was created to attract Brazilian logging companies. These efforts were complemented by initiatives to increase commercial opportunities for community-based ventures. For example, efforts focused on improving the processing, packaging, storage, and marketing of Brazil nuts, and a condom factory was established to ensure a robust market for rubber. In Acre, the state government pursued a balanced approach to capitalise on industrial investment and know-how and at the same time foster opportunities for community-based operations. Businesses in Acre are also promoted through product fairs.

The China case [12] points out that large industrial companies have the advantage of good access to international markets. In this case, benefits accruing to local community members are primarily limited to the creation of job opportunities, similar to the Indonesian case on industrial forestry concessions [15]. In the South African case [27], private companies support out-grower schemes, providing capacity-building opportunities to small producers for forestry enterprise development.

Approaches to enhance commercial opportunities from SFM

The cases from Acre, Brazil [1,3], Argentina [2], and Guatemala [6,8] mention efforts to strengthen value chains for forest products, including the following approaches:

- formation of cooperatives and associations to represent Brazil nuts, rubber, and copaiba oil producers targeting European markets [1] and to assist communities in drawing up forest management plans and negotiating with timber buyers [3]
- state-sponsored programmes to facilitate improved market access for forest households and communities producing NTFPs and to address the challenges of quantity, variable quality, and connecting producers with promising buyers[1]
- support to local cooperatives linked to Model Forests to promote the commercialisation of handmade products in national and international markets and efforts to strengthen the value chain from raw materials to final products [2]
- creation of a second-tier organisation, Community Enterprise for Forest Services, S.A. (FORESCOM), to provide and channel technical and business services to community forest enterprises [6,8]

Several case studies also refer to encouraging cooperative systems (e.g. Mexico [7,8] and FBIH [23]), including the pursuance of group certification (Acre, Brazil [1], Argentina [2], Bolivia [5], FBIH [23], Indonesia [15], Spain [25]). With regards to certification, the case studies indicate that, overall, this market-based instrument has not led to price premiums

(see Mexico [7] and Indonesia [15]), but it has helped foster a more comprehensive understanding of SFM and has been seen as strategic to ensuring access to important markets. Both industrial and community-based forestry enterprises have at times attracted support from NGOs and international organisations, once they commit to pursuing certification.

The Spain case study [25] describes the development of an innovative information and support system with web-based information to facilitate timber sales involving multiple sellers, including the registration of bidders. Producers have access to up-to-date information on the value of their timber, and linkages to potential buyers are facilitated. This approach has made commercial timber transactions more transparent in the case study area.

3.8.2 Aspects constraining enhancement of commercial opportunities

Limited forestry enterprise development

A common constraint that permeates a number of the case studies relates to the limited capacity for forestry enterprise development. Here, the term "limited capacity" is used in a broad sense, encompassing limited processing capacity (often due to lack of capital for investment), scant business management skills (few, if any, training opportunities for forestry enterprise development), and deficiencies in important technical skills (associated with scant capacity-building opportunities). Lack of technical and managerial knowledge has resulted in community-based operations being vulnerable to unscrupulous buyers of timber and internal problems of corruption.

Bureaucratic bottlenecks

Several case studies describe examples of bureaucratic bottlenecks created by public sector institutions that effectively impede the operational and commercial success of community-based forestry enterprises. A myriad of bureaucratic requirements, procedures, and fees augment the difficulty and costs of doing business. In Nepal [16], where forest policies, laws, and institutions are largely protection-oriented, the imposition of administrative requirements serves to dissuade timber harvesting and trade. In other countries, technical and regulatory requirements are imposed (e.g. forest inventories and management plans), without providing access to training to adequately meet them. When community members and local actors must engage with public sector officials for permits, for example, they subject themselves to unbalanced power arrangements in which they are quite vulnerable to corruption and decision-making that lacks transparency.

Constraints related to timber transport

Once permits are secured for timber harvesting and commercialisation, another constraint relates to transport of timber to the market. Local officials often take advantage of timber being transported through their jurisdictions to charge illegal fees. The transport-related corruption can lead to a decision to restrict timber transport since accessing markets further afield is too costly and stressful (e.g. Nepal [16]).

Lack of land tenure or use rights

Lack of land tenure limits opportunities to take part in timber harvesting and other commercial activities related to forests. This issue is treated in more depth in section 3.1 of Part III.

Problems of illegality

Various examples in the case studies illustrate how illegality constrains commercial benefits derived from SFM. Throughout the world, illegal loggers sell timber and fuelwood at reduced prices, creating unfair competition for legal forestry operations. Timber theft in areas under management undermines conservation and commercial objectives. Unrestrained illegality reflects weak institutional capacity of the government and/or the presence of corruption among government officials. On the other hand, complex legal requirements and bureaucratic bottlenecks create conditions that make timber harvesting outside the law a more attractive alternative (Figure III 3.5).

Institutional and societal objectives do not align with commercial timber production

A number of case studies illustrate that public sector institutions often implement policies that essentially block community involvement in the commercial harvesting of timber. In Cambodia [11] and Thailand [17] case studies, emphasis has been focused on traditional use, with no efforts to further commercial interests. Timber harvesting has been prohibited in exclosures in Ethiopia [18,27], but collecting honey, frankincense, and other NTFPs is permitted in areas undergoing restoration. Harvesting has also been prohibited in highland forest reserves in Uganda [22], limiting commercial opportunities. In the United States [10], timber harvesting has been largely curtailed on public land in order to protect endangered wildlife species, particularly the spotted owl. The resulting drastic reduction in timber rents has led to a downsizing of the forest service and loss of employment. As in the case of Ethiopia,

Figure III 3.5 Timber products produced without management plans and harvesting permits for sale in a local market. Cumbersome regulations and lack of resources and capacities often push local actors into illegal production. ©Marko Katila

some local actors in the US PNW [10] have taken advantage of opportunities to participate in forest restoration activities with governmental support. The development of small-scale enterprises that produce value-added products has also received some federal support.

Market-related constraints

Some case studies (e.g. Amazon [1,3]) emphasise the lack of secure market access, a common problem when communities are situated in remote regions. Communities can also face problems in producing final products having the quality required by buyers, which can prevent communities from obtaining remunerative prices. In other cases, a small number of buyers control prices, putting community-based operations in a disadvantageous situation (e.g. Mexico [7]). Another common constraint relates to the limited availability of commercial species. In Mexico and Guatemala [6], the species mix varies among communities, with some enjoying a greater preponderance of high value species. Finally, markets are subject to considerable fluctuations for both timber and NTFPs, putting forestry enterprises involved in SFM at risk, especially during economic downturns.

3.9 Collaboration between forest industries and communities or small-scale farmers

In the case studies from developing countries where industrial forestry is important, there have also been efforts to develop collaboration between forest companies and local communities or farmers (e.g. Brazil [1,3], Bolivia [5], Guatemala [6], Indonesia [15], Mozambique [21]).

The motivations for companies to engage in partnerships with communities and small-scale farmers can relate to securing raw material or labour or to social responsibility concerns and reputation. Communities, on the other hand, often lack technology, capacities, and finance to embark on large-scale commercial operations. Partnerships can bring employment opportunities, secure access to forest resources, provide capacity development, and also include infrastructure development and social services (Mayers and Vermeulen 2002).

Various kinds of partnerships have developed between forest companies and communities or small-scale farmers. They can be divided into different types: joint ventures, co-management, out-grower schemes, corporate social responsibility projects, support to farm forestry, community or farmer lands

leased by companies, forest concessions allocated by communities to companies or companies contracted for logging, group/community certification with company support, and environmental service agreements (adapted from Mayers and Vermeulen 2002). Of these potential forms of collaboration, only some are presented in the case studies analysed in this volume.

In Brazil [3], some communities contract timber companies for logging and transport. Timber prices are negotiated beforehand. Companies can also be in charge of all production activities and bear logging costs. The company-community partnership can help reduce risks, because companies are in a better position to process timber and have better market access. However, communities often lack negotiating power and companies may pay too little for products originating from community-based operations. Sometimes other complementary benefits are also negotiated (e.g. roads, local employment).

In Mozambique [21], company-community partnerships have been regarded as a way to bring economic benefits to local communities. Community consultation and approval is required prior to allocation of exploitation rights to third parties and 20% of forestry tax revenues are earmarked for allocation to communities. Consultations are meant to provide a platform for the establishment of a partnership between forest operators and local communities. Community committees should be established to represent the community and receive and manage the funds. However, the consultations and the decisions taken, particularly the promises made by the forest operator, are often not taken into account in practical operations, and apparently there is no clear mechanism to enforce compliance.

In South Africa [27], as a response to the land restitution policy that has created uncertainty over land rights, the private forest industry has embarked on a voluntary land-redistribution scheme where land ownership is voluntarily transferred to local communities and then leased back to the industrial forest grower-processor for two crop rotations, along with strong technological support and extension services that is made available to new landowners. Pilot-scale land transfers under this scheme have already taken place, and it appears to be a more workable solution than forced land redistribution. Several out-grower schemes are also in operation in South Africa in which the company usually provides the seedlings, technical support, and even loans and guarantees to buy the timber produced (Howard et al. 2005).

The case study from China [12] concludes that the main forms of community and local stakeholder involvement in the three case companies have been fairly similar, having a philanthropic emphasis and a narrow understanding of the stakeholder concept and community involvement. Corporate social responsibility activities are driven by company needs. Attempts to involve local communities emerge only after conflicts arise. Stakeholder management is more reactive than proactive, aiming to minimise conflict, not to solve the roots of some future conflict.

The case study from Italy [27] demonstrates a partnership between a company providing drinking water and small-scale forest owners. With a slight increase in the water bill, the company is able to compensate forest owners for converting their coppice forest into even-aged stands within the catchment area. Compensation helps forest owners to cover the cost of changes in management practices and land-opportunity costs.

Increasing tourism creates new opportunities for forest communities and forest owners. For example, in Quintana Roo in Mexico [7], there is no industrial forestry in the region in the sense of large for-profit timber corporations. In many cases, local companies and individuals conduct logging operations, operate sawmills, and commercialise forest products; in others, ejidos possess an integrated vertical structure, participating in all the aspects of forest management. However, in recent decades, the demand from the tourism industry for forest-based products has been another type of industrial presence that can affect SFM in the region. The tourism industry demands timber and non-timber resources from the forest and, most importantly, labour from the communities. However, the tourism industry rarely collaborates or engages directly with communities. The impact of tourism on SFM is still not fully known.

The tourism industry also poses demands for attractive forest environments, emphasising the forest's aesthetic features. In northern Finland [24], industrial forestry has historically been important; however, nature-based tourism is now the strongest growing industry that uses natural forests, though it uses them in an untraditional way. This has led to conflicts between the interests of the tourism industry and the state organisation responsible for forest management on state-owned lands.

3.10 Capacity-building and technical assistance

Capacity-building and technical assistance are recognised as vital in efforts seeking to further SFM. The majority of the case studies that address capacity-building and technical assistance indicate that considerable efforts have been made to provide these important services. By its very nature, however, capacity-building is a broad concept and the case studies reflect a high degree of variability in terms of institutional support provided, target groups, topics covered, continuity, and issues of scale.

3.10.1 Organisations involved in the provision of capacity-building and technical assistance

Although governmental organisations have played a key role in capacity-building and technical assistance in a number of the case studies, these activities are commonly driven by international initiatives, often with NGO support. This overall tendency is not surprising, taking into account that SFM has often been promoted and funded by the international cooperation. This implied dependency of capacity-building programmes on support from NGOs and international organisations makes these services vulnerable to fluctuations in funding from the donor community.

In a few cases, explicit reference is made to the fact that capacity-building and technical assistance programmes are lacking, commonly due to human and financial limitations of public sector institutions. The lack of capacity-building is seen to be especially problematic in contexts characterised by conflict and resource degradation (e.g. Cambodia [11]) and land-use change (e.g. Mozambique [21]) and in countries where legal requirements related to SFM are becoming more complex (e.g. Nepal [16]).

The case study in South Africa [27] highlights the role forestry companies have played in the realisation of capacity-building programmes, primarily related to out-grower schemes to encourage new enterprise development.

The case studies that focus on Model Forest initiatives in Argentina [2] and Spain [25] highlight cooperation among diverse stakeholders in capacity-building and technical assistance. This cooperation appears to expand access to capacity-building to a broader constituency of stakeholders and would appear to favour programme continuity over time.

3.10.2 Target groups

When viewed broadly, the case studies make clear that a wide range of stakeholders require capacity-building and technical assistance: from decision-makers to persons directly involved in management activities in the forests and in the harvesting and processing of timber and NTFPs. In between, persons involved in management, education, extension, and other functions also require capacity-building. As objectives evolve, the knowledge and skills to carry out SFM also change, creating special challenges for capacity-building and technical-assistance programmes alluded to later in this synthesis.

Several case studies emphasise that capacity-building and technical assistance are primarily made available to only a portion of the stakeholders. This is often due to limited financial and human resources available to carry out these activities.

3.10.3 Topics

In relation to capacity-building, the case studies refer to a variety of necessary topics, including;

- technical skills related to agroforestry, bioenergy, biodiversity assessments, natural forest management, reduced-impact logging, volume determination, plantation forestry, preparation of management plans, and environmental impact assessment
- leadership and management skills
- commercialisation and financial issues like enterprise development, tourism, value chains, microfinance, ecosystem services, and REDD+
- topics related to policy instruments, norms, regulatory framework, and governance, such as legality verification, lobbying, and advocacy
- social issues such as conflict resolution

This partial list gives a sense of the breadth and complexity of the capacity-building and technical assistance needs identified in the case studies. While many of the studies indicate a primary focus on technical aspects in their capacity-building programmes, others seek to empower civil society groups to participate more effectively in SFM by enhancing their knowledge of policy instruments, norms and regulations, and commercial opportunities.

Communities and companies pursuing forest certification must comply with a broad set of principles and criteria. For that reason, in the case studies in which forest certification is being pursued or sustained, capacity-building programmes tend to be more comprehensive in nature. However, the lack of trained certification auditors has created problems (e.g. Indonesia [15]), since poorly trained and inexperienced auditors make poor recommendations and can undermine the credibility of certification.

3.10.4 Challenges

As indicated previously, capacity-building and technical-assistance needs evolve in a continuous fashion, making it necessary to introduce new topics and information over time. As the Acre, Brazil, case [1] points out, the expansion of training and technical-assistance needs can often outpace the development of local capacity, creating weak links and gaps in capacity-building programmes. Only a few case studies explicitly address this challenge (e.g. Acre, Brazil [1], Argentina [2], The Gambia

[19]), and little reference is made to incorporating lessons learned into capacity-building programmes to increase their quality and effectiveness over time.

Another challenge relates to the importance of ensuring continuity for capacity-building and technical-assistance programmes. Since resource needs for the provision of these services are, in many cases, at least partially met through donor assistance, capacity-building programmes are vulnerable to reduced support, as indicated earlier. Efforts to augment co-operation among stakeholders, for example in the Model Forest initiatives in Spain [25] and Argentina [2], represent one promising strategy for mitigating excessive dependence on donor support.

Many initiatives seeking to promote SFM tend to focus on specific regions within a country. A common challenge, especially taking into account the limitations facing many institutions, is how to scale out capacity-building and technical-assistance programmes to integrate dispersed communities and farmers. The formation of local trainers, fostering of exchanges or "cross visits" among communities, and building on traditional practices are three strategies mentioned in the case studies to address this challenge (e.g. Mexico [7,8], India [13]; see also the cases from Guatemala and Colombia [8]).

A pervasive challenge facing capacity-building programmes in the case studies is that programmes often concentrate on developing tools and technical skills to carry out specific activities such as forest management, nursery management, and plantation establishment, with less attention given to developing capacities related to markets, institutional development, leadership, etc. Others point out, however, that the viability of SFM requires underlying capacities that are harder and often more time-consuming to develop (see Potter and Brough 2004), skills related to staff, structures, systems, and roles that are necessary to consolidate SFM initiatives – the institutional support. As many case studies point out, knowledge and know-how can be essentially orphaned without adequate institutional support. This challenge might be called the challenge of institutionalising SFM.

3.11 Access to capital

This section explores the dynamics associated with formal and informal access to capital in the forestry operations analysed in the different case studies. The forestry operations range from large-scale industrial operations to a variety of local small-scale forestry operations, which in many cases take place outside of the law. The synthesis is organised around three questions: 1) How do local actors access capital? 2) Have efforts been made to create formal mechanisms that provide capital to local actors involved in forest-related activities? 3) How have investments in forest-related activities impacted traditional uses of forests?

3.11.1 Access to credit in the forestry sector

For actors in the forestry sector, the access to finance is quite heterogeneous. Both formal and informal finance systems co-exist in the sector. Some countries or regions tend to capture more credit, due to the pre-eminence of timber industry supply; in others, informal sources of credit are widely available and tend to target large-scale timber management and plantations and some small-scale tree planting – only in a few cases targeting NTFPs. Interestingly, in a few case studies from developed economies, some formal credit is being channelled to activities related to the biomass sector and forest-based recreational activities.

Where there is a more important forestry sector, such as the cases in Canada [9] and Finland [24], capital is available through formal channels, mainly commercial banks. The US PNW [10] is noteworthy to highlight because access to capital has been a significant problem since the financial crisis in the late 1990s for both large sawmills and smaller operations focused on small-diameter material. Many factors contribute to this problem, including a progressive contraction of the industry, decline of independent rural banks, and lack of reliability of timber supply due to constraints on harvesting imposed by environmental legislation. Currently, there are some government loan and grant programmes, especially for biomass development and conversion to small-diameter processing (both in the woods and mills). Government energy funds, however, tend to focus on very large facilities, too large to contribute to sustainable biomass energy development in this region. Micro-loan funds are typically too small to be helpful, even for small operators. Some state and federal loan and grant programmes, such as Fuels for Schools, have helped, for example, to convert a small number of public buildings to wood heating or to purchase harvesting equipment and the like. In general, communities have poor access to capital.

In other cases, where there is an important presence of smallholders depending for their livelihoods on forest-based activities, such as in the Brazilian Amazon [1] and Mexico [7], formal sources of credit have been put in place through commercial banks, often state development banks. For example, in Acre, Brazil [1], several credit lines are operational through the state (e.g. PRONAF Florestal) and through smallholder cooperatives such as COOPERACRE that supports the extraction and marketing of

some NTFPs (e.g. nuts, resins). It is noteworthy that smallholders in Brazil have placed a low demand on formal credit lines in spite of the fact that they must have credit to cover the fixed costs of their forestry operations. Often communities do not meet established criteria to access commercial credit lines (e.g. land title, collateral), suggesting that access to formal credit lines persists as a main issue in small-scale forestry. A similar situation occurs in Mexico, where farmer access to capital comes primarily from state and federal assistance programmes; and communal associations (*Sociedades Civiles*) mostly survive from these funding sources. So, the availability of credit in remote rural areas is an important issue without a satisfactory resolution as yet.

Several informal mechanisms constitute an important source of finance for smallholders undertaking timber management, collection of NTFPs, or tree planting. For example, in Mexico [7], smallholders tend to rely on the *tandas*, rotational credit associations that constitute an alternative to bank loans. In the Bolivian northern Amazon [5], there is an extensive system of *habilito*, which is a form of advance payment provided by industry to intermediaries and from these to smallholders or land estate holders in order to cover the operational costs required to undertake Brazil nut collection in the forests. In Guatemala [6], social forest concessionaries have access to capital through advances from wood buyers, which is also the case across several locations in the Brazilian Amazon [1,3]. In Ethiopia [18], lack of collateral reduces the smallholders' ability to secure capital from banks. Yet, these farmers have some access to capital through an informal finance mechanism known as *iquib* (saving clubs), although forest-related activities are not significant except for the selling of wood from the small woodlots around homesteads.

In Cambodia [11] and Nepal [16], the formal sources for financing forest-related activities are also weak or non-existent. In Madagascar [20], credit for forest activities is generally poor, and while microcredit exists, it is used by few farmers: the main source of capital is the sale of assets, mainly cattle. This also applies to other cases, such as in the Brazilian Amazon [1,4] where cattle constitute the main source of savings and the means to finance other productive activities or the source of capital for responding to external shocks, when required.

3.11.2 Efforts to improve financing for forest management

Some efforts can be observed in several countries to improve finance for forest-based activities, mainly timber management. In Acre, Brazil [1], the state government has invested heavily in programmes (e.g. *Sistema Estadual de Incentivos a Serviços Ambientais*) that include mechanisms for financing the transition to sustainable practices, backed up by technical assistance, and infrastructure investments. In Argentina [2], the government has contributed to enhancing the use of forestland and improving local livelihoods of indigenous communities and small farmers through expanding bank loans targeting SFM. In Uganda [22], similar efforts are being put in place by the government with support of a donor-funded programme that provides funding to private landholders to establish forest plantations. In general, however, large companies have benefitted most, while small farmers face difficulties in meeting the conditions. Also in Uganda, government funds obtained from the African Development Bank (AfDB) have also helped communities and private individuals plant trees, and some microfinance institutions provide loans to farmers. In Ethiopia [18], a severe lack of access to capital has led to implementing actions in land and forestry rehabilitation, mainly building erosion-control structures inside selected areas through Food for Work programmes.

In BIH [23], formal channels to access financial incentives have been developed for all actors by specific instruments prescribed by the Law on Forest 2002. For public forestry companies, some channels to access capital were also provided by various international organisations such as the World Bank, FAO, SIDA, USAID[4], and others. In Indonesia [15], access to capital is a major issue for small- and medium-sized enterprises and community forests that require significant capital in order to comply with the national Timber Legality Assurance System, labelled SVLK. There are efforts in that country to provide some sources of financing to help cover costs, mainly through government subsidies, and some limited resources for smallholder certification are channelled by NGOs. Nonetheless, as mentioned earlier, in most of these cases, one of the main issues facing rural credit, mainly for forest-based activities, is the lack of farmer collateral, thus limiting the penetration of credit to the most accessible areas, where transaction costs are lower.

In a few cases, recent expansion of informal sources of credit has become evident, such as increasing informal financing of forest operations by Chinese timber merchants in Mozambique [21] that provides financial facilities to local operators to cut

[4] Food and Agriculture Organization of the United Nations (FAO), Swedish International Development Cooperation Agency (SIDA), United Sates Agency for International Development (USAID).

down trees and secure the market for logs. This has, however, been identified as a factor driving illegal logging in this country.

3.11.3 Effects of investments in traditional forest-use practices

The effects of investments in forest management, harvesting of NTFPs, tree planting or recreational activities on traditional forests use and management practices are poorly known. Unfortunately, the case studies undertaken do not provide enough information to assess potential implications, but two main situations can be observed. On one hand, in most cases formal finance supports timber extraction, which constitutes a market-oriented activity and has tended to displace some subsistence-oriented traditional forestry practices, mainly those related to the harvesting of NTFPs. Yet, the final outcome on smallholder livelihoods is difficult to decipher. On the other hand, funding provided through informal sources tends to support smallholders' relatively diverse livelihood portfolios. In this latter situation, both market conditions and smallholder preferences define the activities for investment. Yet, those selected are often the ones providing higher income streams, which in the long term tend to affect traditional forests uses. In a few exceptional cases, such as in Bolivia [5] and Brazil [1,3], smallholders have invested in, for example, harvesting of Brazil nuts or rubber-tapping, which contribute to secure traditional-forest-based livelihoods that at the same time tend to protect forest resources.

3.12 Security and conflict

Issues of security and conflict were included in the analytical framework for the case studies, recognising the often antagonistic relationship between these issues and progress towards SFM. Conditions that impede SFM, such as unclear land tenure, illegality, and policy-driven land-use change, often lead to conflicts (Ejigu 2006). This section provides an overview of issues of security and conflict and their effects on SFM demonstrated in the case studies.

In 10 of the case studies, issues of security and conflict are not considered problematic. In all of these cases, outcomes related to contributions of forest resources to local livelihoods are perceived to be positive. In a similar fashion, outcomes related to forest condition and extent are seen to be stable or positive. In contrast, in the 14 case studies where conflicts are still pervasive, outcomes relating to forest condition and local livelihoods are much more mixed: only three cases report positive trends with regards to forest condition and six with regards to contributions to local livelihoods. In the remaining cases, outcomes are seen as negative or unclear since both positive and negative outcomes are sometimes shown in the same case.

3.12.1 Case studies in which issues of security and conflict are not considered problematic

In at least two of the cases in which security and conflict are not considered problematic, the reality was quite distinct in the not-too-distant past. In Acre, Brazil [1], drug cartels and death squads, coupled with widespread government corruption, led to severe problems of governance and public safety. In past two decades, however, remarkable strides have been made to strengthen the regulatory framework, increase the effectiveness of government institutions, and enhance the participation of different stakeholders in SFM. These notable efforts have greatly diminished the conflicts that characterised Acre, while also reducing processes of deforestation and creating opportunities to generate economic benefits from forest-related activities.

In Ethiopia [18,27], the extreme degradation that characterised the case study areas was partly a consequence of conflict and war. The establishment of exclosures has been implemented to rehabilitate degraded land, and although this measure has restricted access to some areas used for traditional grazing (resulting in increased tree cover), the environmental benefits of restoration are perceived to have improved rural livelihoods by increasing the availability of grass for livestock, poles for construction, and employment opportunities for soil and water conservation activities.

3.12.2 Case studies in which issues of security and conflict are considered problematic

More than half of the case studies report problematic security and conflict issues that affect progress towards SFM. The underlying causes of these conflicts vary but generally fit into the following broad categories (these and other types of conflicts arising in natural-resource management are categorised in Warner 2000):

- Disputes over land tenure, resource ownership, and use: Several case studies report problems related to land and resource ownership. Although many cases indicate significant progress with regards to the granting of land tenure or use rights to local communities, there are exceptions. In several case studies, governments retain ownership of forestland and natural resources and establish conservation areas or grant concessions to private companies to stimulate investment and production that will drive economic growth. The economic land concessions in Cambodia [11], the encouragement of foreign direct investment in Mozambique [21], the establishment of plantation forests in China, and forest conservation policies in Thailand [17] are manifestations of policies that marginalise local communities involved in forestry and ignore their customary rights, leading to tension and conflicts.
- Security issues affecting SFM: Issues of security and illegality are problematic in several case studies. Illicit activities such as drug trafficking, hunting of wildlife, and looting of archaeological sites pose a serious threat to the forestry concession process in the Peten, Guatemala [6]. Similar problems are found in neighbouring Quintana Roo, Mexico [7], where some conflicts between ejidos is related to illegal logging, despite the fact that illegal logging in Quintana Roo is moderate compared to elsewhere in Mexico. In Madagascar [20], cattle thieves hide stolen livestock in forests and have been reported to burn forests to cover their tracks. Finally, in South Africa [27], isolated incidents of crime, including arson in plantation forests, robbery, and murder, have had very negative impacts on SFM.

The case studies suggest that progress towards SFM is enhanced when effective mechanisms and conditions are in place to manage and/or avoid serious conflict. For example, as shown in the case study from Thailand [17], conflict mediation helped transform the prolonged conflict between the local community and national park authorities towards long-term cooperation in forest management. The cases also make clear that security issues and illegality commonly represent serious threats to SFM. The complexity of these problems makes clear the challenge in adequately addressing them.

3.13 Research and monitoring

Since the UN Conference on Environment and Development in Rio de Janeiro in 1992, numerous international initiatives have worked to define SFM and to establish monitoring and reporting protocols and standards for tracking its progress. These efforts have resulted in both global and regional criteria and indicator (C&I) sets for evaluating and tracking the implementation of SFM.

All the countries in which the case studies are located are involved in some of these global or regional C&I processes. Many countries have also translated the general C&I sets into C&I specific at the country or subnational level. This process also includes the development of applied research programmes to generate baseline data of local conditions and to track change.

The case of the Argentina Model Forests [2] is the only one of the analysed case studies in which explicit reference is made to the establishment of local indicators to develop a local monitoring system based on solid scientific information. Nine other case studies report on different types of monitoring activities, mainly focused on monitoring forest extent and condition – in some cases monitoring socio-economic indicators, biomass, or endangered species (Acre, Brazil [1], Bolivia [5], Canada [9], US PNW [10], India [13], Finland [24], Uganda [22]). Systematic monitoring is required by certification systems (Indonesia [15]).

In Guatemala [6], the system for monitoring community concessions is in place, but the generated information is not effectively used to orient management practices or to improve management plans. Often, forest management activities are monitored and controlled by a community organisation, as for example, in the case of Cururú in Bolivia [8], which includes supervision and technical and administrative control of activities and surveillance to detect and control unauthorised entries. In many case studies, monitoring systems are under development but have not yet been put into practice (Mexico [7], Cambodia [11], Indonesia [14], Ethiopia [18], Mozambique [21], Spain [25], South Africa [27]).

The gap between C&I systems and current practices for forest management is so wide that progress in SFM can best be made through an adaptive management approach that provides a framework for incorporating new knowledge generated by learning and research into the development and implementation of appropriate, locally adapted practices.

The case study on forest monitoring in Europe [26] shows how forest monitoring can provide information relevant to clean air policies, political processes related to SFM, and regional forest policy-making. The International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) of the Convention on Long-range Transboundary Air Pollution (CLRTAP) reveals effects of air pollution on forests, conducts risk assessments, and assesses the effectiveness of air-pollution abatement measures. Its results contribute to the scientific basis for clean air policies

under CLRTAP. Under this convention, monitoring and research have been closely connected to policy-making, which has contributed substantially to its success.

The increasing complexity of forestry problems is reflected in forestry-related research needs. Numerous topics, such as climate change, food security, and water availability, are significant to forest policy-makers and are of high interest to different stakeholders. Also, as indicated by the case studies, SFM is carried out in a myriad of different social and cultural conditions that must be understood in order to develop measures to address forest-related challenges. This emphasises the need for interdisciplinary research.

One-third of the case studies report on SFM-related research. Yet, there is great variation among the case studies, ranging from locations that have been the focus of considerable research efforts to locations with very little research. Research has focused on diverse topics, for example on topics related to forest policy and governance, certification, biodiversity conservation, livelihoods, and cultural issues (e.g. Acre [1], Argentina [2], Mexico [7], US PNW [10], Madagascar [20], Mozambique [21], Uganda [22], Finland [24]). However, in a significant number of these studies, research activities have focused mainly on specific technical issues such as plantation management, agroforestry, forest management practises, adaptive management, and greenhouse gas emissions (e.g. Brazil [3], Bolivia [5], Guatemala [6], Mexico [7], Canada [9], China [12], Ethiopia [18,27], Indonesia [15], BIH [23], Madagascar [20], Mozambique [21], Uganda [22], Italy [27], South Africa [27]). Technological innovation and research to add value to forest products and services are reported to have supported SFM in the case studies from Guatemala and Mexico [8].

Even though the reported research indicates that some progress has been made, considerable efforts are needed to provide research-based information to advance SFM at different scales. However, in many parts of the world, there has been a paradoxical reduction in research capacity, precisely when the complexity of forestry is increasing and the need for information is greater than ever. Therefore, the allocation of more financial and technical support and cooperation is urgently needed to strengthen SFM research capacity (Galloway et al. 2010), especially in developing countries.

Interactions among prerequisite conditions

Glenn Galloway, Pia Katila, Wil de Jong, and Pablo Pacheco

This chapter focuses on the interactions among prerequisite conditions, which, based on the case studies analysed in this volume, seem to support or hinder progress towards SFM. Section 4.1 describes the most important interactions among the prerequisite conditions related to policies institutions and governance, while 4.2 focuses on those related to livelihoods, capacities, and socio-economic conditions. In reality prerequisite conditions interact among themselves in various, complex, ways, and in 4.3 we draw attention to some of the main interactions across realms that seem to be important to forest cover and condition and forest-related livelihoods. In that section (4.3), the observed interactions are related to the perceived trends in forest and livelihood outcomes. The information about the perceived trends in the outcomes is based on the informed assessment of the authors of each case study. It is important to note that it relates to the particular trends observed in each specific case; it does not necessarily describe the situation in a wider area or the whole country since in several case studies the outcomes relate to specific projects.

4.1 Interactions among prerequisite conditions relating to policies, institutions, and governance

4.1.1 Synergistic interactions

Policy alignment

Positive trends in livelihoods and forest condition are supported by alignment of different sectoral policies and policy implementation. Synergies among agricultural and forest policies, the recognition of customary rights, and institutions and programmes that support sustainable local-level forest management are related to reported positive trends, for example in the case studies from Acre, Brazil [1], and Argentina [2]. In Acre, comprehensive policy and regulatory reforms were supported by mobilising resources, extension services, credit, and links with agricultural policies that led to intensification and reduced pressure on forests. In Ethiopia [18,27], tenure changes on agricultural lands have supported forest rehabilitation by partly reducing pressure to use hillsides for cultivation. Synergies can also be observed among water and forest policies in a watershed area in the case study from Italy [27], in which maintaining forest cover is supported by compensating forest owners for the ecosystem services they provide for maintaining water quality and ground water.

Stakeholder participation and strong communal institutions

The case studies from Mexico [7,8] and Urbión, Spain [25], show how strong communal institutions with effective internal rules for regulating forest use and benefit sharing are instrumental for community-based management. These institutions also need to be formally recognised and respected. As these case studies demonstrate, strong local forest-management institutions are often based on long-term cultural and economic links to forest resources. The important role of effective participation, stakeholder cooperation, and strong organisation in SFM is also reported in the case studies from Guatemala, Peru, and Mexico [8].

Stakeholder participation is important for developing legitimate policies and programmes at different scales. Different platforms for negotiation are linked to positive outcomes at local and regional levels. In the case studies from Argentina [2] and Spain [25], the platform is provided though the Model Forest initiative that brings together different stakeholders. The cases from US PNW [10] and Canada [9], on the other hand, demonstrate how different stakeholders with competing forest values were able to come together to negotiate and agree on the use of vast forest areas.

4.1.2 Discord among prerequisite conditions

Forest policies undermined by unclear rights to forests and trees

Even when policies to support and promote SFM exist, they can be undermined by unclear or unsecure rights to forests and trees (e.g. Cambodia [11], Indonesia [14,15], Ethiopia [18], Madagascar [20], Mozambique [21]) leading to unsustainable practices and weakening the legitimacy of local institutions. This often results when customary rights to resources are not legally recognised or when there is friction between the legal rights and the status of local actors, customary rights, and rule systems. Despite a shift towards recognising customary rights, the recognition of these rights is still weak in, for example, Indonesia [14,15], Thailand [17], and Madagascar [20]. In India, the constitution recognises customary rights and rules, but this has not been respected by state and national governments [13].

Conflicting policies, lack of coordination, and ineffective implementation

In many cases conflicts between forest and other sectoral policies, especially in agriculture and mining, and those seeking to promote large-scale investment in land resources undermine policies aimed at supporting SFM and local livelihoods (e.g. Argentina [2], Mexico [7], Cambodia [11], China [12], Indonesia [14,15], Mozambique [21]). Sectoral policies are often developed in isolation without considering the realities of local people, especially their reliance on livelihood strategies that often combine forest-based and agricultural activities (e.g. Madagascar [20]).

Policies to promote large-scale investments combined with lack of coordination among public-sector institutions responsible for land management often result in land-use change and loss of local communities to access to forest resources – even to displacement of rural communities. For example, as demonstrated in the case study from Cambodia [11], policies to promote economic land concessions undermine efforts to develop community forest management. On the other hand, strict and ambitious forest conservation policies can also undermine efforts to develop community-based or other local-level forest management and forest-related livelihoods, as described in the case study from Thailand [17].

As the case study from Mozambique [21] shows, ineffective implementation of existing policies can also effectively undermine development towards SFM and towards realising forest-related benefits to communities. Weak implementation and enforcement of forest legislation is also reported to undermine progress towards SFM in Bolivia [5], India [13], and Uganda [22].

In some cases the implementation of forest policies in support of SFM are hampered by institutional weakness related to ineffective and poorly funded decentralisation and de-concentration processes (e.g. India [13], Nepal [16], Uganda [22], FBIH [23]) that lead to inefficiency in the functioning of public sector institutions and high transaction costs that impede the consolidation of SFM.

Issues that undermine institutional reforms supporting community and small-scale forest management

Policies to promote small-scale and community forest management are often weakened by a moratorium or restrictions on timber commercialisation (e.g. Cambodia [11], Nepal [16], Thailand [17], Ethiopia [18], Mozambique [21], Uganda [22]). This reduces opportunities to enhance economic benefits stemming from SFM and leads to diminished interest in participating in SFM on the part of communities. In addition, demanding, cumbersome, and costly bureaucratic processes for approval of management plans and acquiring permits (e.g. Brazil [3], Bolivia [5], Mexico [7], Nepal [16], The Gambia [19], Uganda [22]), and complex contractual arrangements (Madagascar [20]) lead to high transaction costs, increase risks, and can effectively discourage community participation in SFM. Similarly, lack of stability in how forest regulations are interpreted increases risks and uncertainty regarding future possibilities to manage and benefit from forests, as demonstrated by the case study from Nepal [16]. Often, the regulatory reforms that support local forest management and forest-related development are compromised by resistance to change by the forest administration and forest officers, whose dominant views favour state-centred conservation and commercial forestry models (e.g. Bolivia [5], Cambodia [11], India [13], Nepal [16], Thailand [17], Mozambique [21]).

Lack of representation and participation

Policies that seek greater community involvement in forest management can be hampered by arrangements that limit or exclude key stakeholders from forest management and related decision-making (e.g. Canada [9], Cambodia [11], Finland [24]). As reported in the case study on the Canadian Boreal Forest Agreement [9], First Nations were not included in the negotiation process. In northern Finland, lack of effective participation of local inhabitants in forest-management planning on state-owned forestlands has contributed to conflicts.

Favourable policy measures offset by corruption and illegality

Corruption and illegal activities hamper forest-sector development in many countries (e.g. Guatemala [6], Mexico [7], Cambodia [11], Indonesia [14], Nepal [16], The Gambia [19], Uganda [22]). Lack of transparency and unfair competition reduce economic benefits associated with SFM and undermine trust. Illegality is often associated with forest loss and high grading of valuable timber species, leading to a reduction in forest quality.

4.2 Interactions among prerequisite conditions relating to livelihoods, capacities, and cultural and socio-economic aspects

4.2.1 Livelihoods, capacities, and access to capital

In most of the case studies presented, forests are important for local livelihoods. However, the contribution of forests to local livelihoods is location specific, shaped by history and culture, and it can vary among regions, communities, and often also within individual communities. This is demonstrated for example in the case study from Bolivia [5]. Prevailing social relationships within communities, such as hierarchical social stratification in Nepal [16], may interfere with efforts to institute SFM and exclude some stakeholders from forest-related decision-making, thereby weakening the possibilities that these groups benefit from forest resources.

Communities and smallholders often lack the technical and managerial capacities and financial resources needed to engage in SFM – especially in the commercial use of forest resources. For these reasons, the integration of local producers into improved market opportunities is limited or lacking (e.g. Brazil [3], Cambodia [11], Mozambique [21], Uganda [22], FBIH [23]). Capacity-building efforts and efforts seeking to facilitate access to capital are linked to improved market access and thus improved livelihood opportunities (e.g. Argentina [2], The Gambia [19], Spain [25]). As exemplified by the case studies from Argentina and Mexico [8], a combination of capacity-building, locally adapted technological solutions, and financial support have enhanced progress towards SFM.

Capacity-building and technical-assistance programmes are often dependent on external sources and have benefited extensively from international assistance. While this investment has increased capacities of diverse stakeholders, programme continuity is vulnerable to reductions in donor support (e.g. Bolivia [5], Guatemala [6], Mexico [7], Indonesia [15], Ethiopia [18], The Gambia [19], Uganda [22]). Because of the lack of long-term continuity, it is difficult to sustain capacity-building programmes that would be capable of responding to evolving needs (e.g. Guatemala [6], The Gambia [19], Uganda [22]).

In relation to wider societal changes, economic and livelihood opportunities related to SFM are evolving and diversifying from primarily timber production to alternatives such as tourism and ecosystem services (e.g. Argentina [2], Mexico [7], US PNW [10], India [13], Thailand [17], Ethiopia [18], Finland [24], FBIH [23], Spain [25], Italy [27]). These changes often result in changes in forest-related economic opportunities for different stakeholders that are accessible to some while restricting others, for example through increased controls on timber harvesting (e.g. Canada [9], US PNW [10]). In many cases the economic value of the other alternatives is already greater than traditional timber production, as for example in some regions in northern Finland [24]. In the US PNW [10] also, the importance of a timber-based economy is declining while the production of water and amenity services has increased.

4.2.2 Partnerships between communities or smallholders and companies

As the case studies from Brazil [1,3] indicate, partnerships between communities and companies may support SFM and enable communities to better benefit from forest resources, when there are clear and binding agreements that clearly define the distribution of responsibilities and benefits between the parties and when companies comply with the agreements. These partnerships can help to reduce risks, because companies are better positioned to process timber and have access to more attractive markets. However, many communities have limited capacities to negotiate or enforce agreements, and they may receive lower-than-expected income streams or other benefits (e.g. Mozambique [21]). To strengthen their position, in Brazil some communities have established cooperatives to undertake planning, monitoring, transporting, sawing, and trading of timber that originates in community-based projects.

4.3 Interactions among prerequisite conditions across realms

The previous section emphasised the importance of situating the discussion on SFM in the specific local cultural and socio-economic reality. In addition, the extent and condition of forests are instrumental in defining the opportunities for forests to provide various products and services for local communities and smallholders and for society at large. Since variability in forest condition greatly affects the potential of communities to derive benefits from the resource, it also shapes their incentives for forest management.

4.3.1 Synergistic interactions leading mostly to positive trends

In many of the case studies analysed in this volume, the trends in forest condition and livelihoods seem to be mostly positive. They also demonstrate that the more comprehensive and synergistic the measures implemented to advance forest-related local development, the better the results. The following examples demonstrate this synergistic interaction across realms in very different situations. The comprehensive efforts in Acre, Brazil [1] provide an invaluable example of how measures in different realms interact to achieve desired impacts. The successful development was built on strong cultural and economic history and social movements that created a strong local demand for reforms. The important measures in Acre have included synergistic policies, where the intensification of the agricultural production systems was combined with strengthening the rights to forest resources; policies supporting SFM including 1) sustainable logging systems, 2) state-provided rubber subsidies, 3) environmental service schemes, and 4) investment in non-timber and timber market chains and cooperatives that provided alternative livelihoods for many extractivist families. However, even with this sustained effort, pressures on forests associated with evolving economic opportunities put this process into question, indicating that SFM is and will continue to be a challenge as socio-economic development leads to reduced dependence on forests and undermines forest-based livelihood strategies, strategies that have safeguarded forests as a productive resource in many locations.

In Quintana Roo, Mexico [7], positive trends can be associated with traditional cultural values and local community governance, as well as institutions enforcing land-use zoning and regulations for natural resource management combined with adaptive management and technical assistance. In addition, the diversification of forest activities has supported sustainable CF by shifting the products marketed and by capitalising on other forest values and opportunities, such as payments for environmental services (biodiversity and hydrological) and ecotourism activities. On the other hand, higher deforestation rates are present among some communities due to urban sprawl and expansion of agriculture.

In the case study from northern India [13], a partnership with an NGO facilitates institutional development and the strengthening of community resource rights, empowerment, and capacity development. Based on global REDD+ strategies that created the opportunity and mechanisms for payments for environmental services, the private voluntary carbon markets now provide an effective catalyst and programmatic framework for developing resource management institutions, mapping and boundary demarcation, and long-term planning, with potential funding for mitigation, restoration, and income-generating activities aimed at reversing forest loss. The development is based on the strengthening of the traditional institutions.

In Guatemala [6], considerable efforts to empower community groups to manage community concessions for conservation and livelihood benefits, including commercial use, combined with the legal system for establishing these concessions, security of community rights, and capacity-building efforts have contributed to positive trends. Yet, capacity-building efforts have been dependent on external funding and thus lack continuity.

An agreement to protect and sustainably manage a vast area of boreal forest in Canada [9] resulted from an international campaign that raised awareness, increased diverse actors' participation, and put pressure on industry. Large-scale planning enabled the coordination of different, competing forest uses and the incorporation of local livelihood considerations and industry interests with conservation. This process has included capacity-building for many local stakeholders and technical assistance. However, the First Nations were not included in the agreement.

The case study from Indonesia [15] demonstrates positive trends from certified areas. In Indonesia, forests and forestry are placed high on the national agenda but suffer from many conflicting interests, resulting in their unsustainable exploitation. Despite forestry regulations intended to promote SFM and financial and technical support from donors and international non-governmental organisations, destructive forestry practices persist. Unclear land tenure, weak law enforcement, collusion, and corruption, as well as conflicting and inconsistent governmental regulations, remain root causes of deficiencies in forest management in the country. Certification requires that concessions resolve land-tenure con-

flicts on a case-by-case basis and requires some stakeholder cooperation in management. It has also helped promote the transition from forest exploitation to multiple-objective forest management and increased access to international markets. However, certification is not the correct instrument to address sector-wide problems.

4.3.2 Synergistic interaction among prerequisite conditions that contribute to positive trends in community forestry

Based on the analysis of five community forest management case studies that have resulted in positive trends, chapter 8 in Part II concludes that the crucial issue for positive development is the ability to respond to the locally specific context and evolving conditions in a responsible and committed way, including a long-term vision for pursuing management objectives and communities' expectations for local development. Forests are important to very important to livelihoods in all of the analysed communities. Job creation, better salaries, and investments in community infrastructure and services appear to be the main direct benefits from forest management. The following conditions are reported to underlie positive trends in the case study areas:

- Reforms in the policy and regulatory framework are instrumental in creating the conditions for clarifying and recognising land-tenure rights in traditional community territories. This, in turn, paves the way for communities to engage in the community-forest management process.
- Local decisions regarding the protection of forests and drawing of rules and control measures for forestry activities are important for empowering communities and strengthening their capacities in negotiation and conflict resolution. Cultural identity and tradition play an important role in facilitating the internal organisation for decision-making and compliance.
- The development of local capacities for forest management, in some cases also including enterprise development, is fundamental to the process.
- The forging of alliances and partnerships with governmental and non-governmental organisations is instrumental in advancing community efforts for achieving their forest management objectives.
- Management strengths are linked to the diversification of forest uses through technological innovation and research to add value to forest products and services. Efforts to develop value-added products focus mainly on lesser-known timber species and some on NTFPs with established markets. However, direct payments from environmental services are still quite limited.
- The access to financial resources for community-based forest management is still quite difficult, but some innovative ways of financing forestry activities for smallholders are reported.
- Mainly as the result of efforts by external agencies, monitoring as a management tool has gained acceptance and interest. The usual entry point consists of monitoring the impacts of commercial timber operations through post-harvest evaluations.

4.3.3 Interaction leading to mixed outcomes

Several case studies demonstrate a situation where community livelihoods are highly dependent on forests; In general, policies and regulations facilitating SFM and community management, and in some cases also the mechanisms for acquiring legally recognised rights to forests, are in place (e.g. Bolivia [5], Nepal [16], Mozambique [21]). Yet, lack of capacities of local actors and forest personnel together with cumbersome regulations for commercial use of forest resources undermine forests' potential to contribute to local livelihoods and poverty reduction. This is further aggravated by lack of policy implementation, weak law enforcement, and illegalities. In Nepal, CF has delivered some positive livelihood outcomes and facilitated rehabilitation of degraded forests. However, the regulatory framework and policies discourage timber harvesting and trade and prevent communities from fully benefitting from opportunities generated by improved forest conditions.

Similarly, in Uganda [22], efforts to encourage community forest management have been undermined by restrictions on the harvesting and commercialisation of timber and charcoal. This has been partially offset by an increase in the establishment of trees outside forests in plantations and agroforestry systems because an increase in prices for timber, charcoal, and poles has made tree-planting attractive.

The case study from US PNW [10] shows how the outcomes vary depending on the socio-economic situation and differences in the importance of forest resources to local livelihoods. An intense forest conflict resulted in a dramatic shift in forest policy in all federal forestlands from sustainable yield forestry towards increased multi-stakeholder participation, ecosystem- and landscape-focused management, and fire management. Science-based information and intensive planning exercises had an important role in the process. This shift moved the emphasis

Figure III 4.1 Vehicle for villager's transportation, purchased with the profits of a forest-based enterprise. ©Fernanda Tomaselli

from economic values towards emphasis on conservation and contributed to the transformation of the timber industry and its importance. Isolated forest-dependent communities show growing poverty and limited economic opportunity. Many have sought to develop business capacity to undertake restoration and manufacturing of value-added wood products, but in many communities, this has not replaced the losses brought on by the transformation of the timber industry.

4.3.4 Interaction leading to mostly negative outcomes

In two case studies, the trends in relation to both forest cover and livelihoods seem to be negative (Cambodia [11], Madagascar [20], Figure III 4.1). In these cases, the rural population is still strongly dependent on forests but the rights to forests are insecure. In Cambodia, traditional use rights to forest products are recognised and the legal framework for establishing CF is in place, but capacities in both the forest administration and communities to implement CF are weak. In Madagascar, customary tenure system still prevails in some areas, but it is largely ignored by the state, which is the legal owner of all forests. In both cases, there is also a lack of coordination among sectoral policies. In Madagascar, the interconnectedness of forestry and agricultural activities and the need to develop alternative livelihood options to compensate restrictions on forest clearing are not reflected in sectoral policies. In Cambodia, the granting of large-scale land concessions and lack of coordination between that and the establishment of community forests is undermining SFM. Illegal activities and corruption also challenge SFM in both cases.

4.4 Influences of international processes

4.4.1 Introduction

Since the UN Conference on Environment and Development in 1992 SFM has featured prominently in international forest-related policy processes and discourses (here understood as ideas and concepts). At the same time, international forest governance has developed into a complex, fragmented regime (Rayner et al. 2010) that includes both legally binding agreements, such as the Convention on Biological Diversity (CBD), and non-legally binding instruments, such as the Non-Legally Binding Instrument on All Types of Forests adopted by the UN in 2007. There has also been a trend towards increased recognition of forests' ecological and social values. In addition to timber, ecosystem services that forests provide, and indigenous and community forest rights have gained prominence on the international agenda (Arts et al. 2010). This section focuses on the influences of international processes and the related discourses on national and local policies and behaviour as reported in the case studies.

While the international processes often aim at influencing policy-making at the national level, the pathways through which this occurs can be quite distinct, depending on the context. Bernstein and Cashore (2012) distinguish between 1) international rules, 2) international norms and discourse, 3) interventions in markets, and 4) direct access to domestic policy-making processes.

4.4.2 International rules

International rules refer to the influence of legally binding agreements. The most noticeable agreements influencing forests in the case studies are the CBD and the UN Framework Convention on Climate Change (UNFCC). Except for the US, all countries represented in the case studies are parties to the CBD. Madagascar [20], for example, has implemented this treaty through the National Environmental Action Plan. A major component of this plan is to promote the sustainable use of state-owned forest resources by handing over the rights to manage forests to local communities. In the case study from Thailand [17], the influence can be considered indirect, as the conflict described in that study originated from the establishment of a national park for biodiversity conservation. In most case studies, however, this treaty is not reported to have influenced SFM at the local level.

REDD+ (referring to measures for reducing emissions from deforestation and forest degradation and enhancing carbon stocks, forest conservation, and SFM) is the instrument based on the UNFCCC, developed to transfer carbon credits between developing and developed countries. Based on the case studies analysed, it seems to be the most visible and potentially influential of the international processes affecting forests. On the one hand, REDD+ is seen to bring new opportunities to augment local forest-related development and SFM; on the other, risks and challenges related to the development of REDD+ schemes are also recognised. Several case studies report strategy and policy development and/or pilot projects related to REDD+ (e.g. Acre [1], Cambodia [11], Ethiopia [18], Madagascar [20], Mozambique [21], Uganda [22]).

The REDD+ discourse has affected federal and state policies and increased the emphasis on policies to reduce deforestation and conserve forests. For example, Mexico [7] is a REDD+ partner country and has invested in many reforestation, conservation, environmental services, agricultural intensification and community management programmes related to REDD+. Linking development and conservation to REDD+ in state development plans in, for instance, Quintana Roo is evident. However, concerns and confusion are prevalent among communities and forest civil societies on how to meet REDD+ requirements to measure and monitor carbon stocks and reduce emissions and how the potential benefits from REDD+ will be distributed.

In Acre, Brazil [1], a special incentive system is effective at the state level (Incentives for Environmental Services, Portuguese acronym SISA, effective since 2010) focusing on the conservation and recuperation of seven environmental services, including carbon sequestration and enhancement of stocks through forest conservation and management. The objective of the carbon component of SISA is recognised internationally as a sub-national REDD+ programme. It has been implemented to promote the reduction of greenhouse gas emissions from deforestation and degradation. Acre has established a statewide deforestation target for 2020 in conformance with international standards defined by the European Union and the Kyoto Protocol. In 2010, under SISA, Acre signed a historic, sub-national memorandum of understanding with the state of California on future cap-and-trade emissions trading; and in 2012, the state signed an agreement with the German Development Bank in the amount of EUR 19 million as payment for reductions in carbon emissions already achieved due to avoided deforestation, the first state-level REDD+ initiative of its kind in the world. However, there is a lack of clear linkages between community contribution to sustainable management of land and forests and the climate change agenda under REDD+.

The case study from India [13], introduces an example of opportunities created by REDD+. It describes a community REDD+ project in which communities are responding to rapid deforestation by developing a management institution that will build the capacity of traditional governance bodies to conserve and restore ancient community forestlands. The project is financed by the sale of carbon-offset credits and through payments for other environmental services, including protection of a major water source for the state capital.

In some cases, as in Madagascar [20], REDD+ has influenced the perception of deforestation and degradation at the local level and created expectations for making money from forests. However, there is lack of understanding about how REDD+ will work at the local level and what kind of benefits, if any, it can really bring.

Several concerns relate to the development of REDD+ in developing countries. For example, in Mozambique [21], foreign private investors are acquiring large extensions of land for REDD+ projects even though the country does not yet have policies to support such projects. Also in Cambodia [11], there is a risk that REDD+ commitments could be used as a justification for further land concessions. The

perceived increased value of forests may lead the government to exclude communities or restrict their participation in management and, therefore, diminish promising livelihood options. Similar concerns have also been expressed in relation to community forest management in Nepal [16].

For developed countries (except for the United States), the international rules are an important frame and the rules are generally followed, as for example in Canada [9] and Finland [24]. Within the European Union, many of the global agreements and processes are further included in EU regulations, with clear effects on national legislation. The European Water Framework directive, for instance, has contributed to legal changes in countries as they have started to adapt national laws according to the framework's main principles, which rest on the concept of using compensation for environmental cost as a positive economic tool to change behaviour at the local level. In Italy [27], this principle was introduced in the law and enabled the addition of an extra payment on the water bill (from 3% to 8%) to compensate forest owners directly for the maintenance of forest cover in the upstream catchment area.

BIH [23] has pursued political efforts to join the European Union and has ratified various legally binding agreements and regulations. The formal commitment to implement these obligations stands, but practical implementation has not always led to SFM or positive changes in the national forestry sector.

4.4.3 Norms and discourses

The non-legally binding instruments and global policy processes, notably the UN Conference on Environment and Development in Rio de Janeiro in 1992 and the processes that followed, increased the inclusion of ideas of sustainability and SFM in the forest legislation of many countries (e.g. Indonesia [15]).

The increasing visibility of indigenous and other local communities' forest rights in the global forest discourses and conflicts between legal and customary access to forest resources contributed to integrating community rights into national policies in some countries. The developments in Acre, Brazil [1], clearly exemplify this. The shift in the global discourse made the focus on local communities and social benefits of forests legitimate and led to the massive Pilot Program for Protection of the Brazilian Rain Forest (PPG-7) that supported widespread experimentation in forest-based development. In response to international influences and pressures, policies to support community-based certified forest management and enforcement of deforestation regulations were initiated. International, national, and local NGOs and researchers were also influential in providing direct support to community-oriented programs and support for certified forests and payments for environmental services programmes.

The global trends of moving from government to governance, decentralisation, and increasing participation of local actors have affected to some degree the development in many case studies. These developments have led to transferring, at least to some degree, the forest management authority and related decision-making from central government to lower levels in the administrative hierarchy. These discourses have also supported different community-based or participatory forest management models. The Gambia [19] has been cited as a pioneer in implementing participatory forest management in Africa, especially in developing CF as a mechanism for transferring forest ownership from the government to local communities. In Uganda [22], reforms in public administration, including the establishment of local governments and new policy instruments, have aimed at encouraging local-level forest management.

The millennium development goals (MDGs) are mentioned only in three cases. In Mozambique [21], they have been featured as driving forces in national policies but have had few practical impacts. In Nepal [16], CF has been seen to play a key role in achieving MDGs. In Ethiopia [18], MDGs have been used to promote policies and programmes toward forest landscape restoration.

4.4.4 Market-related interventions

Certification

In Indonesia [14,15], the FSC is the only voluntary certification scheme with international traction: it covers 91% of the certified natural production forests. Despite unfavourable conditions such as unclear land tenure and inconsistent forest regulations, it seems that certification has contributed to improved forest management practices in Indonesia [14,15] by promoting transparency and by including a wide group of stakeholders in forest management decision-making. The contribution of certification to improving forest management is claimed to be more substantial than the impacts of governmental policies. The forest management requirements for certification are more demanding than those set by government regulation. However, certification is not an instrument for addressing unclear tenure issues and inconsistent policies. Many issues, including high costs, still impede progress in certification and SFM in Indonesia.

Certification is also reported to have advanced SFM in Guatemala [6], Spain [25], and BIH [23] and improved forest plantation management in South

Africa [27]. In BIH, more than 50% of the state forests are FSC certified. The case study from Spain reports that certification under the Programme for the Endorsement of Forest Certification (PEFC) has improved forest management but has not affected timber prices.

Legality verification

The EU FLEGT Action Plan aims at eliminating illegal timber from the markets. Voluntary Partnership Agreements (VPAs) between wood-producing countries and the European Union and EU Timber Regulation are key elements of this strategy. A VPA is an agreement between a timber-exporting country and the European Union. It aims to confirm that the exported wood is from legal sources and produced according to the exporting country's legislation. The intention of the EU Timber Regulation and the US Lacey Act is to ensure that no illegal timber or timber products can be sold in the European Union or United States, respectively.

Among the case study countries, only Indonesia [14] has signed a VPA. In Indonesia the national legality verification and certification systems (SVLK and PHPL)[5] were motivated by FLEGT and VPA, even though they were enacted before Indonesia signed the VPA. The authors of the chapter [14] argue that the development of Indonesia's national timber legality assurance system (SVLK) and the signing of the VPA have potential to reduce illegal logging in Indonesia. The improved access to EU and US markets as well other global markets, while also supporting environmental goals, has gained wide support from various actors.

For their part, Cambodia [11] and Thailand [17] are in the pre-negotiation phase for VPAs. In Cambodia, economic land concessions have significant implications for Cambodia's ability to meet international commitments and obligations, such as dealing with illegal logging. FLEGT efforts could thus further encourage the government to address the issues related to land concessions.

4.4.5 Direct influence

Acre's [1] forest-based development programme and more broadly, the expansion of community-based SFM in Brazil [3] have been directly influenced by international actors – the rubber tapper social movement and several communities received support from international environmentalists. International NGOs and researchers also have been influential in the development of forest-based policies and behaviours in Acre, working together in supporting community-oriented policies and technical extension work with rural communities. The World Wildlife Fund regional office is in Acre; and it has provided strong support to certification efforts there.

The Canadian Forest Service (CFS) created the Model Forest concept as an enabling tool for interested parties to become more involved in the management of natural resources and in contributing to innovations supporting SFM. The national Model Forest programmes, as for example, in Argentina [2] often receive support from the CFS and the Canadian Model Forest Network (CMFN) in order to develop and implement the model forest concept.

4.4.6 Pathways interact

The different pathways of influence previously discussed often interact. In Indonesia [14], for example, all four pathways were important for creating support for timber legality verification in the domestic policy process. In China [12], both international norms and markets pathways have influenced developments at the national level through certification and sustainability reporting standards. In Urbión, Spain [25], the main pathways of influence have been international norms and discourses (biodiversity-enhancing measures) and markets through certification.

In US PNW [10], and based on earlier analyses also in Canada, the markets pathway has been considered very influential in the process that led to an agreement on the use and protection of large forest areas. However, the analysis in this volume of the pathways of influence in Canada [9] finds that the direct access to domestic policy-making offers a much better explanation and that market campaigns only had significant effect in combination with the direct access pathway.

While International processes can influence policy-making at the national level, the outcomes of international discourse and processes are often influenced by conflicts, discussions, and policy development that spreads from the national to international sphere. In other words, the influence is a two-way street. For example, the forest biodiversity/conservation biology/ecosystem management discourse that became influential in the US PNW [10] from the 1980s onwards was extremely influential at the global level as well.

[5] Indonesia's Timber Legality Verification System (SVLK) and Sustainable Production Forest Management Standard (Pengelolaan Hutan Produksi Lestari, PHPL).

Methodological and analytical considerations

Glenn Galloway

To finalise Part III, it is important to provide some reflections on methodological and analytical considerations. To begin with, attention must be focused once more on the diversity of cases included in this volume. This diversity is invaluable for understanding how SFM has been and is being pursued in extremely different socio-economic and biophysical contexts around the world. It also introduces some difficulties in analysing the cases in a collective fashion, even when the authors for each case study were provided with a common analytical framework.

One important issue relates to the availability of information corresponding to the different prerequisite conditions and other topics of interest. Not surprisingly, this information varies notably across the case studies. When information sought was not readily available, time and resource constraints did not permit the realisation of new studies to generate more information to fill in potential gaps.

It is also apparent that in some cases, information on specific aspects is much more comprehensive than on other aspects included in the analytical framework. Gaps in the information, may, in some cases, relate more to the lack of readily available information than to a lack of efforts associated with one or more of the prerequisite conditions.

Information provided on each prerequisite condition is necessarily quite concise because of the broad, interdisciplinary focus of the case studies. In reality, many of the topics included in the analytical framework could be the topic of lengthy reports, if not books. Thus, mandatory brevity might, in some cases, have led to important aspects being excluded from the analysis.

While the authors did report, as requested, on aspects like capacity-building programmes, it is not possible to gain a clear sense of the quality of these interventions. One can envision cases in which efforts are made associated with many of the prerequisite conditions included in the analytical framework, but unless the quality and continuity of these efforts are adequate, little can be inferred about their importance and effectiveness in contributing to SFM.

Finally, more attention could have been focused on cultural aspects and their importance in efforts to further SFM. Although some cases do make considerable references to the importance of aligning SFM with local cultures and traditional values (e.g. Acre, Brazil [1], Latin America [8], India [13], BIH [23], Spain [25]), this perspective is somewhat limited in other cases. Closely linked to cultural considerations are historical precedents that contribute to shaping the present situation and perceived trends in important outcomes related to SFM. More attention to these aspects would enrich future studies of this type and provide additional insights into the outcomes of SFM.

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PART IV

POSSIBLE FUTURE PATHWAYS

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Introduction and synthesis

Wil de Jong

1.1 Introduction

Forestry sciences, just like most applied, empirically based sciences, adhere to reductionist, deductive principles. The analysis undertaken in Part III of this book aimed to compile generalisable evidence of factors that can causally be linked to sustainable forest management (SFM). It also attempts to link prerequisite conditions structurally or through agency with appropriate management of forests, reflected in forest condition and the quality of livelihoods of forest-dependent dwellers. The analysis of the case studies in Part II provides important and relevant evidence of how key prerequisite conditions do link to SFM. But, as explained in Part III, the relationships are complex and oftentimes appear context specific.

Providing more compelling evidence of the linkages between prerequisite and SFM conditions requires more rigorous data collection of a large number of cases (Zenteno 2013), something that is beyond the capacity of most researchers or organisations. Even with a much more rigorous and comprehensive analysis, however, a likely outcome will be that prerequisite conditions and SFM are best represented as a complex dynamic system characterised by stochastic and nonlinear relations. While this may be discouraging, the results summarised at the beginning of Part III do constitute valuable insights that can be used in pursuit of forestry objectives – either policy objectives, forest management objectives, or forest development assistance objectives.

In light of this, it makes considerable sense to explore other options to anticipate the futures of forests, SFM, or for that matter, the vagaries of prerequisite conditions. If prerequisite conditions and SFM behave like a complex dynamic system, additional options need to be sought that can support the design of policies, appropriate management plans, or interventions aimed at achieving SFM. Part IV of this book explores a different suite of options that can be helpful when short- and medium-term policies or more strategic forest-management decisions need to be made.

The options that Part IV explores are captured by terms such as *foresight, forward looking*, *future pathways*, or *future scenarios*. There are several reasons why such an SFM futurology exercise is relevant and useful. If relevant trends are known, it may be possible to also understand what possible futures of forests and SFM are, which at least in theory should make it possible to plan for appropriate interventions. Anticipating possible future pathways of forestry and related aspects complements a limited understanding of how prerequisite conditions actually shape SFM. The interaction goes both ways. The future of prerequisite conditions depends on measures taken by actors and stakeholders involved in SFM. But understanding the future trends of the very prerequisite conditions that influence SFM is useful, even though the links between the two are not easily understood.

Neither is the understanding of future trends an unequivocal matter. The forest sector has relied on outlook studies since the early 1950s (Hurmekoski and Hetemäki 2013). These provide important insights into future trends, and at least in theory are valuable when important policy or other strategic decisions need to be made. However, more complex processes, including the future trends of SFM or the prerequisite conditions that have a bearing on SFM, are difficult to capture by relying primarily on quantitative market models, as most outlook studies do. Foresight studies and related exercises that rely on qualitative methods is a new field that has emerged over recent decades and is increasingly gaining recognition for its important contribution to future planning and strategic decision-making.

Part IV chapters are all concerned with forward looking on issues related to forestry. Their primary intention is to complement Parts II and III, which draw lessons from the efforts of a considerable number of local experiences seeking to achieve SFM. While applying future studies to forestry matters is in itself very useful, projecting the findings of Parts II and III into the future adds additional value to the analysis in this book.

This first chapter of Part IV introduces its four chapters, creating links between these chapters and Parts II and III. Following this introduction, section 2 briefly reflects on foresight in forestry. Section 3 presents highlights of the four chapters of Part IV and section 4 links with the findings related to prerequisite conditions and SFM, summarised in the beginning of Part III.

1.2 Foresight in forestry

"Futures studies" is an academic field that develops approaches, methods, and tools to anticipate possible, probable, or desired future trends. Most futures-studies practitioners will argue, as Part IV, chapter 3 does, that futures studies is not about predicting the future so much as understanding the range of possible scenarios that may occur and how decisions taken today might lead to one scenario but not others. Future studies have become a common, although still not universally accepted, area of academic inquiry. Pelli (2008, p. 7) uses the term *foresight* as the concept that represents future-oriented explorations applied in sectors that combine science, technology, and innovation. One view of foresight or futures studies is that they include multiple approaches and methods. They include the more traditional quantitative methods that explore future trends by using data; apply computational techniques to establish functional relations between variables; and, once these relationships are determined, use them to predict future trends of variables of interest. Regression analyses are commonly used to establish functional relations between data and project future trends, but they are only one of an array of possible statistical interference methods, where future trends are deducted from observed data.

The more typical futures studies tools and methods employ carefully elicited anticipations of ranges of possible future trends. The trends may rely on data sets, for instance in the case of the International Futures project[1] that explores the possible linkages between multiple trends, each of which can be understood through time-series data but whose interactions are much more difficult to grasp. Hurmekosi and Hetemäki (2013) call this "integrated global system modelling." Related to the International Futures project, and similar to integrated systems modelling are so-called dynamic system analyses (e.g. Wilensky and Resnick 1999), which are increasingly being used to understand societal and environmental interactions to identify better development options (Leach et al. 2010). In addition to statistical interference and dynamic systems analysis, foresight tools like the Delphi method, scenarios, future scenarios, backcasting, and visioning have been used widely in businesses and, more recently, in environmental sectors, including forestry (Wollenberg et al. 2000, Evans et al. 2008 and 2010, Hurmekoski and Hetemäki, 2013). These procedures are employed to capture people's expertise on issues to anticipate ranges of possible future developments without depending on constructed statistic inference. These methods rely on the recognition that people may have either intuitive or conscious understanding of factors that will shape future developments and that, with the application of well-designed procedures, this understanding can be solicited, systematised, and made available to broader constituencies. While these methods and exercises are met with skepticism (Masini 2006, Ehliasson 2008), they are nonetheless finding acceptance in many fields, including in environmental sciences (e.g. Mieg 2004, Carpenter et al. 2006, Patel et al. 2007, Stock et al. 2007).

In the forestry sector, foresight studies have been undertaken for decades. Specifically, outlook studies have been attempted since the 1950s, but they relied until recently mostly on time-series data and statistical computations (Hurmekoski and Hetemäki 2013). Examples include quantitative market models or similar exercises that provide decision-makers with information on predicted long-term trends in the sector and projections of future developments (Hurmekoski and Hetemäki 2013). Outlook studies carried out by the United Nations Food and Agriculture Organization (FAO) are the best known and most comprehensive examples of forestry outlook studies. FAO Outlook Studies intend to "support policy reviews and strategic planning" for which they "depict the range of choices available to forestry policy makers and describe the alternative scenarios that might arise as a result of these choices" (FAO 2013).

FAO Outlook Studies compile multiple sources of information, including national outlook studies, and data provided by national experts. FAO Outlook Studies are particularly relevant to the context of Part IV since they are based on both supply and demand models and on the qualitative examination of topics and issues that could significantly affect future developments (FAO 2013). Pelli (2008) points out that the sixth FAO Forest Sector Outlook Study (FAO 2005) adopted a more holistic view of the forest sector in Europe. While these trends are welcomed by proponents of futures studies, Hurmekoski and Hetemäki (2013) argue that outlook studies still rely primarily on quantitative analyses of forest products production and trade and do not adequately address trends related to forest-based ecosystem services. As a result, they are inadequate for anticipating structural change, especially taking into consideration the growing strategic importance of these services.

Despite the modest shift towards the adoption of new foresight methods, including efforts alluded to in FAO Outlook Studies, Hurmekoski and Hetemäki (2013) argue that the use of these qualitative methods has to date only gained modest popularity in the forestry sector. For some time, however, the tropical forestry development community has been quite active in developing future scenarios in the context of social forestry. Several future scenarios guidelines were published during the 2000s (Wollenberg et al. 2000, Nemarundwe et al. 2003, Evans et al. 2006a,

[1] http://pardee.du.edu/history-ifs.

2006b) to aid practitioners in use of these tools and methods. The underlying objective was to promote greater community involvement in forestry planning and sub-national forest policy design (Sheppard and Meitner 2005). Future scenarios, and their various variants (Nemarundwe et al. 2003) were considered one set of a wider suite of tools (Evans et al. 2006a, 2006b) intended to "incorporate community knowledge, preferences, and values into decision making in natural resources management" (Lynam et al. 2007, p. 1). Several critical reflections on the use of these tools and methods (e.g. Kassa et al. 2006, Lynam et al. 2007, Evans et al. 2008, 2010) do underscore their value, based on multiple practical experiences, and also their shortcomings. The latter include the possibility that outcomes might be manipulated, their costs could be high, and their application requires trained facilitators (Evans et al. 2010). These constraints may explain why these quite successful participatory methods have not been used as widely as initially hoped for.

Pelli (2008) draws distinction between foresight studies implemented at the national level, including exercises to envision preferred futures, and those carried out by the private sector to facilitate strategic business decisions. Forestry issues, however, can be recognised implicitly or explicitly in foresight studies, including those that have a wider focus, beyond the forest sector. This is the case, for instance, with the European Union Foresight Expert group, which prepared foresight papers, one of which is on environment (EC 2002, Pelli 2008). In similar fashion, foresight exercises have been part of the Millennium Ecosystem Assessment and the various reports produced by the Intergovernmental Panel on Climate Change (IPCC) (Part IV, chapter 5).

1.3 Foresights and outlooks for SFM and prerequisite conditions

Part IV contains four chapters that address future perspectives of SFM, taking into consideration the prerequisite conditions of SFM included in the analytical framework introduced in Part I. Three of them can be located somewhere along the spectrum of forestry foresights studies. Chapter 2, for example, can be qualified as an expert assessment of a number of relevant trends in contemporary forestry; the authors rely on literature and their expert judgment to anticipate these trends. Chapter 3 takes a number of FAO Outlook Studies and summarises them for information on the prerequisite conditions for SFM. In essence, chapter 3 can be qualified as a meta-outlook study. Chapter 4 introduces multi-scale participatory scenarios as a tool for more effective and efficient policy-making. The tool draws on the options provided by future scenarios exercises (cf. Evans et al. 2008, 2010), exploring possible and alternative futures, but with the added value that they are pursued simultaneously among different constituencies and effectively communicated among the different constituencies and to decision-makers that represent the different constituencies. Chapter 5 uses narratives of shared socio-economic pathways (O'Neill et al. 2014), which are "part of a scenario framework for generating scenarios" that are to provide a common basis for future work on impacts, adaptation, and vulnerability and are currently being developed as one component of a new round of climate scenarios. Chapter 5 also explores, similar to chapter 3, trends of prerequisite conditions in alternative SSPs narratives. They also postulate alternative possible prerequisite-condition scenarios and try to match those with the SSPs.

Chapter 2 projects important trends in global forestry. For instance, biodiversity conservation and other services provided by forests will increasingly be derived from anthropogenic forests. The number and diversity of actors with a stake in or that are engaged with forestry matters will continue to evolve and increase, as has happened during the past two decades or so. As a consequence, the balance of forest goods and services that are valued by society will change, reflecting evolving needs, preferences, and values of forest stakeholders. These observed and projected trends will require that forest management, including silvicultural practices, should be adapted to this new reality. In general terms, forest management practices and the knowledge that drives them will need to be broadened to encompass the growing diversity of objectives and the changing nature of forests.

Chapter 2 also reflects specifically on the future of tropical forest logging, an issue particular relevant to local SFM. The current reality is that tropical timber logging generally exceeds replacement capacity; as a result, forest timber stocks are undergoing a process of depletion that will continue unless logging is drastically reduced. Over-harvesting is widely recognised but not taken into adequate consideration in the planning and implementation of logging practices. As this unfortunate reality becomes increasingly apparent, tropical forest logging will likely assume a minor role in global wood production, catering primarily to specialised niche markets. Forest encroachment will likely continue in only certain parts of the world. In the meantime, global forest-stocks will continue to be impacted by forest encroachment, but important regional variations are expected to become more marked over time. In this context, Sub-Saharan Africa is one of the last tropical forest frontiers and is still subject to increasing industrial and domestic pressures, resulting in the loss and degradation

of forests. Oil palm expansion in countries such as Indonesia will likely continue expanding to supply a growing market demand and relatively weak state land-use regulations are unable to curtail excessive conversion of forestlands to this crop. In contrast, in the Brazilian Amazon, a decoupling of deforestation and the expansion of agricultural crops can be observed, since new areas being planted with soybeans are taking place on already deforested lands.

Chapter 3 equally projects short- and medium-term future trends on issues relevant to SFM. Unlike chapter 2, it draws on outlook studies that have been produced by FAO since 2003 to assess trends in the prerequisite conditions for SFM and project them into the future. The chapter is structured according to the four categories of prerequisite conditions included in the analytical framework (see Parts I and III): policies, institutions, and governance; livelihoods, capacities, and cultural and social aspects; natural resources base; and research and monitoring.

Chapter 3 concludes that according to existing information, the dominance of public ownership of forests likely will change only slightly towards more private ownership. While this is the case, however, the role of governmental institutions will undergo drastic reductions, with a progressive shift to policy-making, regulatory functions, and the provision of goods and services that the private sector is unable or unlikely to provide. Meanwhile, the management of public forestlands is expected to continuing shifting to the private sector, including corporate businesses, farmers, and communities. The importance of the provision of ecosystem services and amenity values will be increasingly recognised, resulting in a notable shift from traditional forest products. These fundamental changes will also be reflected in forest policies, oriented away from timber-focused management to the provision of ecosystem services, poverty alleviation, and landscape approaches.

Disaggregating these trends, chapter 3 further observes that many countries will face challenges associated with the fragmentation of national environmental and forestry agendas and the simultaneous involvement of numerous governmental agencies. In these countries, environmental agendas will likely converge, but as a result, policy coherence and coordination will become a major issue. Economic transition and globalisation are also impacting the forest and environmental sectors. In Asia, many countries have been benefitting from more open economic policies, while in Africa a host of countries have suffered from global economic turbulence and cheap imports that undermine markets for local products. In the future, environmental issues of emerging importance could change the course of forestry in many ways. With climate change, forests and forestry will be at the forefront of global political discussions, with considerable potential for reshaping the future of the sector.

Wood supply will remain important, but wood production will continue to shift from logging in natural stands to planted forests, as observed in chapter 2. According to chapter 3, this process will reduce logging pressure on natural forests in the near future. Fast-growing plantations for biomass production are expected to be established, especially in Africa, which will also supply fuel to power plants to be built. This will concur with the development of new technologies, such as cellulosic conversion processes for biofuel production and efficient small-scale wood gasification technologies, resulting in significant impacts on wood use and corresponding trends in wood production. Production in existing plantations will possibly increase through improved management practices. Asia's share in global wood-product consumption will increase considerably between 2005 and 2020, but the Asia-Pacific region will also increasingly become a producer and exporter of value-added products, especially furniture, relying on imports of lower value-added items. Latin America will steadily increase production, consumption, and trade of most forest products. The largest increase in exports will be in the case of pulp and paper, which are a dominant component of forest-products exports from the region. The remarkable growth of exports of sawn wood, plywood, and other value-added products, such as mouldings, floors, and furniture, will also continue, supplied with wood from forest plantations. Europe will remain a net exporter of wood products. Consumption of wood energy will grow steadily, fully utilising residues from harvesting and other sources. Wood will play an important part in reaching the goals of increasing the use of renewable energy in Europe without expansion of the forest area.

While the overall trend indicates a reduction in the logging of natural forests and a growing dependence on wood supply from plantations, the state of the world's forest is still worrisome. The annual global area of forest conversion has oscillated around 13 million ha; forest converted to other uses or lost through natural causes. There are indications of declining forest conversion, but the picture is mixed across regions. The estimated forest growing stock of 527 billion m^3 (average 131 m^3/ha) has decreased slightly in recent years due to a global net reduction in forest area. The world's estimated 650 billion tons of carbon stored in forests has also decreased as a result of forest loss.

Chapter 4 describes how developing multi-scale participatory scenarios (MSPSs) can be an important tool for the integration and effective communication of aspirations, preferences, and needs of actors at multiple levels. The need to progressively integrate visions of diverse forest stakeholders that operate at different levels is accentuated by contemporary

drivers that influence forest, including global markets and investments (for example, carbon markets). Global and national demands for goods and services derived from forests may constrain local demand and will require adequate understanding and acceptance of changes in related policies, especially at local levels. Chapter 4 not only argues that MSPSs can support integrated forest planning and negotiations, build capacity for futures thinking, and integrate the global and local level forest processes and strategies but also proposes a framework for compiling and documenting evidence of successful examples of MSPSs.

Chapter 4 contends that MSPSs can generate plausible narratives of possible futures that have been derived using well-elaborated procedural steps and adopting coherent and internally consistent assumptions about key relationships and driving forces (c.f. van der Heijden 1996). A critical advantage of MSPSs is that they allow linking narratives of possible futures across scales, making it possible to identify synergies as well as conflicting visions of possible futures. MSPSs indeed appear to hold the promise for generating synergies between local and global scale, and to make progress towards shared visions among multiple stakeholders, facilitating the development of policies and actions that take into account the shared or contrasting visions.

The chapter, however, also points out that MSPSs are challenging and expensive and require an adequate process of capacity-building before they can be used effectively. In addition, they typically involve a large number of stakeholders, meetings, and preparatory work. The MSPS approach, although promising, is still in a pioneering stage, for example in forest sector literature.

The final chapter in Part IV (chapter 5) strives to establish links between elements of long-term global scenarios and the prerequisite conditions of SFM, as discussed in Parts I and III. The chapter uses the so-called shared socio-economic pathways (SSPs) narratives, which are scenarios that cover a spectrum of mitigation and adaptation challenges. The five SSPs provide narratives of the possible general state of global society, depending on how mitigation and adaptation issues shape societal values and measures undertaken. Of particular relevance to the present volume, the chapter tests how different SSP narratives relate to the prerequisite condition for SFM. The chapter pursues two approaches: 1) analysing how the prerequisite conditions are represented in the SSP narratives and 2), postulating prerequisite condition scenarios and linking those to the SSPs.

SSP narratives that reflect global concerns for sustainable resource management logically suggest positive trends for SFM. However, of greater significance are the contradictions between the two SSPs that, on one hand, assume dominance of adaptation challenges versus the alternative SSP that foresees a dominance of mitigation challenges. The two SSPs that foresee high adaptation challenges, characterised by the keywords "fragmentation" and "inequality," both envision deteriorating social cohesion and reduced international cooperation in addressing shared global challenges linked to climate change. As a consequence, the narratives of these two SSPs suggest several challenges for SFM, since the conditions that promote climate adaptation capacity, which are constrained under the SSPs "fragmentation" and "equality," are similar to the conditions that contribute to SFM. In other words, SFM would also be constrained under these scenarios.

The SSP that foresees high mitigation challenges, identified as "conventional development," generally suggests positive trends for the prerequisite conditions. The "conventional development" SSP, however, foresees progressive influence of market mechanisms with unpredictable outcomes for the environment. There is logic in these results since under the mitigation-challenged scenarios, there will be more value put on forest carbon stocks, while under adaptation-challenged scenarios, there is likely to be more pressure on forests and ecosystems in general, with a concurrent reduction in society's institutional capacity to resolve wider societal problems.

Chapter 5 derives three alternative possible scenarios for the prerequisite conditions and tests these against the SSP narratives. The three different prerequisite condition scenarios align comprehensively with different SSP narratives. The SSP identified as "sustainability" coincides well with prerequisite conditions that are also conducive for SFM. The analysis suggests marked difference between the two SSPs that foresee adaptation challenges ("fragmentation" and "inequality") and the prerequisite condition "tenure rights" (ambiguous tenure versus corporate land appropriation) and "public administration" (inadequate administration and corruption versus less effective over-regulation).

1.4 Futures of sustainable forest management

1.4.1 Outlooks for prerequisite conditions and SFM

As indicated in Part III, the case studies suggest a positive link between tenure reforms benefitting local forest users and progress towards SFM. Chapters 2 and 3 of Part IV both consider recent changes in forest tenure and how these policy measures will likely continue in the future. While changes in communal property of forest has been dramatic, this still largely occurs in only a small number of countries

(chapter 2) and the transfer of ownership has not been as universal as sometimes suggested. Chapter 3 provides detail on projected future trends of forest ownership, which will change most in China and somewhat in Africa, though benefits will often accrue to companies. In other words, not all reforms will target and benefit communities and smallholders. In Latin America, the great surge in forest ownership by communities, indigenous groups, and smallholders has stagnated somewhat, and further dramatic increases are not envisioned at this time. It is therefore, difficult to anticipate how future tenure reform will contribute to overall progress of SFM.

While the tenure trends are unclear in many countries and the contribution to SFM is hard to anticipate, chapter 2 does suggest that the importance of forestry-related activities for rural livelihoods may possibly increase, even though the analysis of Part III suggests that a trend of declining forest area and condition may be a challenging factor. Declines in forest cover are also anticipated in the FAO Forest Outlooks (chapter 3). However chapter 2 also anticipates that future forest benefits, including products, environmental services, and biodiversity conservation, will be derived from what it calls "anthropogenic forests." This conclusion suggests that even with progress towards SFM by communities and smallholders, mature, natural forests may become less common in many regions. Nonetheless, forestry production will likely remain important among rural forest dwellers in many parts in the world.

Therefore, the multiple conditions that favour communal and smallholder forestry activities should be adjusted to reflect these new realities and trends. This is the central and probably most important point of chapter 2. Because of changes in the forest, landscape, and reliance of society on forest benefits, the concept of SFM is changing. The implication is that the causal relations between prerequisite conditions and SFM will also change, but in ways that are difficult to predict.

One can observe a number of similarities between the analysis of Part III and trends signalled in the chapters of Part IV. The lack of reconciliation of land uses and how this affects local SFM is also reflected in the continued encroachment into forestlands that also will have detrimental impacts on local forest management. The support of public administrative bodies has been rather weak and ineffectual, and trends suggest further public administration withdrawal from the forestry sector. The lack of enforcement of laws and regulations, one of the major challenges of progress towards SFM in tropical forest countries, reflects the weak presence of public administration. While this problem is subjected to international and bilateral attention, major progress will likely be elusive while governments continue to reduce funding for forest administrative agencies. Similarly, the need for capacity-building in all aspects of SFM and research and monitoring will continue to remain a serious challenge, despite the acknowledgment of their importance for enhancing SFM and local forest-related development (Part IV, chapter 3).

1.4.2 Foresight in SFM projects

The majority of cases discussed in Part II and similar efforts seeking SFM are, in a sense, forward-looking exercises. Projects aimed at SFM have an important element of forward looking; consciously or not, they rely on approaches like visioning (cf. Wollenberg et al. 2000, Nemarundwe et al. 2003) or backcasting (cf. Hurmekoski and Hetemäki 2013). These projects postulate a future vision of healthy well-managed forests and the provision of adequate benefits from forests, deriving strategies intended to achieve those visions. This is similar to the procedures that have been suggested for visioning exercises (Evans et al. 2006a, 2006b). Few if any of the projects on which the cases of Part II are based mention the generation of knowledge about conditions that contribute to SFM as an explicit objective. Rather, the knowledge generated from the cases can be understood as a product of action research carried out as part of project implementation.

This implicit relationship between project planning and implementation and foresight activities deserves further attention, since ample opportunities exist to derive further insights from efforts seeking to pursue SFM. If these activities were recognised, in part, as foresight activities, it should be possible to improve project strategies over time by adopting available techniques like future scenarios and visioning. The recognition that SFM projects integrate important foresight components should lead to a growing understanding of the value of these tools and to their incorporation into SFM initiatives.

Chapter 4 points out that MSPS tools are not only useful for the development of appropriate policies that integrate views, aspirations, and needs of stakeholders at different levels but they are also useful tools for projects that pursue SFM, even when they are primarily executed at the local level. By incorporating some elements of MSPS, more explicit attention will probably be placed on efforts to address conditions outside the local arena that may have an impact on local efforts to promote SFM. An enhanced recognition of the forward-looking side of local efforts to pursue SFM should also contribute to an understanding of the value of foresight tools in forestry, such as visioning.

However, there is to date insufficient empirical evidence of how scenarios, visioning, or backcasting

exercises actually shape projects. Relevant questions can be posed, such as: How realistic were the visioning exercises? Did the visioning exercise facilitate the anticipation of observed outcomes? Trying to analyse systematically the foresight element of SFM projects could become an invaluable empirical approach to analysing the value of these tools in SFM projects.

1.4.3 The fate and role of forestry in climate change challenges

Chapters 2 and 3 of Part IV focus on quite specific trends related to forestry and linkages between these trends and potential progress in local experiences of SFM. Chapter 5 views forestry and SFM beyond the timeline considered in chapters 2 and 3. Specifically, the exercise examines linkages between SFM and how society may respond to challenges associated with climate change. The range of options of societal responses to climate change presented and their implications for human society are necessarily quite general. The scenarios are relevant, however, to understanding a wide range of possible options. Which options will have an important influence on the direction that human society will take? That in turn will strongly influence the prerequisite conditions of SFM. While the precise outcome of how society will address climate change in the future is difficult to predict, it is already useful to keep in mind that these responses may take different directions and that those directions will have a strong bearing on the future of forests and forestry. Understanding possible trends of prerequisite conditions and SFM under alternative plausible scenarios of responses to climate change will be important for strategic decisions to be made at the global level, in organisations with global mandates, by national governments when strategic directions of forest or broader environmental policies are to be made, and by organisations that have more focused mandates.

Again, it is difficult to anticipate choices that society will make regarding responses to climate change. Likely future efforts to project climate change will become more robust, resulting in greater clarity of the relative importance of global mitigation and adaptation challenges. Along with greater clarity and enhanced understanding of associated trade-offs, more is expected to be known about multiple societal processes, including possible trends of forests and the conditions that contribute to SFM. An important take-home message from chapter 5 is the understanding that there is an implicit link between SSPs and future prerequisite conditions; there is a link between future challenges for SFM and the SSP that best reflects reality.

It is quite possible to recognise reciprocity between the prerequisite conditions and SSPs. On the one hand, alternative SSPs will shape the prerequisite conditions in a variable fashion, consequently impacting forests and forestry. On the other hand, forests and forestry may contribute in a significant fashion to the ensuing SSPs. Progress in future efforts towards SFM, regardless of the precise path taken (chapter 2), should increase the options to address climate change challenges, both in terms of mitigation and adaptation. While this link is not overtly explicit in chapter 5, it is implicit in the underlying objective of this volume: to capture lessons and enhance understanding of efforts to promote SFM. The use of methodologies associated with SSPs offers a potentially powerful approach to progress towards SFM. By better understanding how to foster SFM, it should be possible to explore options to orient future trends towards a preferred SSP, for example, a pathway that results in better lives for a larger number and greater proportion of human society.

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Management of natural tropical forests in the past and present and projections for the future

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Abstract: Considering the increasing areas covered by tropical disturbed forests, it is clear that future conservation of biodiversity and tropical forest ecosystems will mostly take place within what we call here "anthropogenic" forests, and only if they are well-managed. The term "well-managed" means that the elastic capacity of a specific forest type is respected and the rules for logging and other forest use practices must be established to guarantee the perpetuation of forests in good conditions so that they provide all the services desired by society. Hence, tropical silviculture will have to play a major role in the future to ensure sustained and sustainable production of forest products. The first part of this chapter presents the concept of SFM of tropical forests, and the silvicultural practices to be implemented in the future in managed production forests. The second part discusses the diversity of actors involved in the management of tropical forests and the need to include these actors in SFM in the tropics. The third part reviews the shortcomings of current policies and discusses the move towards more integrated management perspectives as well as multi-level forest governance approaches. The last part examines the role of forest policies in promoting SFM in the tropics, taking into account the changing perception of sustainability, the technical constraints of tropical silviculture, and the need to involve multiple actors.

Keywords: Tropical silviculture, sustainable management of tropical forests, tropical managed forests, tropical forest policy

2.1 Introduction

Forests cover about 4 billion ha worldwide, representing 31% of the total land area on earth and 7% of the earth's surface (FAO 2010). Although the rate of deforestation has decreased during the past decade, forests still disappear at an alarming rate, particularly in tropical regions (FAO 2012, Figures IV 2.1 and IV 2.2). About 13 million ha per year were converted to other uses or lost through natural causes between 2000 and 2010, compared with 16 million ha per year in the 1990s (FAO 2010, 2012). After massive deforestation for several centuries, most developed countries experienced a transition from net forest cover decline to net forest cover increase 100 years ago or even earlier (Figure IV 2.1, Rudel et al. 2005). As a result, European countries now have more forests than they had 100 years ago (FAO 2012). Presently, forest cover in Europe consists mainly of planted and naturally guided regenerating forests often managed as production forests, which are quite different from the original (primary) forests of these countries. In contrast, tropical forests were still largely intact until about the mid-20th century and since have decreased dramatically (Figure IV 2.2). Tropical forests are mainly impacted by advancing cash crops such as oil palm and soybean, cattle ranching, and in certain cases, small-scale agriculture. At present, natural tropical forests amount to about 50% of the world's forests, are home to more than two-thirds of terrestrial living species, and contain the highest terrestrial biodiversity on earth. Blaser et al. (2011) estimated that about 50% of tropical forests are still primary forests, while only 36% of the world's forests are primary and only 12% are included in legally protected areas (FAO 2010).

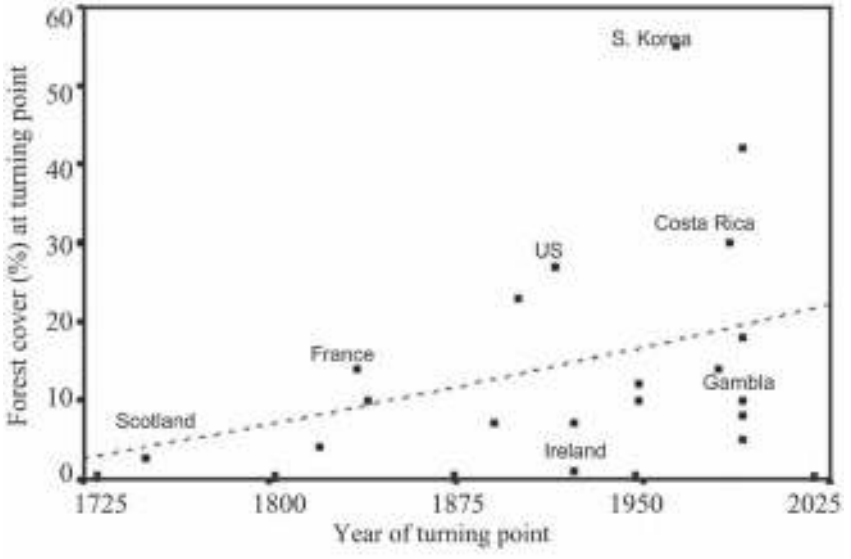

Figure IV 2.1 Forest cover at turning point in different countries which already started forest transition. Source: Rudel et al. 2005

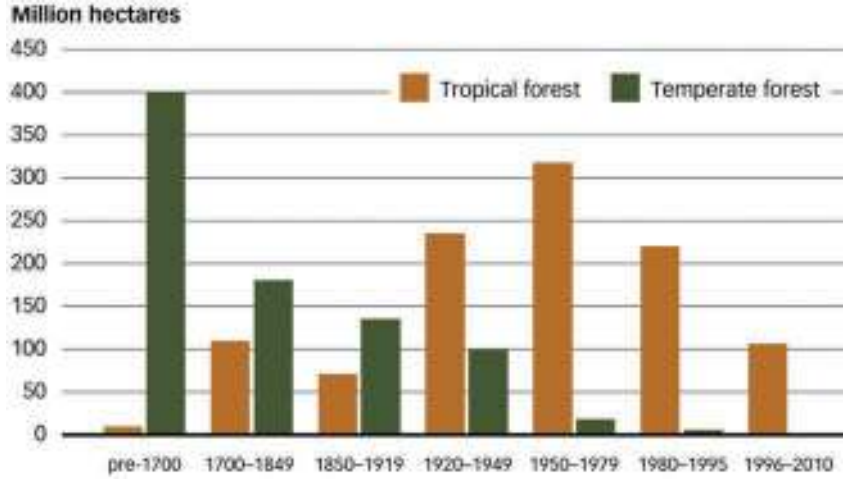

Figure IV 2.2 Change in forest cover in the tropics and temperate regions. Source: FAO 2012

The conservation of tropical forests is, without doubt, one of the main challenges of this century, but areas established for forest conservation will not be able to ensure the conservation of all species (Nasi and Frost 2009).

However, considering the increasing areas covered by tropical disturbed forests, it is clear that future conservation of biodiversity and forest ecosystems will mostly take place within what we call here "anthropogenic" forests, and only if they are well-managed. The term "well-managed" means that the elastic capacity of a specific forest type is respected[1] and the rules for logging and other forest use practices must be established to guarantee the perpetuation of forests in good conditions so that they provide all the services desired by society. Hence, tropical silviculture will have to play a major role in the future to ensure sustained and sustainable production of forest products (Peña-Claros et al. 2008, Villegas et al. 2009). Silviculture is defined here as "the art and science of producing and tending forests by manipulating their establishment, species composition, structure, and dynamics to fulfil given management objectives" (ITTO 2002).

[1] Elastic capacity of a forest ecosystem: forest management needs to take into account the dynamic processes of a forest within a range of changing vertical forest structure, species composition and biodiversity, and productivity that is normally associated with the natural forest type expected at a specific site.

Although, sustainable forest management (SFM) is considered by the forest sector to be synonymous with good forestry, forestry and forest management are commonly perceived negatively by many forest ecologists, conservationists, and society in general. This perception is largely a result of bad forestry practices such as extraction of excessive amounts of timber and fuelwood and illegal logging, very common in the past and still quite common in tropical forests. However, even excessively logged forests can retain high biodiversity and stored carbon (Berry et al. 2010, Putz et al. 2012). Silvicultural practices that are part of overall good forest management are likely to be efficient tools to conserve large areas of production forests that provide multiple forest functions. Tropical forest academics generally defend silviculture as a tool that helps effective conservation of tropical forests while enhancing the production of timber or other products. Forest ecologists and conservationists, on the other hand, argue for biodiversity conservation in protected areas or the promotion of community forest management, which is widely considered to have less impact on tropical forests (Gibson et al. 2011, Putz et al. 2012, Sist et al. 2012, Zimmerman and Kormos 2012a, Zimmerman and Kormos 2012b).

This chapter has four parts. Part one considers the concept of SFM of tropical forests, focusing on the trends previously mentioned, and on silvicultural practices to be implemented in managed production forests. The second part discusses the diversity of actors involved in the management of tropical forests and the need to include these actors in SFM in the tropics. The third part reviews the shortcomings of current policies and discusses the move towards more integrated management perspectives as well as multi-level forest governance approaches. The last part examines the role of forest policies in promoting SFM in the tropics, taking into account the changing perception of sustainability, the technical constraints of tropical silviculture, and the need to involve multiple actors.

2.2 Modern tropical silviculture: Towards new concepts of sustainability

2.2.1 The concept of sustainability

One of the most accepted definitions of SFM is that of ITTO (2005): "The process of managing permanent forest land to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction in its inherent values and future productivity and without undue undesirable effects on the physical and social environment." SFM's goal is not only to ensure the flow of goods and services but also to maintain forest processes intact, including keeping the array of functional species that provide those goods and services (Thompson et al. 2009). SFM considers forests in both time and space. Hence, SFM represents a balance between conservation and the production of forest goods and services for humans and must operate within the capacity of the forest to recover and maintain its functions. For the World Commission on Forests and Sustainable Development (1999), SFM "must be a flexible concept that accepts changes in the mix of goods and services produced or preserved over long periods of time and according to changing values signaled by various stakeholder groups" and that SFM "should be viewed as a process that can be constantly adapted according to changing values, resources, institutions, and technologies."

Tropical forest management until recently focused mostly on timber production, with the principal objective being sustainable timber yield. The central approach was logging of trees above a minimum diameter size and subsequently allowing the tree stock to recover for a period of between 30 and 40 years. The crucial question for foresters for many years was, therefore, how much does the timber stock increase during a rotation cycle between 30 and 40 years. Under this view of forest management, sustainability is reached if at each logging cycle the same volume of timber is extracted as will be recuperated over the next 30 to 40 years.

However, silviculture is certainly not limited to developing practices just to promote timber yield. Silviculture must be regarded as the practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs that are previously defined in the management plan. Silvicultural practice consists of the various treatments that may be applied to forest stands to maintain and enhance their utility for the purposes defined in the management plan (Smith 1986). Finally, silviculture must also ensure the long-term continuity of essential ecologic functions, and the health and productivity of forested ecosystems (Nyland 1996). Under these considerations, silviculture is primarily a tool to both achieve sustainable production of goods and maintain the environmental services provided by forest ecosystems.

Most of tropical forest biologists, ecologists, and conservationists have a somewhat different view of SFM. In their view, it requires the return to the conditions before logging by the end of the rotation cycle. This implies that the forests should exhibit the same structure, the same timber volume and the same species diversity, biomass, and ecological processes as before the logging operation. Studies looking at the

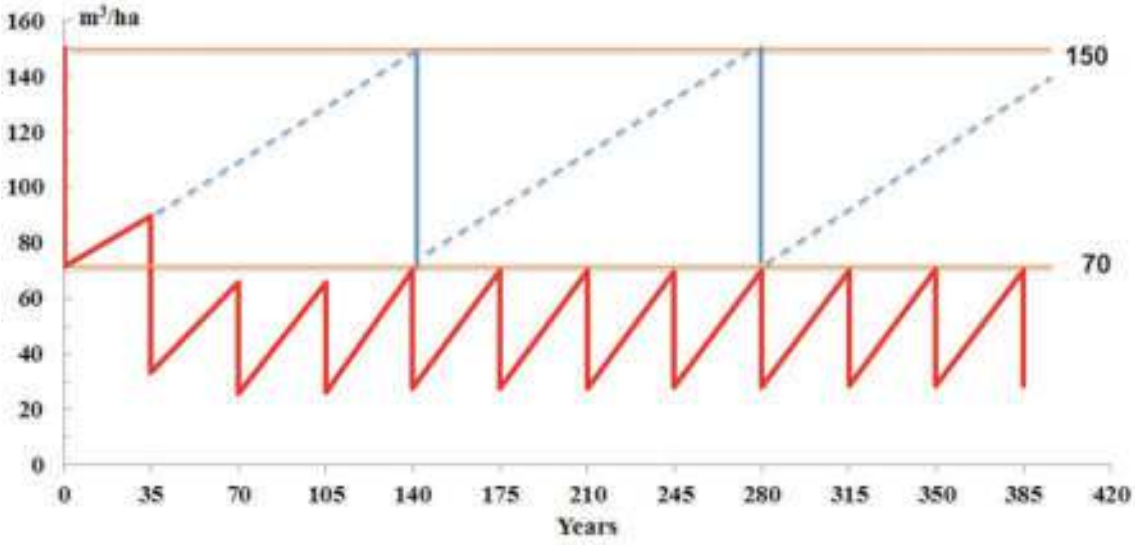

Figure IV 2.3 Sustainable extracted timber volume at each rotation cycle of 35 years (red line) and at cycles of 100 % timber volume reconstitution (blue lines) in a mixed dipterocarp forest of East Borneo. Source: Sist et al. 2003

impact of logging on the recovery of some of these variables (timber volume, biomass, and tree species diversity) in tropical forests, however, demonstrate that within a rotation cycle of 30 to 40 years, only 50% of the initial timber volume can be recovered (Putz et al. 2012). For example, in Southeast Asia, simulations of post-logging forest dynamics suggest that a rotation cycle of 40 years yielded harvestable timber of 60 m³/ha, while the first felling in primary forest yielded 87 m³/ha (Sist et al. 2003, Figure IV 2.3).

Logging intensity has been largely recognised as the main factor determining the forest's capacity for timber reconstitution and biomass in tropical forests (Sist et al. 2003, Putz et al. 2008). Even when reduced-impact logging techniques are used (see Putz et al. 2008 for details on RIL techniques), several studies seriously question the forest's capacity to recover both timber volume and biomass within the length of the rotation cycle (Dauber et al. 2005, Zarin et al. 2007). The silvicultural management of tropical humid (primary) forests is complex. Primary forests regenerate in small patches (gaps) and thus are ecologically multifaceted. Thus the first logging interventions in such complex ecosystems are decisive with respect to the destiny of these forests. Although under sustainable practices these managed forests are likely to remain very close to primary forests, they will undoubtedly present differences in their structure and species composition.

Logging intensity plays also a major role in the reconstitution of biomass. For example, Mazzei et al. (2010) show that, in the Amazon, with a logging intensity of three trees/ha the pre-logging biomass would recover after 15 years while under higher felling intensities of six trees/ha and nine trees/ha, biomass recovery would take 51 and 88 years, respectively. Regionally, forest structure (Paoli et al. 2008, Quesada et al. 2012) and species composition (Condit et al. 2002, ter Steege et al. 2013) can vary significantly due to soil and climate variations (e.g. Amazon basin, Congo basin), affecting biomass stocks and dynamics (Malhi et al. 2004, Slik et al. 2010). The capacity of a forest to recover its initial timber volume and biomass is therefore likely to be influenced by these variations in dynamics (Sist et al. 2011).

2.2.2 Silviculture as a tool for conservation

Achieving sustainable timber production was the dominant focus for a long time. However, when societal demands on forests changed and began to include, for instance, contributing to rural livelihoods, satisfying recreation needs, and providing ecosystem services, sustainable timber production became too narrow a focus. Forests produce much more than just timber and the forest products and benefits are of interest to many more actors than logging companies only (Nasi and Frost 2009). New societal demands resulted in the replacement of sustainable timber production with the concept of multiple-use forestry, which encompasses production of different goods (timber, non-timber forest products) as well as services (environmental, scenic, conservation) (Guariguata et al. 2012).

Tropical primary forests exhibit particular features that should be taken into account when logging them, including:

- Existence of emergent trees that are the preferred target of logging in primary forests, particularly in the first cut. However, as these trees have grown over long periods of time, they will not be part of consecutive cutting cycles in a managed forest.
- Great variety of sites and forest types with different structures and composition. The variety of tree species is enormous, making silvicultural planning complex and challenging.
- Most of the (commercially) interesting species occur in small numbers, thus single-tree mixture generally dominates.
- In all tropical forest types, however, there are so-called horizontally and vertically continuous tree species that also occur with higher abundance. These species are of particular interest in silviculturally managed forests; but with few exceptions, they are not the preferred species from a commercial viewpoint.
- Only few tree species in humid tropical forests produce marketable wood in larger scales, with the exception of dipterocarp forests in Southeast Asia.

Many companies that hold forest concessions in Southeast Asia and South America will soon begin, or have already started, the second felling cycle. Forests being logged for a second time, 30 to 40 years after the first logging, are poorer than during the first logging cycle. The timber volume has not recovered its initial level and in many cases there are insufficient numbers of small and mid-sized trees that eventually should produce timber for a third logging cycle. The lack of future crop trees is partly linked to physiological reasons, as mid-sized trees are not necessarily younger than canopy-dominant trees but are losers in stand competition, and to the fact that these trees are often damaged from the first cut. In such cases, silvicultural treatments are of utmost importance and they need to adapt to the conditions of forests logged for a second time to ensure that these forests will be productive in the future. It may be necessary to increase the number of years in the rotation cycle because many of these forests have been logged more than once within the first rotation cycle. Conservation of these logged forests is essential for the future. Unfortunately, technical recommendations made by researchers to adapt harvesting practices to the regeneration capacities of valuable species are usually ignored not only by forest companies but also by sectoral agencies that develop forest regulations (Fredericksen and Putz 2003, Sist and Nascimento-Ferreira 2007, Peña-Claros et al. 2008). For example in dipterocarp forests of Kalimantan provinces (Indonesian parts of Borneo), where minimum diameter cutting limits of 60 cm and cutting cycles of 40 years could be applied (Sist et al. 2003), new regulations promoting a diameter cutting limit of 40 cm associated with line planting of fast-growing timber species and cycles of 25 years are now implemented in areas logged only 20 years ago. These new technical recommendations are incompatible with the concept of sustainable timber production and will undoubtedly lead to the ultimate impoverishment of these production forests within a short time, causing their eventual replacement with short-term profitable tree plantations such as oil palm plantations.

Degraded and secondary forests are now the predominant forest types in many tropical countries. Degraded forests are "skimmed-off" primary forests in which timber, fuelwood, and other forest products have gradually been depleted. Depending on the intensity, what remains is either degraded primary forest or secondary growth. Secondary forests contain various stages of succession and are less heterogeneous within and between different sites, at least during the early pioneer stages. They are also less diverse. The dominant species in the early secondary stages are short-living pioneer trees that demand light. Over time, secondary forests become more diverse and shade-bearing species can install themselves (as long as the seed-disbursing vector is existent). The quantity of biomass can reach that of primary forests in the course of 100 years or more, depending on site conditions. Under good site conditions, secondary forests have a high capacity to sequester CO_2 and can become important carbon sinks. Most degradation is the result of unsustainable extraction of forest products and values. The area affected is estimated to be between 850 million ha (ITTO 2005) and 1.1 billion ha (WRI 1999). An exception to this is commercial selective logging in humid forests at short intervals, but this affects a smaller area in comparison with other forms of degradation.

We are now living in a world largely shaped by human activities (an era called the Anthropocene) and we are entering an era dominated by the above-mentioned logged-over forests and by agroforests, secondary forests, and "novel forests" (Lugo 2009, Lugo 2013). These novel forests are principally a mix of native and introduced plant and animal species, which is not incompatible with the regeneration of native species. In some areas, Puerto Rico being a well-documented example, these novel forests largely dominate the landscape and have naturalised over most of the geographic space (Martinuzzi et al. 2013). The novel forests are the results of past and present anthropogenic activities, essentially abandonment of agricultural land and naturalisation of exotic species. The area of novel ecosystems, (Hobbs et al. 2013) including novel forests, will increase

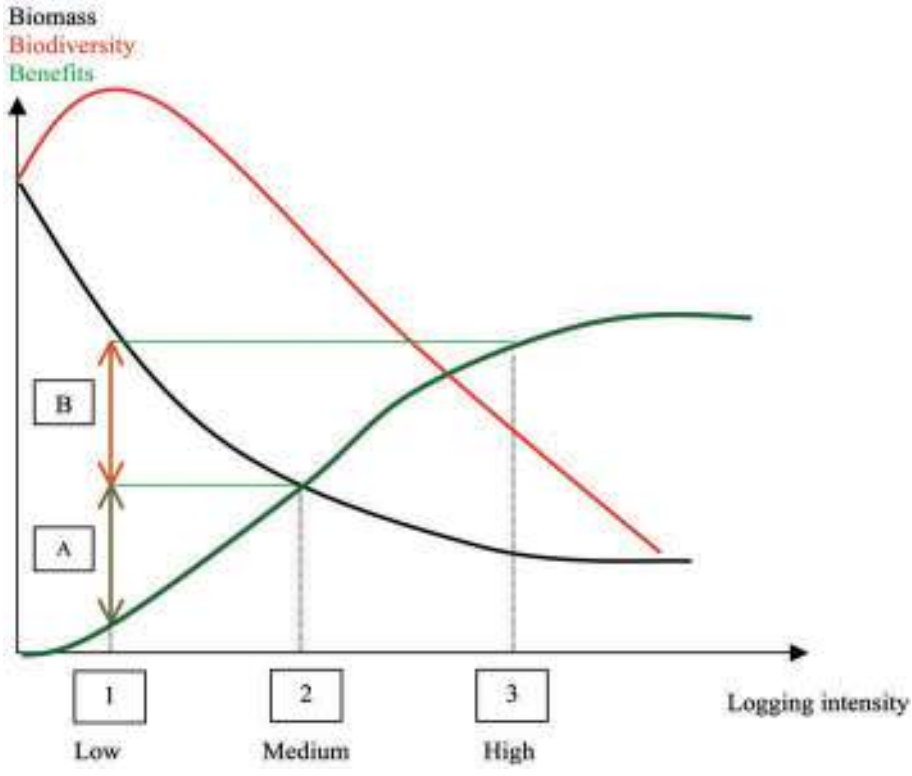

Figure IV 2.4 Theoretical trend curves for biodiversity, aboveground biomass (agb) and immediate logging benefits depending on logging intensity at a given moment. These curves can be used to define production compromises. In a context of payments for environmental services, A, B and A+B represent the lost earnings between the different compromises (respectively between 1 and 2, between 2 and 3 and between 1 and 3) and can form the calculation basis for assessing the cost of payments for environmental services.
Compromise 1: Low intensity and low financial earnings, high agb and biodiversity
Compromise 2: Medium intensity, moderate financial earnings, moderate biodiversity and agb
Compromise 3: High intensity and financial earnings, very low biodiversity and low agb.

dramatically in the near future because of our increasing human footprint and the effects of climate change and species migrations. It is therefore crucial to consider these novel forests in planning forest management practices.

To summarise, tropical silviculture needs to adapt to the new context of SFM, a context characterised by different types of forests, a diversity of forest stakeholders, and new demands for forest goods and services. Multiple management objectives need to be met within the same forestry production unit. The emergence of new payments for environmental services markets opens up economic development possibilities for forest-provided environmental services. Forest management practices cannot be implemented solely to sustain timber yield, rather they need to seek compromise between the production of forest products and environmental services (Figure IV 2.4). The main challenge that tropical silviculture faces is to identify the thresholds of extraction intensity compatible with the maintenance of the main environmental services targeted for a given forest management unit (Sist et al. 2011).

2.3 Forest management for different stakeholders and different objectives

2.3.1 Growing recognition of community and smallholder forest tenure rights

Tropical forest management was long dominated by logging companies that managed large concessions. However, it is estimated that approximately 800 million people in rural areas worldwide obtain important contributions to their incomes through extraction of timber and other forest products (ITTO 2011). For at least the past 20 years, rural populations have actively claimed their rights to benefit from the forest resources and to be recognised by legislation as legal and significant actors in the forestry sector. As a consequence, they indeed become more and more important although forest legislation still poorly reflects this new situation. The multiple local forest stakeholders have their own needs, capacities,

perceptions, and forest-related livelihood strategies. They focus not only on timber production but also on using the forest for subsistence needs, commercially exploiting multiple forest products such as fuelwood, food, and medicinal plants, or pursuing ecotourism that also promotes their own cultural heritage. Several studies have demonstrated that community forest management, when it is formally recognised and land ownership is legally recognised, can effectively contribute to the conservation of natural forests (see Guariguata et al. 2012).

What is the importance of forest land owned or legally administrated by forest communities, whether they are ethnically mixed communities, indigenous people, or smallholders? A recent assessment of ITTO (2011) regarding the change of forest land tenure in 39 tropical countries between 2002 and 2008 shows a trend of recognition of forest communities' and smallholders' rights to forestland and forest use, particularly in Latin America. The survey shows that in the 30 countries with complete data, the absolute area of public forestland has decreased substantially, by 15% from 2002 to 2008 (1.3 million ha versus 1.1 million ha), while the forest areas designated for use by ethnically mixed communities and indigenous groups has increased by 66% (43 million ha versus 71 million ha) and 22%, respectively, during the same period (Figure IV 2.5). Finally, the forest area owned by individuals or private companies also increased by 122% (100 million ha versus 222 million ha). In 2008, governments in these 30 countries administrated 65% of the total forest area, while the private sector (ethnically mixed communities, indigenous people, smallholders and companies) administrated or owned 35% of the forest area. Ethnically mixed communities and indigenous groups controlled 22% of all forestlands (Figure IV 2.5).

Latin America showed the highest change in forest land tenure: forestlands administrated by government decreased by 45%, from 453 million ha in 2002 to 225 million ha in 2008. In comparison, Asian and African countries have shown almost no change in forest land tenure (Figure IV 2.6). The majority of African countries assessed in the report have only a very small percentage of forestlands administrated or owned by communities. The global transition of administration and ownership of forestlands from government to communities is happening in only a few countries, mainly in Latin America and particularly in Brazil. Brazil especially has pursued significant change in forest tenure towards the recognition of ownership of ethnically mixed forest communities, indigenous people, and smallholders, thereby demanding the use of different models, linked to diverse sets of rules, for forestland allocation and forest resource management (Pacheco et al. 2011).

From 2003 to 2006, Brazil created 487 000 km^2 of conservation units, in most of which traditional forest use is regulated and allowed. Smallholders who settled the Brazilian Amazon during the past decades are held responsible by the forest code for conserving at least 50% of their lands in forest. These forest reserves, which represent 12 million ha, can be managed following a forest management plan approved by the local authorities. According to the Brazilian Forest Service, forestland under the responsibility of communities and smallholders covers an area of about 40 million ha, which represents an area similar to that which can be given out as forest concessions (Amaral et al. 2007, SFB 2010). In the Amazon states with high levels of colonisation, where forestlands have been converted into pasture or agricultural lands or degraded by predatory logging, the contribution of communities and smallholders to forest conservation plays a major role since they still own forests in good condition with high timber volumes. In the state of Pará, for instance, it is estimated that communities and smallholders will in the future contribute to about 60% of the supply of wood to operating sawmills (Sablayrolles et al. 2013).

2.3.2 Community forest management and improved business models

The involvement of different actors in the management of natural tropical forest is undoubtedly one of the key issues in promoting large-scale SFM and preserving forests from degradation and conversion in the future. The so-called community-based forest management (CBFM) must therefore be developed to contribute more actively to the forestry sector than in the past, when logging companies were the main supplier of timber.

CBFM still faces many limitations in its implementation, execution, and financial profitability. Such limitations are partially caused by poor organisational capacity, lack of knowledge of forestry techniques, limited access to markets, and lack of regulations taking into account the specificity of CBFM. To overcome these difficulties, implementation of new communal forest management systems has usually been supported by public or international financial assistance. Unfortunately, most of these difficulties, particularly those related to forest regulations that are still poorly adapted to CBFM, usually persist once the financial and technical support has stopped and are a source of failure (Humphries et al. 2012, Drigo et al. 2013, Sablayrolles et al. 2013, Part II chapter 3).

To understand its limitations and to find solutions for promoting CBFM, it is essential to recognise the diversity of both actors and forest production systems. For example, a forest community managing a

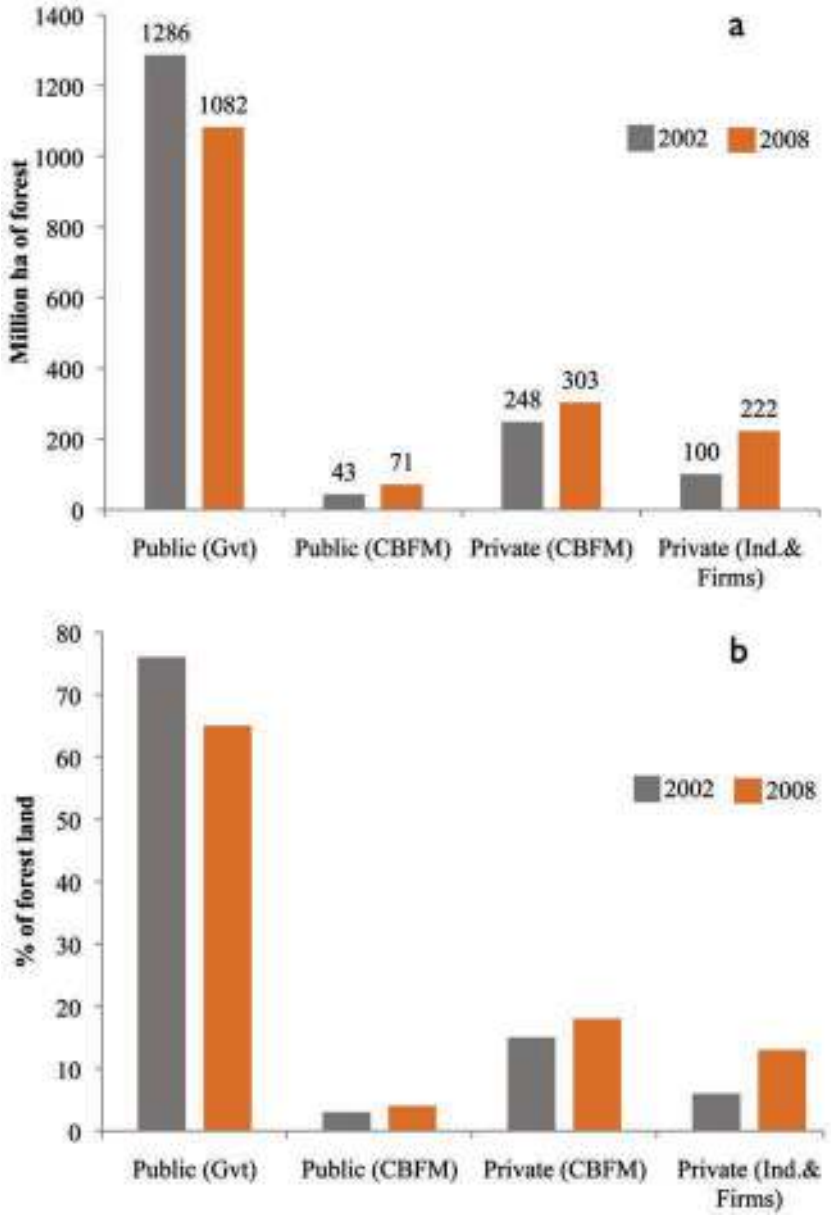

Figure IV 2.5 Forest tenure distribution by tenure category in 30 tropical countries with complete data for 2002 and 2008 (a: in millions of ha, b: in percentage of total forest cover).
Public (gvt): Public forest lands owned and administrated by government and not designated for use by communities or indigenous peoples.
Public (CBFM): Public forest lands designated for use by communities and indigenous (Community Based Forest Management).
Private (CBFM): Private lands owned by communities or indigenous groups.
Private (Ind. & Firms): Private lands owned by individual (e.g. farmers) or firms (e.g. logging company).
Source: ITTO 2011

common forestland of several thousand hectares will be more similar to a logging company managing a concession than to smallholders who individually own small patches of forests. In the first case, forest management activities may generate most of the community income but will require larger organisational and financial capacity, e.g. to implement silvicultural treatments. In the second case, forest management activities will provide only a part of the individual family income. This proportion of income seems to play an important role: long-term simulation of the income using different agrarian smallholder models suggests that livelihood strategies that include forest management for timber increase household resilience to adequately address risks and calamities (see Part II chapter 4).

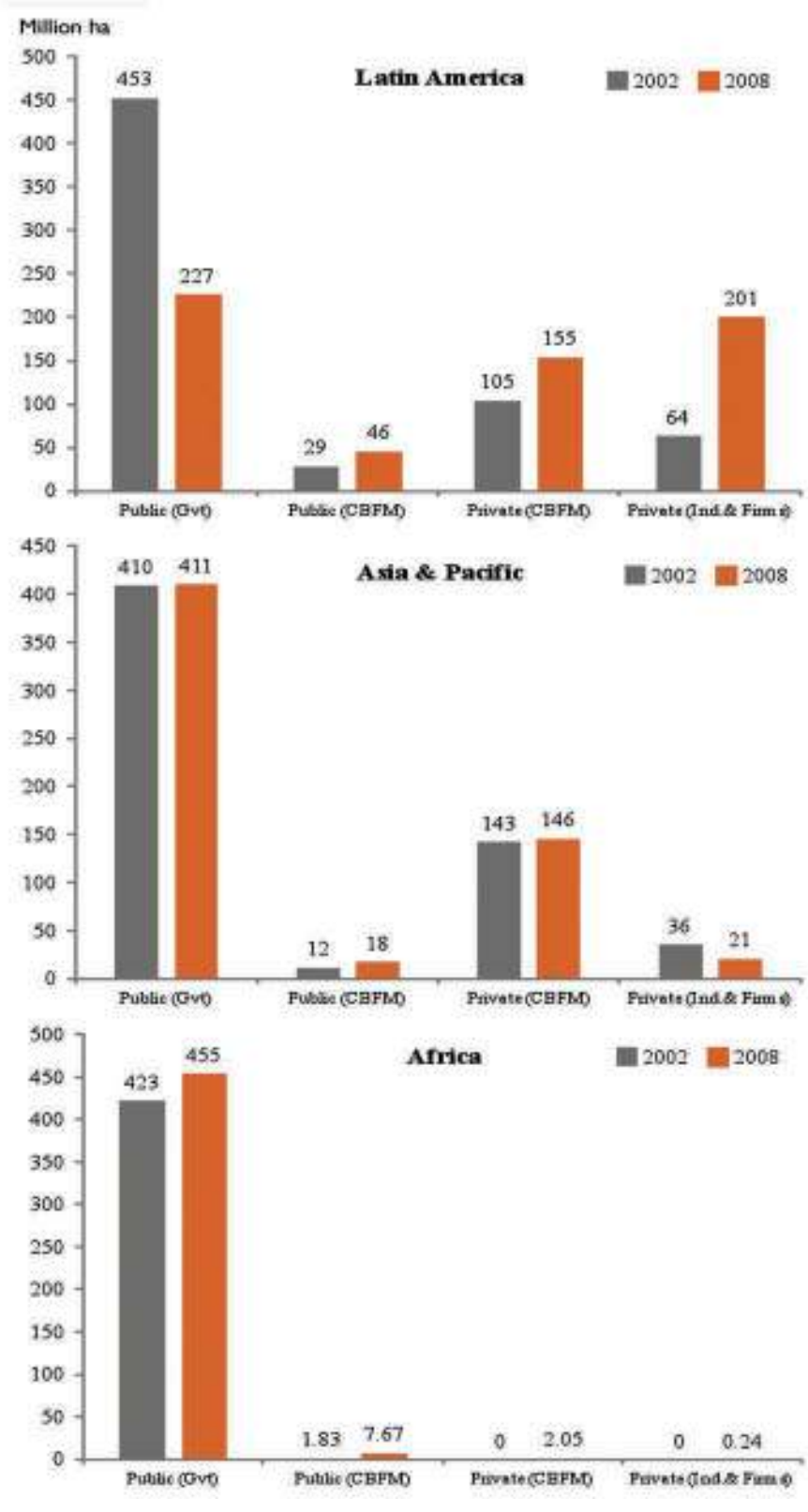

Figure IV 2.6 Forest tenure distribution by tenure category in Latin America, Asia and Africa including 30 tropical countries with complete data for 2002 and 2008 (in millions of ha). Source: ITTO 2011

Latin America: 8 countries accounting for 82 % of Latin American tropical forests (Brazil, Bolivia, Colombia, Ecuador, Guyana, Honduras, Suriname, Venezuela)

Asia: 8 countries accounting for 90 % of the Asian tropical forests (Australia, Cambodia, China, India, Indonesia, Myanmar, PNG, Thailand)

Africa: 14 countries accounting for 84 % of African tropical forests (Angola, Cameroon, CAR, Chad, Congo, Côte d'Ivoire, DRC, Gabon, Niger, Nigeria, Sudan, Tanzania, Togo, Zambia)

2.4 New forest policy and governance approaches

2.4.1 Current policy frameworks for forest management

In most forest-rich tropical countries, forest policies have focused almost exclusively on regulating timber extraction on public lands that were given out under concessions to logging companies (Karsenty et al. 2008). Forest management plans are seen as the primary instrument to regulate large-scale logging and to promote sustainable timber harvesting, associated with different stumpage-fee arrangements, often linked to the volume harvested on those public lands. These regulations, however, have in most cases failed to promote SFM, not only because the regulations were based on a narrow understanding of sustainability but also because of the constrained broader institutional context associated with forest management (Nasi et al. 2011).

Broadly speaking, current forestry legislation has two weaknesses. The first is that by favouring mechanised selective logging practised by forest companies, it does not adequately take into account the communities and smallholders that are undertaking multiple-use forest management. When legislation does consider communities and smallholders, it imposes large-scale industrial management models for a diversity of situations where local actors follow different rationales for making use of their forests (Pokorny et al. 2008). The second weakness is that forestry legislation tends, almost universally, to favour command-and-control schemes linked to verification of the legal supply of timber. The command-and-control approach is not only costly but relatively ineffective, resulting in substantial illegal harvesting of tropical timber often tied to bad forest management practices (Lawson and MacFaul 2010). In addition, this approach often penalises the local actors who cannot comply with the forest management regulations favouring large-scale industrial logging and perpetuates an extended informal sector. These cases are documented for Latin America (Pacheco et al. 2008), Cameroon (Cerutti et al. 2013), and Indonesia (McCarthy 2002).

By neglecting practices and aspirations of smallholders and communities, the policy frameworks fail to address the critical limitations that these local actors face, such as limited investment capacity, poor knowledge of silvicultural and harvesting techniques, and limited market information (Pacheco 2012). For example, the Brazilian Forest Code authorises logging in the forest reserve of agrarian properties held by smallholders only after approval of a management plan by the competent local authorities. The approval criteria, however, are more suited to large-scale mechanised logging operations by specialised companies than to farm forestry characterised by small areas, low timber volumes, low investment capacity, and inadequate knowledge of logging and business management techniques. Smallholders are thus forced to sell their standing trees, usually for a low price, to logging companies, many of which are illegal. These practices are detrimental not only to the smallholders, who make little money from their forest reserve and bear the legal responsibility for this illegal trade, but also to the regenerative capacity of the logged forest.

In other cases, smallholders and communities apply forest management practices that do not harm the forests in the long run, yet these practices are not recognised by forestry agencies or trained professionals. This often results in local actors using their forests rather informally (Pokorny et al. 2008). Furthermore, relatively high bureaucratic barriers and transactions costs impede compliance by smallholders and communities with forestry norms (Pacheco et al. 2008). A strong need exists to revise present legislation in order to take into consideration the specific conditions of community and smallholder forest management. Site-specific intervention models need to take into account the variety of contexts and community interests, rather than replicating models that have been successful elsewhere (Hajjar et al. 2013). Forest regulations will have to be flexible enough to be adapted to a broad diversity of forestry situations. Command-and-control schemes are likely to have limited effect in controlling illegal timber when the institutional conditions and incentive systems are not in place for the different local stakeholders to undertake long-term forest management.

2.4.2 Towards more integrated policy approaches

In most cases, forestry policy frameworks are devised in isolation from other sectoral policies, mainly agriculture and land policies and finance and trade policies. The lack of policy harmonisation is one of the main factors working against the maintenance of production forests and protected areas. Indeed, in many countries, unsecure land tenure constitutes an important bottleneck that inhibits investments and impedes long-term perspectives for natural resource management (Robinson et al. 2013). Important contradictions between forest policy and agricultural policy only increase with growing concerns for ensuring supply of food and energy, which also accentuates the existing conflicts between agriculture and conservation land use (Phalan et al. 2011).

The overall trend is for tropical countries to still

Box IV 2.1 The integration of forest and agriculture in the Brazilian Amazon

For more than 40 years, small settlers in the Amazon have been pursuing the same strategy: they clear the forest to grow food crops, like maize, rice, or manioc. After two or three years, the soil loses its fertility and requires an extensive fallow period. The settlers then convert their plots into pastures, since cattle ranching is the most profitable activity in the short term, and open new forestlands to grow food crops. If each of the 460 000 smallholder families in Brazil cleared just one hectare of forest per year, this would amount to 4600 km², exceeding the 3900 km² of annual deforestation that the Brazilian government set as the maximum for 2020. It is therefore vital that smallholders make their systems more productive and manage soil fertility more effectively. This requires the creation of mixed forestry-farming-ranching models that enhance natural forests while protecting them and that increase agricultural productivity. Considering the 12 million ha of permanent forest reserve held by smallholders in the agrarian settlements, the implementation of integrated forestry and agriculture practices will play a key role in reducing future deforestation. One way to develop such farm forestry is to regulate partnerships between smallholders and forestry companies. Defining rules and specifications guaranteeing the equity of contracts and the environmental sustainability of operations would create a favourable environment both for the development of farm forestry and for greater legal accountability of logging companies. In practice, companies undertake timber harvesting, although the smallholders remain legally responsible for the implementation and execution of the forest management plan. The control of the forest inventory, however, is of strategic importance, for instance in setting the conditions for the sale of timber. It is important to enable smallholders to control this crucial phase of forest inventory through financial support from the government or forestry credits.

give precedence to the expansion of agricultural land for commodity crops and of pastureland (Gibbs et al. 2010). In cases such as Indonesia, the rapid expansion of oil palm seems unlikely to decline due to a growing market demand and relatively weak state land-use regulations (Wheeler et al. 2013). In contrast, there is an emerging trend in the decoupling of expansion of agricultural crops and deforestation in the Brazilian Amazon because the expansion of soybean production is taking place in already deforested lands (Macedoa et al. 2012). This suggests that it is possible to increase agricultural yields without affecting forests. However particular institutional arrangements must be in place in order to integrate the apparently contradictory goals of agricultural expansion and forest conservation (Hecht 2012). In Brazil, there are explicit attempts to integrate forests and agriculture (see Box IV 2.1). While reducing the pressure on forests is a condition for SFM, clarifying forest use rights and incentives, which are often absent, are also required. The situation in sub-Saharan Africa (SSA) can be seen as the "last frontier." This is a place where a relative abundance of land, combined with relatively low population and weak government, appears to be open for grabs (Gibbs et al. 2010). It is very likely that we are going to see an expansion of both industrial (because of external demand) and family farming in many SSA countries in the coming decade. It is also likely that this will happen at the expense of forested lands.

Incentive systems to promote sustainable forest management require the adoption of a wider perspective of sustainable land management, not merely a focus on forest management. While recognition of the need for more harmonised policy frameworks for supporting socio-economic development is not new, stronger measures are needed for more articulated and holistic inter-sectoral approaches that support social welfare and complementing integrated natural resources management. Two interconnected goals are embraced by these emerging approaches. The first is the recognition of the importance of sustaining the provision of forests goods and ecosystem services under the notion of multifunctional landscapes (Fisher et al. 2009). The second stresses the need to optimise land uses to ensure adequate food and energy supply for a growing population without increasing the pressures on forests from expansion of cropland (Smith 2013). These two objectives go beyond the goal of SFM, yet SFM remains a fundamental element of multifunctional landscape management. This, in turn, makes the objective of sustainable forestry both more challenging and more complex to implement in practice.

2.4.3 Multi-level and multi-actor forest governance

The achievement of SFM in the tropics may only be possible under new governance architectures that embrace multiple interconnected levels from the local to the global and that engage multiple actors, including both state and non-state actors. The obstacles

to good governance in the forestry sector are corruption, weak law enforcement, unclear tenure rights for land and trees, and marginalisation of local actors in the context of relatively costly and bureaucratic command-and-control approaches for ensuring legal timber supply. It is increasingly clear that multi-level governance of forest resources involves complex interactions of state, private, and civil society actors at various levels and of institutions that link higher levels of social and political organisation (Mwangi and Wardell 2012). Thus, forests governance increasingly embraces a whole range of institutional arrangements negotiated at different levels, connected in diverse ways (Agrawal et al. 2008, McDermott et al. 2010). These arrangements include negotiations by local stakeholders on ways to use forests and share their benefits, policy frameworks issued at the national level regulating how forest resources should be accessed and managed, and decisions from consumer countries on timber-market regulations (e.g. FLEGT[2], Lacey Act) or multi-stakeholder processes involving the private sector and civil society, such as in forestry certification (e.g. Forest Stewardship Council). Finally some global processes, such as the United Nations Forum on Forest, Convention on Biological Diversity, and United Nations Framework Convention on Climate Change, have diverse but not obvious impacts on decision-making about forests and in shaping SFM. The recently adopted Warsaw framework for REDD+[3] is an example of such global processes that if properly implemented, should reduce deforestation and degradation through a combination of incentive measures and rigorous monitoring and verification (http://www.forestcarbonasia.org/other-publications/warsaw-framework-redd-plus/). The combination of global governance and domestic policy leads to different pathways through which they can influence forest management (Bernstein and Cashore 2012).

Each of the governance mechanisms and processes mentioned, such as FLEGT, certification, and REDD+, have their own strengths and weaknesses in supporting forest governance, and thus SFM. For example, forestry certification is likely one of the most advanced schemes (Auld et al. 2008), but it has faced a slower uptake in tropical natural managed forests due to its high cost and failure to yield a premium price for certified timber. Yet, forest certification has the potential to improve weak normative frameworks that allow the unsustainable use of forests (Cerutti et al. 2011). While FLEGT conveys a sense of responsibility from consumer countries to halt timber associated with illegal logging, it may also tend to exclude smallholders who cannot comply with forestry regulations, despite the fact that their operations, in many cases, have lower effects on forest conditions than industrial logging (Atyi et al. 2013). What really matters, however, are the interactions of the different instruments and the combined effects from the supply side and the consumption side.

2.5 Discussion and conclusion

Tropical forest management must adapt to the new tendencies observed during the past decades. The first important change is the type of forest that will be managed in the future. For many tropical countries of Southeast Asia, for example, forests being logged have already entered the second cycle of timber production, but operators still act as if the forests were in their original state. Indeed, new regulations for timber extraction decrease the minimum diameter cutting limit in order to harvest smaller trees already present during the first harvest, while sustainability would require harvesting only trees that grew during the rotation duration to a harvestable size. As a result, the timber volumes being extracted today at second rotation are still very high and result in high damage while reducing the regenerative and elastic capacity of the forests. Future tropical silviculture will have to consider many different types of forests that were usually discarded in the past, such as secondary forests, degraded forests, agroforests, and novel forests (Nasi and Frost 2009).

It is therefore essential to assess the regeneration capacities of the existing logged-over forests on a regional scale, in terms of wood volume, non-timber forest products, biodiversity, and carbon stocks, and to make silvicultural recommendations that are adapted to the different types of forests in a given region. For example, in the very heart of the Amazon basin, there are major differences in structure, composition, and species richness that are important to take into account, as they will partly determine the regenerative capacities of forests after logging. The same is true for the forests in the Congo basin. Unlike the tropical silviculture of today, which still addresses primary forests with a large stock of timber, tomorrow's silviculture will deal with disturbed, sometimes degraded forests that will have to be strictly managed and in some extreme cases restored through intensive restorative silviculture. It will no longer be possible to settle for intervening during logging operations; it will also be necessary to turn to post-logging silvicultural treatments, such

[2] Forest Law Enforcement, Governance and Trade (FLEGT)

[3] Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+)

as liana removal around future crop trees, refinement and timber-stand improvement, and enrichment planting with species of commercial value.

Tropical silviculture must be an effective tool for forest conservation while ensuring benefits for a wide range of actors who manage from a few to thousands of hectares. Although, it is undeniable that various demands on tropical forests to provide multiple goods and services have increased during the past two decades, tropical forest management systems have made little or no progress in moving from timber-dominated models into more diversified ones aimed at producing multiple goods and services (Panayatou and Ashton 1992, García-Fernández et al. 2008, Guariguata et al. 2012). This in spite of widely acknowledged social and financial advantages of multiple-use forest management (Kant 2004, Wang and Wilson 2007). Multiple-use forest management could represent an alternative for generating complementary revenue between two timber rotation cycles, which often exceeds 30 years. In addition to non-timber forest products, services provided by tropical forest such as biodiversity, soil protection, and climate-change mitigation are now considered as potential sources of income under the mechanisms of payment for ecosystem services, for instance REDD+.

CBFM is usually considered to be less damaging than industrial logging. However, in many tropical countries, the so-called small-scale forestry implemented by rural populations is in constant evolution – in many cases, communities and smallholders implement mechanised industrial logging through partnerships with logging companies or even by themselves (see Part II chapter 3, Humphries et al. 2012). So the difference between CBFM and industrial logging is less and less obvious, but some CBFM characteristics such as small forest areas and use of only a few species still must be taken into account.

The generalisation of sustainable tropical forest management practices will not happen without important changes in forest resource governance and in how the pressures from competing land uses are managed. Three aspects are important with regard to the transition required in forests governance. First, policy approaches will have to adopt more plural and flexible views when considering the disparate perspectives of diverse actors related to well-managed forests. Second, forest policies are increasingly becoming part of more integrated policy frameworks to ensure the provision of forests goods and services in multifunctional landscapes rather than considering production forests in isolation. Finally, multi-scale governance approaches will be needed given the increasing interaction likely in the future between decisions made at the sub-national level with those taken by national governments as well as the influence that import market or investment regulations in consumer countries and certification processes may have in shaping decision-making around forest resource management.

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Synopsis of FAO Regional Forest Outlook Studies

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Abstract: In this chapter we follow the idea introduced in the previous chapters of this book on the need to better understand the conditions that enable and foster progress towards sustainable forest management (SFM) or hinder it. The prerequisite conditions defined in the analytical framework in Part I of this book (Table I 3.1) were utilised to examine the information provided by regional outlook studies published by FAO in recent years in Africa, Asia-Pacific, Latin America, Europe, Russia, and North America (FAO 2003, 2006, 2010a, 2012a, UNECE/FAO 2012a, 2012b). Our objective was to synthesise the information provided in these publications related to the prerequisite conditions. Moreover, we were interested in the future scenarios and trends highlighted in these reports. The synopsis was performed by grouping the findings into four groups of prerequisite conditions stated in the analytical framework (Part I, chapter 3). The examination was challenging due to the wide variation of conditions among countries and regions that are referred to in the outlook studies. Although it was difficult to draw global conclusions and identify clear trends, the most relevant findings are stressed in the discussions presented in the abovementioned groups and in the chapter's last section – "Concluding remarks" – which also describes the main constraints encountered in the synopsis.

Keywords: Forest outlook studies, sustainable forest management, prerequisite conditions, forest governance, forest livelihood, natural resources base, forest research, forest monitoring, forest trends, forest scenarios

3.1 Introduction

There is wide recognition of the enormous value of forests for humanity. Forests are fundamental for providing economic goods, maintaining clean water supplies, mitigating climate change, sheltering biodiversity, and supplying recreational services. An estimated 1.3 billion of the world's poorest people obtain an important part of their incomes, food, and medicine from forests. The United Nations stated in its *Non-Legally Binding Instrument on All Types of Forests* (UN 2007) that sustainable forest management (SFM), as a dynamic and evolving concept, aims to maintain and enhance the economic, social, and environmental values of all types of forests for the benefit of present and future generations (more detailed discussion on this evolving concept is presented in Part IV, chapter 2). SFM is needed for safeguarding and enhancing the positive contributions of forested areas to society. This is not a new recommendation and decision-makers at national and global scales have repeatedly received this message for several decades. Why has it been so difficult to progress in instituting SFM, when it has been proclaimed as an imperative policy objective in many countries?

To find an answer to this fundamental question, we have postulated the need to better understand the conditions that foster progress towards SFM or hinder it. Consequently, Part I of this book presented an analytical framework that aimed at identifying some of the important prerequisite conditions for progress in SFM. This framework (see Table I 3.1) guided the local-level case study analyses presented in Part II and framed the development of the syntheses of the case studies and the analyses across cases in Part III.

In this chapter we have used the framework to examine recent United Nations Food and Agriculture Organization (FAO) outlook studies to draw out some of the future trends in different regions of the world with respect to the prerequisite conditions. These publications contain relevant information on

Table IV 3.1 Six forest-sector outlook reports studied in the current chapter.

Title	Publisher(s)	Region(s) covered	Publication year	Period covered	Scenarios
Forestry Outlook Study for Africa	FAO	Africa	2003	2003–2020	5 scenarios
Tendencias y perspectivas del sector forestal en América Latina y el Caribe	FAO	Latin America and Caribbean region	2006	2005–2020	Potential trends up to 2020
Asia-Pacific Forests and Forestry to 2020	FAO	Asia-Pacific	2010	2010–2020	3 scenarios
The Russian Federation Forest Sector Outlook Study	FAO	Russian Federation	2012	2010–2030	3 scenarios
European Forest Sector Outlook Study II	UNECE/FAO	Europe	2012	2010–2030	One reference scenario and four policy scenarios up to 2030
The North American Forest Sector Outlook Study	UNECE/FAO	North America	2012	2006–2030	

current status and future trends in forest management at regional levels. The knowledge is important in guiding actions that are crucial for facilitating progress in SFM.

The present chapter is based on and restricted to six regional forest-sector outlook reports published by the United Nations forest agencies (FAO and UNECE) and described in Table IV 3.1.

In addition, the following sources were used to update information and figures provided in the publications cited in Table IV 3.1: *Global Forest Resources Assessment 2010. Main report* (FAO 2010b) and *State of the World's Forests 2012* (FAO 2012b).

The outlook studies, an integral component of FAO's forestry strategy, have been aimed at assessing and analysing the status, trends, and prospects of forest and forestry in different regions. They are based on a large amount of information compiled by a group of experts who are familiar with the prevailing conditions in the various regions. The outlook studies highlight the current situation and pay attention to the new trends in the regional and global forest sectors, identifying challenges and emerging opportunities. Outlook studies take into account past and future economic, social, institutional, and technological changes. Most of them introduce an overview of future scenarios with a time horizon between 10 to 20 years into the future.

The main purpose of FAO outlook studies has been to strengthen the knowledge base of national forest organisations and consequently to provide these countries with the information required to develop appropriate forestry programs and policies, enhance the sector's contribution to socio-economic welfare, maintain environmental assets, and ensure the full range of necessary goods and services generated on a sustainable basis. The studies generally emphasise problems of poverty and environmental degradation, which adversely affect forest areas in numerous countries. They intend to support policy development and strategic planning, depict the range of choices available to forestry policy-makers, and describe alternative scenarios as a result of different choices. They have also been used in the development of strategic forest planning at regional levels.

Unlike local case studies in Part II, which mostly focus on past and current issues and developments, the UN outlook studies represent forward-looking investigations. The regional outlook reports have been examined as large continental-scale case studies to complement this book's Part II local-scale case studies and to give an overview of the expected future trends in the regions where the case studies are situated. This chapter summarises findings from the outlook studies in respect to the prerequisite conditions identified in the analytical framework presented

in Part I (see Table I 3.1). In the framework, these conditions are grouped into four broad categories:

- policies, institutions, and governance
- livelihoods, capacities, and cultural and social aspects
- natural resources base
- research and monitoring

The results presented in section 3.2 are structured according to the above categories. Each of them also contains a brief description of major continental trends, which are not predictive but rather intend to help policy-makers gain insights into the consequences of certain policy choices. Section 3.3 concisely lists few concluding remarks and a number of difficulties that prevented drawing global conclusions from these outlook studies.

3.2 Summarised findings from the outlook studies

3.2.1 Policies, institutions, and governance

Societies devise mechanisms to regulate appropriation of tangible and intangible goods and services. Conditions related to the regulatory mechanisms for forests and forestry are reflected in policies, institutions, and governance. This section includes topics ranging from land tenure and rights to forests and trees, public administration, participation, and stakeholder cooperation, long-term societal commitment to SFM, and influences of regional and global processes on forest-related policies and behaviour (Table I 3.1).

Land tenure

Based on the outlook studies, it can be presumed that clear and secure tenure forms the backbone of efficient land use and has direct bearing on forests and forestry (FAO 2010a). Uncertain land tenure discourages long-term investments and sustainable management and encourages maximisation of short-term benefits. Security of tenure is a necessary but insufficient condition to enhance incomes and lift people out of poverty. Technical and managerial skills of owners, proactive entrepreneurship, adequate financing, sufficient resources, supportive legislation, and access to markets are among the critical factors that enable SFM (FAO 2006, 2010a).

According to the Global Forest Resources Assessment (FRA) (FAO 2010b) 80% of the global forest area in 2005 was publicly owned, 18% was privately owned and 2% ownership was classified as "other", including unknown and disputed proprietorship. Except in Europe, public ownership is globally predominant, but the importance of public ownership varies among the regions. The area of privately owned forests has increased over the past 15 years in both Asia and South America because of the significant changes in countries such as China, Colombia, and Bolivia. The area of private forests also increased slightly in Africa and declined in North America (FAO 2010b).

Globally, it is predicted that in the next 20 years, public ownership of forestlands will remain predominant, although the area under public ownership will decrease slightly. The increase in privately owned forests will mostly occur due to new forest plantations rather than increased natural forests (particularly in Asia and Latin America). Reduction in public forests will be due to changes in tenure and decreases in forest area, while the latter is the more likely in many countries and regions (FAO 2010b). Private forests will further decline in North America due to long-term restoration and conservation strategies in the countries, which are mostly the responsibility of government agencies (FAO 2010b). In Africa, the role of the state will remain dominant, with some management rights devolved to private corporations in the high-forest-cover countries of Central Africa and to communities in eastern and southern Africa. In Asia, forest ownership and management will continue to shift as a consequence of land tenure reform in China in favour of private ownership by individuals and families (FAO 2010b). In Latin America, the area of forests under private and community ownership is expected to moderately increase (FAO 2006). In Russia, private forest ownership is unlikely to be introduced in the near future mainly because of the attitudes and social feelings of the majority of the population and of policymakers. A large part of the most productive forests in Russia is under long-term lease, which will restrain development of more efficient and flexible modern forestry contracting systems based on sound state-private cooperation. This will be difficult to reverse in the next two decades (FAO 2012a).

Public administration

Publicly owned forests can be managed by the state, communities, individuals, or the private sector. At present states manage more than 80% of public forestlands, private corporations, and institutions manage 10% and communities some 7% (FAO 2010b).

In the future the management of public forestlands in Africa and Asia-Pacific will significantly shift to the private sector, including corporate businesses, farmers, and communities. The role of gov-

ernmental institutions will change and will be limited to policy-making, regulatory functions, and the provision of goods and services that the private sector is unable or unlikely to provide (FAO 2003, 2010a).

Devolution of resource management responsibilities to lower-level government agencies and to communities, families, and individuals is expected to be a growing trend across regions. One challenging issue will be the inclusion of local people in decisions on protected area management and aligning livelihood improvement activities with conservation objectives. Involving local communities and ensuring equitable benefit distribution will be essential to sustainable protected-area management. Despite its limitations, however, the potential benefits of decentralisation and wider community participation in resource management will be increasingly recognised (FAO 2003, 2006, 2010a).

Quite a number of countries will face challenges related to the fragmentation of national environmental and forestry agendas and the involvement of numerous governmental agencies. With several departments and ministries working in related areas, coherence and coordination will become a major issue (FAO 2003, 2006, 2010a). The capability of public sector organisations will be crucial for effective and efficient planning and implementation of the new environmental and forest policies. Management for achieving several objectives should be coordinated and compromises between divergent goals need to be made, which will result in inevitable trade-offs. This task will be challenging since many forest institutions, especially in developing countries, will continue to struggle with poorly qualified staff, lack of capacities, low budgets, and poor equipment (FAO 2006, 2010a). In Africa, the decentralised governmental organisations will be more hampered by limited resources and lack of capacities than federal or national authorities. Consequently, decentralisation per se will not necessarily lead to improved management of natural resources. Corruption will continue to be an additional challenge for improving forest governance in many developing countries (FAO 2003). In Russia, decentralisation of the Federal Forestry Agency was too forceful. For instance, the formerly centralised forest guard *(lesoohraha)* structure was dissolved, which led to ecological deterioration in many forests. In the future it will likely become an agency with stronger centralisation and firmer vertical authority (FAO 2012a).

Policy issues

Further evolution of the post-industrial economic model, oriented towards the service sector, will bring about changes in forest management priorities. Provision of ecosystem services and amenity values will gain increased attention (FAO 2012b). In the future forest policies will undergo major changes, with a significant shift away from timber-focused management to the provision of ecosystem services, poverty alleviation, and landscape approaches (FAO 2003, 2010a).

In Europe, private owners will have less-evident market incentives to sell their wood (UNECE/FAO 2012a). In Russia, foreseen instability of the legal environment will play a negative role in forest-sector development. It is predicted that the implementation of forest legislation will be improved in the Central-European part of Russia but will be challenging in remote Asian parts of the country, especially in border regions with China (FAO 2012a).

Participation and stakeholder cooperation

An increasing involvement of a wider range of stakeholders in forest management and policy formulation is expected. However, wide gaps will persist between policies and practice. Greater demands will be seen worldwide for social justice, public participation, transparency, and wider involvement of civil society and private sector organisations in forest management. Social participation will gradually and steadily increase in the preparation and implementation of forest management plans and programs, and these processes will be supported by legal changes. The activities of environmental organisations and non-governmental organisations (NGOs) encourage such participation and demand greater transparency in decisions affecting the use of state forests (FAO 2003, 2006, 2010a). In Russia, NGOs and civil society will increasingly pressure to scale up participation in public forest decision-making (FAO 2012a). In Europe, forest sector policies, institutions, and instruments are generally up to date, stable, and effective. Forest policies increasingly enjoy public support through the participatory nature of national forest program (NFP) processes. Meanwhile in Europe, the challenges posed by climate change, energy supply, and biodiversity conservation are exceptionally complex and long-term. They will require profound policy and management changes (UNECE/FAO 2012a).

Enforcement of laws and regulations

In Africa, Asia-Pacific and Latin America a number of initiatives are already underway to improve forest governance, law enforcement, and legal trade, for instance the Voluntary Partnership Agreements, implementing the EU FLEGT Action Plan. Some of the obstacles related to compliance with laws and regulations are caused by poorly designed laws, insecure land tenure systems, excessive regulations, and

growing complexity and controversy of the legislation. Additional disincentives for compliance with laws are the lack of financial and human resources of national forest services. Especially isolated forest estates will be ill-demarcated, have weak presence of government agencies, and thus suffer from poor management or virtual abandonment. Within Europe, illegal logging is not an issue of wide concern, but legality of wood imported to this continent will remain subject to strict procedures (FAO 2003, 2006, 2010a).

The global role reached by NGOs will become more critical in the future. Apart from creating awareness, they will spearhead action against illegal logging and trade of forest products, unauthorised conversion of forests, and corruption. The efforts of civil society organisations will compel governments and logging companies to comply with the principles of SFM (FAO 2003, 2006, 2010a, UNECE/FAO 2012a).

Influences of regional and global processes

Globalisations, liberalisation of trade, and market-oriented approaches, including privatisation, have produced changes in forestry and will continue to do so. These processes have had diverse impact in different regions and countries. Asian countries have been benefitting from more open economic policies. Many countries in Africa have suffered from global economic turbulence and cheap imports that undermine markets for local products.

In the future environmental issues could also change the course of forestry in various ways. With climate change being as a critical environmental issue, forests and forestry will be at the forefront of global political discussions, with considerable potential for reshaping the future of the sector. The role of forestry in climate change mitigation will largely depend on progress in arresting deforestation and degradation to enhance carbon stocks. Implementing the REDD+ mechanism alone will not resolve the problems caused by climate change but should contribute to broader SFM aims. Social and environmental activities related to climate change adaptation will play an important role in forestry's future development. Legality regulations on imported wood to European Union (FLEGT) and United States (Lacey Act) markets will significantly alter trade flows in the world. Public procurement policies and corporate decisions will produce similar effects. With a large proportion of higher value-added products for Western markets being manufactured in a few key countries, the leverage of such measures on regional trade will be significant. Europe and North America will continue to trigger and encourage major improvements in SFM policies and forest-related behaviour, mostly in tropical forest countries (FAO 2003, 2006, 2010a, UNECE/FAO 2012a).

Commitment to SFM

Globally, the demand for forestland and forest resources will increase because of population growth, urbanisation, expansion of agriculture and cattle grazing, mining, and increasing need for employment. These factors will put pressure on forests and woodlands and make the implementation of SFM difficult even though many countries have adopted SFM as their main forest policy objective, with due consideration of the social, economic, and environmental dimensions. In the near future, the majority of countries are expected to commit to broader SFM goals (FAO 2003, 2010a). In Europe, the SFM concept has rapidly evolved over the past 20 years and will change even more in the coming two decades to comply with complicated and often-contradictory societal needs (UNECE/FAO 2012a).

3.2.2 Livelihoods, capacities, and cultural and socioeconomic aspects

The way forest users interact with forests is influenced by economic, ecological, social, and cultural conditions and by the capacities of forest users. This section focuses on topics such as contribution of forests and forest resources and services to livelihoods; commercial opportunities; access to capital; security and conflict; the role of industrial forestry; and employment (Table I 3.1).

Contribution of forests and forest resources and services to livelihoods

Forests have been and will continue to be very important to forest-dependent communities, providing for basic needs such as fuelwood, housing materials, shelter, grazing opportunities, medicinal plants, and other wood and non-wood forest products. This is particularly significant during natural disasters such as floods and droughts and spread of diseases such as HIV/AIDS, which severely affect society and undermine national economies (FAO 2003, 2006, 2010a). In the next 20 years, high economic growth rates in developing countries will steadily increase demand for food, fibre, and fuel. Demand will also depend on the use of forest products in other economic sectors, such as export packaging and competitive prices on forest products in the region. The main driving forces behind export growth will be raw material and

labour costs, competitiveness, productivity, technological advances and innovations, programs to facilitate export, and domestic demand. To survive in the strengthening international commercial global contest, forest companies will be forced to use all available strategies and tactics, including higher value-added products, trade agreements, value chains, secondary processing, products diversification, and associations of producers (FAO 2006).

Industrial forestry and wood energy

According to the FRA, the total value of forest product removals in 2005 (five-year average) was USD 122 billion. About 71% of this came from industrial roundwood, 15% from non-wood forest products (NWFPs), and 14% from fuelwood. In North America, Latin America, and Oceania, industrial roundwood accounted for almost all of the value of removals. The value of fuelwood removals was particularly important in Asia and Africa, although it may be underreported in many of the outlook studies from other regions (FAO 2010b).

Also, in the future industrial roundwood will remain by far the most important output from forests (in terms of market value) at the global level and in each region, but its value will vary considerably over time and by markets due to changes in market conditions (FAO 2010b).

Global wood removals in 2005 amounted to 3.4 billion cubic meters, which currently account for about 0.7% of growing stock. About half were industrial roundwood and half fuelwood. In Africa 91% of the wood extracted from forests or woodlots is used as fuel and in Asia-Pacific, the share is more than 75%. Industrial roundwood production in Africa currently accounts for about 10% of total wood production (FAO 2010b).

In the longer run, wood removals will gradually increase globally in line with growing populations and income. Significant differences will persist between regions. Over two-thirds of wood will be used as fuelwood in Africa and Asia and less than 20% in Europe, North America, and Oceania. Most of the long-term growth in wood supply will occur in countries in Asia, Latin America, and Oceania that developed forest plantations over the past few decades. Wood supply, particularly industrial roundwood, will continue shifting from natural stands to planted forests. This could partly reduce logging pressure on natural forests in the near future (FAO 2010b).

Wood will be the foremost source of energy in Africa, primarily because of its low cost and wide availability in comparison with other energy sources. In the future, more fuelwood plantations with fast-growing tree species are expected to be established in Africa to also supply fuel for combined heat and power plants that are expected to be built. The introduction of improved stoves will increase the efficiency of burning wood. Africa's wood products sector will be dominated by "low value adding" industries catering largely to external demand. The growth of value-added wood-processing industries will be sluggish. It is predicted that Africa will remain an importer of products such as newsprint, printing, and writing paper (FAO 2003).

Also, in the Asia-Pacific region, wood will continue to be the main source of energy in many countries. As economic growth and energy consumption in industrial and service sectors will increase, the share of wood energy will relatively decline. Energy and environmental policies can bring about important changes in the extent of wood use as many countries will attempt to reduce dependence on fossil energy sources. New technologies, such as cellulosic conversion processes for biofuel production and efficient small-scale wood gasification technologies, will have significant impacts on wood use. In general, wood supplies will be adequate to meet industrial demand, although there could be supply shortages in many localities. Production in existing plantations can be increased significantly through improved management. Wood resources outside forests are expected to increase with secure tenure and markets, which encourage the expansion of farm-based tree planting outside forests. With the exception of sawn wood, the Asian region's share in global wood-product consumption will increase considerably between 2005 and 2020. The Asia-Pacific region will also increasingly become a producer and exporter of value-added products, especially furniture, relying on imports of lower value-added items. The Asia-Pacific region will have to pay greater attention to the efficient use of raw materials and energy. It will also enhance utilisation of wood residues for local processing, energy generation, and wood-fibre recycling (FAO 2010a).

In the next two decades, Latin America will steadily increase production, consumption, and trade of most forest products. The largest increase in exports will be in the case of pulp and paper, which are among the region's major forest products exported. Remarkable growth of exports of sawn wood, plywood, and other value added products, such as mouldings, floors, and furniture will continue. Raw wood will be mainly supplied from forest plantations. Brazil and Chile will hold a prominent position in the regional and global wood production and trade (FAO 2006).

Europe will remain a net exporter of wood products. Consumption of wood energy will grow steadily, fully utilising harvest and other residues. Wood will play an important part in increasing the use of renewable energy in Europe without forest area expansion. All phases of wood supply will be

mobilised, including use of short rotation coppices on agricultural land, landscape care residues, and post-consumer wood (UNECE/FAO 2012a).

In Russia, according to the most favourable innovation scenario, it is expected that innovation technologies will increase high value-added industries. In this scenario the proposed strategy is to increase the use of wood in building as the prime industrial locomotive, which will pull the sector out of the 20-year stagnation and open the way to the downstream wood production chain. Trade of high value-added products will prevail over semi-processed wood. According to the favourable innovation scenario, the manufacturing of primary products will increase until 2030 by 1.5 to3.3 times, depending on the product (FAO 2012a).

In North America, Canada will maintain its dominant position as the prime provider of forest products to meet the excess demands of the United States and emerging economies, especially in Asia. The United States has long been a net importer. It will remain at a disadvantage until 2030 in sawn wood, wood panels, and paper industries, with more balanced positions in round wood and wood pulp (UNECE/FAO 2012b).

Non-wood forest products (NWFPs) and services related to forests

NWFPs will mainly cater to subsistence needs of forest-dependent communities. More NWFPs are, however, expected to be commercialised and are forecasted to generate substantial incomes. Prospects for continued growth of some of the NWFPs, especially medicinal plants, are bright due to improved access to market information and technology. NWFP removals will remain important for rural development and poverty alleviation in many countries. Increased removals of the NWFP will benefit larger number of people if they are harvested sustainably, avoiding excessive exploitation (FAO 2003, 2006, 2010a).

In the future, more income will come from services related to forests. Tourism in general, and ecotourism in particular, will contribute considerably to rural development through employment and income generation in Africa and Asia-Pacific. This is, however, expected to create environmental and social problems as many popular ecotourism areas may suffer from large inflows of visitors, far exceeding carrying capacities and significantly undermining the quality of natural assets (FAO 2003, 2010a).

Watershed protection, arresting of land degradation, conservation of biological diversity, and carbon sequestration are important ecosystem services. The development of ecosystem markets will largely rely on overall social and economic development. In the foreseeable future, payments for ecosystem services (PES) in Africa and Asia-Pacific are most likely to be funded through international transfers in most developing countries. Since ecosystem markets are in the early stages of development, their potential to become an important source of finance for SFM remains unknown and uncertain (FAO 2003, 2010a).

Employment in forestry

Employment in forestry is expected to provide significant benefits in the often-poor rural areas. Increasing employment opportunities will thus enhance the forest sector's contribution to poverty alleviation. The FRA (FAO 2010b) roughly estimated that in 2005 forestry employed about 11 million people globally. Given the unreliability of the employment figures, it is not possible to draw any robust conclusions about the current status and trends in global forestry employment. However, some data suggests that forest-related employment will likely decline in most countries and regions due to improved labour productivity through increased mechanisation and advancing technology. Given that much forestry employment is outside of the formal sector, forest work is likely to be more important for rural livelihoods and national economies than the reported figures suggest (FAO 2010b).

Access to capital

Access to capital for private and public investments, either in human capital or technology, will depend on the ability of countries or localities to attract domestic and foreign capital to the forest sector. In a globalised economy, foreign direct investment (FDI) flows will primarily be based on the expected rates of return and risk perceptions. In the forest sector, logging and associated processing will be the main areas for such investment. However, it must be kept in mind that the investment cycle is utterly different in short rotation plantations in the South and in the Northern forestry. Asia, with high savings and investment rates and with well-developed policies and institutions will continue attracting large FDI, although at a declining rate. Latin America has emerged as another attractive region for FDI. It is expected that in the near future Russia, with its growing supply of allowable wood cut and pledged improvements in the investment climate forecasted by 2018, could become another attractive destination for world forest direct industrial investments. In Russia, the New Forest Code is expected to include implementation mechanisms for the fulfilment of obligations resulting from international agreements, conventions, and protocols (FAO 2012 a). It is expected that encouraging conditions and transparency should attract invest-

ments in the forest sector and promote international cooperation (FAO 2003, 2006, 2010a, 2012a).

Security and conflict

In view of high population densities and growing demands for goods and services, competition for limited natural and financial resources will intensify in many developing countries. Failure to develop efficient political processes, corruption, and poor governance will increase social conflicts, some of which will over time transform into religious, political, and ethnic conflicts. Forests overlap with some of the most underdeveloped and deprived areas in the world that are often populated by the most marginalised groups. Governmental presence will be limited in these areas and when present, can often be seen as an agent of exploitation. In the future it is expected that national forest policies and international agreements will include aspects related to the establishment of effective procedures for the management and resolution of conflicts. In order to strengthen the conservation of protected areas, it will be necessary to reconsider conservation concepts, resolve conflicts, and address demands of the communities living in or near the forest areas that have customary rights over them (FAO 2003, 2006, 2010a).

3.2.3 Natural resources base

The responses of forests to external impacts are influenced by multiple human, environmental, and biophysical factors. The type of soil, weather, physiognomies of vegetation, and its natural productivity as well as the ecosystem conditions compared to its undisturbed natural state, and the resilience of species to the drivers of change are factors that highly influence how forests respond to external impacts. The same factors also affect altered natural forests, planted forests, agroforestry areas, and other types of anthropogenic forests.

This section focuses on the potential of forest and trees outside forests to provide goods and services demanded by society, considering their extension and condition, and the drivers that impact on them causing alterations in their structure and composition.

According to FRA 2010 (FAO 2010b), the world's total forest area is just over 4 billion ha and covers 31% of total land area. Figure IV 3.1 shows how the total land area and forest area of the world are allocated into the six regions considered in this chapter. Note that Asia-Pacific includes the total forest resources of Asia and Oceania. Latin America is the sum of forests of South America, Central America, and Caribbean countries. Europe and the Russian Federation are considered independent regions. The five most forest-rich countries (the Russian Federation, Brazil, Canada, the United States of America, and China) account for more than half of the total forest area.

Deforestation implies a permanent conversion of forestland to other land uses. It is mainly caused by the conversion of forests to agricultural land, mining, cattle husbandry, expansion of urban areas, and road infrastructure. This serious socio-environmental threat shows signs of decreasing in several countries but continues at a high rate in others and is still a severe problem at the global level. According to FAO estimates, about 13 million ha of forest were converted annually to other uses or lost through natural causes in the past decade, representing one of the most challenging threats faced by the global society (FAO 2010b).

Forest area can also increase through afforestation –establishment of forest plantations in areas not forested in recent times– and natural expansion of forests. Accordingly, the net loss of forest area caused by deforestation can be reduced, a phenomenon that has been significant in several regions of the world. FAO statistics point out that the net change in forest area in the period 2000–2010 was estimated at -5.2 million ha per year. Latin America and Africa continue to have the largest net loss of forest (3.8 and 3.4 million ha per year, respectively). The area of forest in North America is stable and in Europe the forest area continues to expand. In Asia, the net gain in forest area (2.2 million ha per year) was primarily due to large-scale afforestation in China, while deforestation rates continued to be high in many countries in South and Southeast Asia (FAO 2010b).

The report of the *State of the World's Forests* (FAO 2012b) presents an optimistic view: "Time and again, forest areas have declined as populations and economies have grown. Rapid economic development is often accompanied by high rates of deforestation. Fortunately, history suggests that as countries reach a certain level of economic development, they are generally able to stabilise and then even increase the area of their forests."

Primary forests (defined by FRA as "naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed"), in particular tropical moist forests, include the most species-rich and diverse terrestrial ecosystems. While 36% of the world's forests are classified as primary, the area is decreasing by some 4 million ha annually, largely due to reclassification because of forest degradation caused by selective logging and other human interventions. Some countries are setting aside parts of their natural forests in which no intervention should take place. With time, these areas evolve into stands that meet the definition of

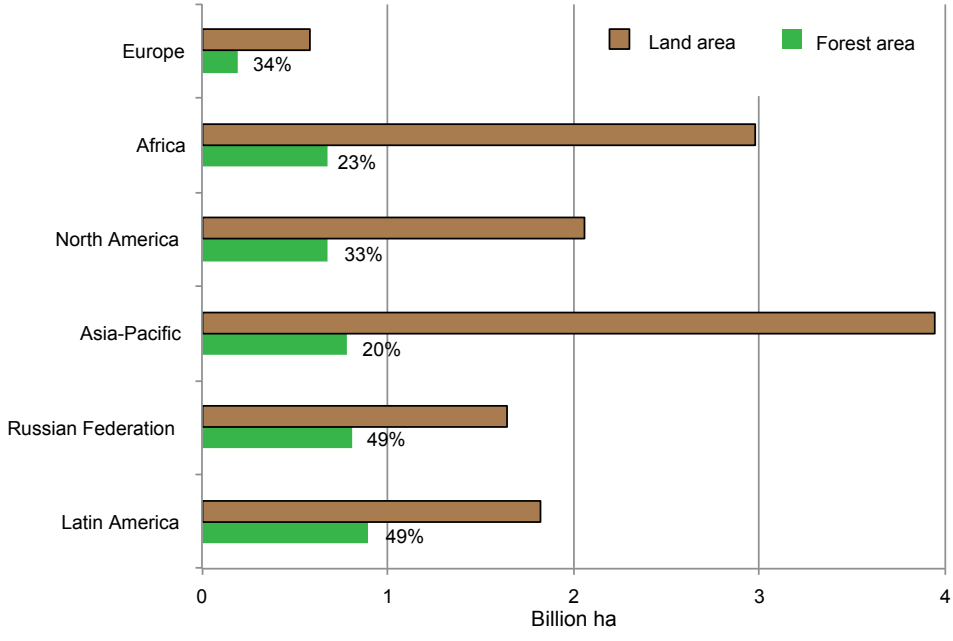

Figure IV 3.1 Total land area and forest area by regions in 2010 (data source FAO 2010b).

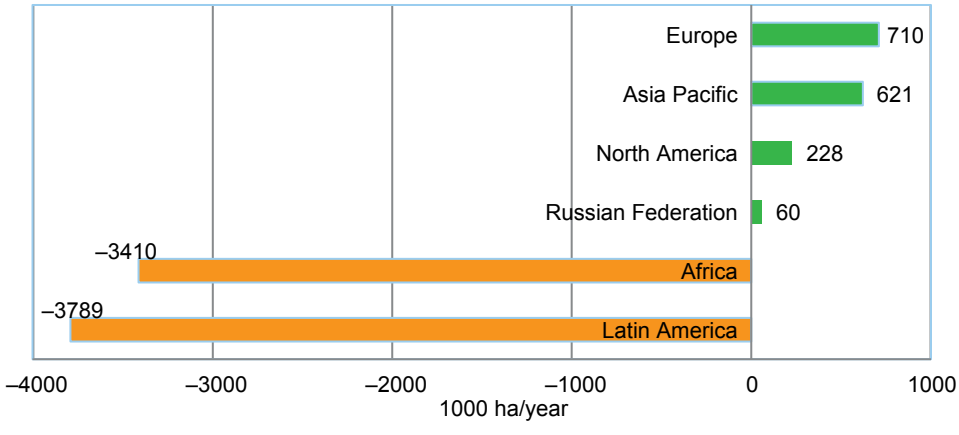

Figure IV 3.2 Annual net gains and losses of forest area by regions in 2005–2010 in 1000 ha/year (data source FAO 2010b).

primary forests (FAO 2010b).

Forests and trees are planted for many purposes and added up to an estimated 7% of the total forest area, or 264 million ha in 2010. During the past decade, the area of planted forests increased by about 5 million ha per year. Most of these forests were established through afforestation, especially in China. Wood supply (particularly industrial roundwood) is increasingly shifting from natural forests to planted forests (FAO 2010b).

Forest degradation – the loss of maintenance of biological diversity over time, biotic integrity, and ecological processes – can also have severe consequences on forests and the people who live in or close to them or benefit from them. Forest degradation often leads to decreased productivity, vitality and health, reduction of the genetic pool, and in extreme cases, could cause the extinction of the whole resource or of some of the species. Fire, most of which is human-induced, unrestrained logging, and grazing will remain the main causes of degradation in most countries. Incidences of pests and diseases also contribute to forest degradation and low productivity. Estimating forest degradation is a complex issue. Therefore, degradation is a major but partly hidden problem, especially in more densely populated low-income countries (FAO 2010a, FAO 2010b).

In 2010, the world's estimated total growing stock was 527 billion m^3 or 131 m^3/ha. It shows a slightly decreasing trend caused by a global reduction in forest area. However, the growing stock per hectare is increasing globally; this is particularly the

case in North America and Europe, excluding the Russian Federation. The growing stock per hectare is highest in the tropical forests of South America and Western and Central Africa, but it is also high in temperate and boreal forests. Forest degradation can severely affect and reduce growing stock (FAO 2010a, FAO 2010b).

The world's estimated carbon storage in forests is more than 650 billion tons, of which 44% is in biomass, 11% in dead wood and litter, and 45% in forest soil. Globally, carbon stocks are decreasing as a result of the forest area loss; however, the carbon stock per hectare has remained almost constant during the past decade (FAO 2010b).

The provision of ecosystem services is gaining importance globally, and large tracts of natural forests are increasingly being withdrawn from production and set aside as protected areas. The area designated for conservation of biological diversity currently accounts for 12% of the total forest area (460 million ha). Legally established protected areas cover approximately 13% of the world's forests (FAO 2010b). Management of protected areas remains problematic; encroachment and poaching of animals and plants and human-wildlife conflicts remain a major problem in many countries in Africa and Asia-Pacific. Nonetheless, protected areas remain the mainstay of biodiversity conservation and safeguards for their permanent protection are essential. Many protected areas, however, exist only on paper, especially in countries with vast tropical forest areas, due to lack of professional staff and material resources for proper control and due management. The costs associated with protected areas are typically borne locally while benefits accrue globally (FAO 2003, 2010a).

"Trees outside forests" refers to trees found on lands that are not categorised as forests or as other wooded land. They include trees found in rural landscapes (e.g. on farms, in fields, in pastures and various forms of horticulture and agroforestry systems, in hedges, along roads and streams) and in urban settings (e.g. on private or public lands and along roads and streets). The wood resources outside forests are increasing as a consequence of secure tenure and because safe markets are encouraging the expansion of farm-based tree planting. In several countries, the profitability of agriculture is declining, which is fostering a shift to less labour-intensive tree crops, especially on marginal lands with low productivity. Home gardens and tree planting under agroforestry have become important sources for industrial roundwood, fuelwood supplies, and NWFPs. Agroforestry – incorporating trees into farms – will be an essential component of global efforts both to enhance rural livelihoods and to mitigate climate change. According to FAO estimates, the potential future contribution of farm forestry through the harvesting of wood, fruits, oils, and medicines from trees could reach about 40% of farm income in the coming decades (FAO 2003, 2006, 2010a).

When summarising the most noteworthy trends in the natural resource base, we must keep in mind the assertions expressed in the latest *State of the World's Forests* (FAO 2012b), which indicates that it has recently registered a positive trend in reducing the rampant deforestation in several regions. Despite the seriousness of the current situation, there is reason for optimism in the longer term because although deforestation is a common pattern, about half of the world's countries have halted or reversed forest loss. Nevertheless, the continuous reduction of primary forests remains a distressing reality.

As stated previously, the world's estimated total growing stock shows a slightly decreasing trend caused by a global reduction in forest area, but it is rising in North America and Europe. Conversely, the growing stock per hectare is increasing globally, which is highly important because of its impact in increasing wood production and carbon stocks. Nevertheless, carbon stocks are globally decreasing as a result of the large extension of forest area lost, and carbon stock per hectare has remained almost constant during the last decade (FAO 2010b).

Several national policies and programs have influenced the growth of planted forests on different continents, particularly in Asia-Pacific and Latin America (FAO 2006, 2010a). The rapid increase in demand for wood from these forests will continue. Forest plantations have significantly increased in productivity and their products are selling at competitive prices, facts that are stimulating investments in new planting areas. Therefore, it can be expected that the area of these forests will continue to grow on different continents, partially decreasing the pressure for timber products extracted from natural forests (FAO 2012b).

There are promising signs due to the increasing importance gained globally for the provision of ecosystem services and the clear trend in raising the number and extension of protected areas in all regions, which is expected to continue to grow. Another promising sign is the increasing interest of communities and various stakeholders in expanding the areas dedicated to agroforestry and obtaining a more integral benefit from trees outside forest.

3.2.4 Research and monitoring

Increasing needs for research and monitoring

Science and technology have significant impacts on the forest sector. Adequate national forest research and education capacity is essential for providing

the information and knowledge needed to manage, utilise, conserve, and enhance forest resources. The magnitude and diversity of demands on forests and the related threats and opportunities have grown significantly in recent decades in many countries. To address these new challenges, research and education systems need to provide appropriate skills and knowledge. There is an urgent need for a better understanding of the interfaces between forests, other natural resources, and social demands and for entrenching the research findings into policy agendas. However, according to FRA 2010, the number of staff in public forest institutions is decreasing and globally only approximately 21 000 professionals work in public forest research institutions. In many countries national capacities in forest research and education seem to be inadequate to support the sustainable development of the forestry sector and respond to emerging issues. Information about education and research provides a useful indication of a country's managerial, technical, and administrative capacity for SFM and its ability to adapt the forestry sector to complex challenges such as climate change (FAO 2010b).

Adoption of remote-sensing techniques, including geographical information systems and global positioning systems, will positively impact forest management in the future. The speed at which vast amounts of spatial and temporal data can be analysed and synthesised has positively impacted the progress of forest management. Improvements in the resolution of satellite imagery and the development of software to interpret images will contribute to real-time monitoring of deforestation, pests and diseases, fires, and other potentially devastating events while improving silvicultural and management practices. Particularly, monitoring data constitutes the basis for forest planning and further implementation of practical research. It also helps to quantify and map the risks linked to climate change. But it must be borne in mind that information from remote-sensing sources must be supported by more reliable data samples provided by intensive field inventories.

Another important topic that will demand renewed efforts is related to the establishment of forest plantations, which not only possess high productivity but also should be more resistant to diseases and pests. To this end, research activities on selective breeding and biotechnological applications should be increased.

In Africa, forestry institutions will remain weak, even under traditional centralised systems. Education and extension will be particularly prone to negligence, especially when resources are shrinking. Therefore, it is predicted that Africa will continue using technology developed elsewhere, including monitoring programmes. Resource limitations will probably decrease the access to advanced technology. The technological divide that exists today between Africa and the rest of the world is therefore likely to persist and widen (FAO 2003).

Enhancing social and ecological sustainability in Asia will require major improvements in science and technological capacities. Stronger inputs from science will be necessary to change the current pattern of resource use. The focus will be on translating existing knowledge into technologies that are more energy and material efficient. These will include technologies for improving management and enhancing productivity (e.g. tree improvement), and the development of innovations for new products and processes. Remote-sensing technologies will greatly help track changes on a real-time basis. Developing commercially viable cellulosic biofuel and biorefinery technologies will have major impacts on the use of wood by 2020 (FAO 2010a).

In Latin America, the research work developed on forestry plantations will continue in the future and will focus primarily on issues related to productivity and efficient use of planted forests, topics that received significant attention in the past three decades. It can be expected that fewer efforts will comparatively be devoted in research on natural forests. It is expected that a marked growth will take place in plantations as a result of new investments in research and technology throughout the whole value chain, with influential contributions from foreign capital. High productivity and competitiveness of wood from planted forests will favour the development of the private sector with an active support from government policies. These achievements have benefitted from intensive research and genetic improvement made with the cultivated fast-growing species, particularly in Brazil and Chile. Financial benefits will guide investments in technological innovations and research on improving the competitiveness of planted forests. The use of modern assessment and planning technologies will reduce the costs of developing information management systems for forest inventory and the preparation of management plans. Digital technologies will also help increase the capability of monitoring large forest areas, which is particularly important for promoting SFM implementation (FAO 2006).

An increase in forestry research is also needed in Europe. There is, for instance, the need to better understand the complex factors that affect forest health and vitality under climate change. The focus of technological and scientific research on this continent will greatly depend on the dominant policy scenario adopted for the future development of this region, whether maximisation of biomass carbon, prioritising biodiversity matters, promoting wood energy production, or fostering innovation and competitiveness (UNECE/FAO 2012a). Also, the conflict caused by the increasing demand for biomaterials

and forest conservation must be solved in an efficient way.

Adjustments in research, training, and education programmes are required, which often require planning ahead, and frequently they demand forest institutional reforms. The importance of informing the public and establishing a dialogue on forest-related issues and priorities is frequently emphasised. Enhanced provision of information and participatory processes will also contribute to increasing the transparency of forest policies and facilitate progress towards more interdisciplinary research and education (FAO 2006, UNECE/FAO 2012a).

In Europe increased guidance and support for owners of small forest properties is urgent. National forest programmes probably need to be revised to better accommodate the role of forestry in climate change mitigation and adaptation and to incorporate specific national circumstances (UNECE/FAO 2012a). In Europe, appropriate forest monitoring is crucial to detect early changes in the health and vitality of forests, pest and disease outbreaks, and forest fires. There is also a need to monitor the success (or failure) of adaptation measures, although constraints in anticipating future trends will require reliance on "learning by doing" (UNECE/FAO 2012a).

Monitoring programmes in Russia are apparently insufficient and unreliable because they cannot accurately estimate the volumes of illegal cuts. Continuing illegal logging activities and inadequate monitoring system both cause local, national, and international tension. Monitoring and assessment issues in all scenarios are to be resolved by 2030 by increasing transparency, distant forest monitoring with aerospace methods, prevention of illegal logging, and adoption of related legal acts (FAO 2012a).

Major trends in research and monitoring

Despite the growing and important challenges facing global forest resources – such as increased demand for forest products, forestland conversion to agricultural production and expansion of urban infrastructure, impacts from climate change, and rising demands on wood for energy generation – the emphasis on scientific and technological research required to find a satisfactory solution to these major challenges is not currently evident. The same is true concerning the low incentive to promote multisectoral and multidisciplinary research, capable of providing solutions to the complex interface between limited and deteriorated natural resources and the growing socio-economic demands of contemporary society.

The gap between growing needs for scientific and technological research on forest resources and increasing pressures that affect them may be illustrated by the declining number of forest researchers at the global scale (FAO 2010b).

Another matter of concern is the concentrated nature of current research activities, most of which is localised in North America and Europe. The meagre amount of research developed in Africa is particularly alarming: this region will continue to depend on technological solutions produced in other parts of the world (FAO 2003).

Adoption of remote-sensing techniques, including geographical information systems and global positioning systems, will positively impact future forest management. The speed at which vast amounts of spatial and temporal data can be analysed and synthesised has positively impacted forest management. Improvements in the resolution of satellite imagery, and the development of software to interpret images will contribute to real-time monitoring of deforestation, pests and diseases, fires, and other potentially devastating events while improving silvicultural and management practices.

In Asia, stronger inputs from science will be necessary to change the current pattern of resource use. Technological solutions for improving management and enhancing productivity are urgently needed (FAO 2010a).

In Latin America, the research work developed on forestry plantations will continue in the future and will focus primarily on issues related to increased productivity and efficient use of planted forests. Research on biotechnological applications will also be maintained or increased (FAO 2006). Research will also increase in Europe, but the thematic emphasis will depend on the policy scenario selected for future development (UNECE/FAO 2012a).

Monitoring data constitutes the basis for forest planning and further implementation of practical research. It also helps to quantify and map the risks linked to climate change. Reliable baselines are needed for accurately tracking the changes in forests and other natural resources. There are important attributes of forest stands that are amenable to assessment at large-scale levels (global and/or regional). However, the crucial challenge is to reliably assess multifunction forest variables at the landscape level, which is the level at which forest management decisions are adopted.

3.3 Concluding remarks

Conditions among countries and regions differ widely and the difference complicates drawing global conclusions or identifying common trends. Countries and regions live through different historic stages of forestry and socio-economic development, so there are no universal recipes for solving similar problems in different countries and continents. Local responses

to global challenges are always time and place specific and depend on peculiar local or national conditions. In a like manner, examination of the prerequisite conditions for SFM in different countries and continents often results in fragmented and even contradictory findings, in which global trends are not easily seen. Often, opposite trends coexist, such as rampant deforestation and establishment of forest plantations or centralisation and decentralisation.

It should be noted that practically all regional outlook studies addressed topics related to policies, livelihoods, the biological resource base, and research. But the synthesis was not exempt from problems because FAO outlook reports did not necessarily share a common structure or methodological procedure and they had diverse forecasting horizons. Nonetheless, some general trends and future challenges were identified across the outlook studies.

Policy issues:
Worldwide demands will grow for social justice, public participation, transparency, and wider involvement of civil society and private sector organisations in decision-making and forest-management planning and implementation.

Countries with stronger economies tend to have well-established and clear public policies, which consider market externalities caused by underestimated ecological values.

Forest management policy:
SFM will undergo major changes, with a significant shift away from timber-focused management to the provision of ecosystem services, poverty alleviation, and landscape approaches. Management to achieve several objectives is to be coordinated and trade-offs between divergent goals need to be made.

Ownership:
In the near future, public ownership will remain predominant, although the area under public ownership will decrease slightly. Unclear land tenure of forestland must be resolved because it is one of major problems leading to illegal cutting and land-grabbing. The management of public forestlands, however, will significantly shift to the private sector, including corporate businesses, farmers, and communities.

Institutions:
The role of governmental institutions will shift from managing resources to policy-making, regulatory functions, and the provision of goods and services that the private sector is unable or unlikely to provide.

Decentralisation:
The transfer of forest management responsibilities to lower level governmental agencies, communities, families, and individuals is also expected to be implemented. This task will be challenging since many local forest institutions struggle with limited human and financial resources.

Social participation:
The involvement of a broader range of stakeholders in forest management and policy formulation is predicted to increase, especially in the preparation and implementation of forest management plans and programs. The activities of environmental organisations and NGOs encourage such participation and demand greater transparency in decisions affecting the use of forests. However, in the near future, wide gaps between policy statements and practice are expected to persist.

Influences of regional and global processes:
A large part of forest conversion is driven by trends, policies, and actions originating from outside of the forestry sector. Globalisation, liberalisation of trade, and market-oriented approaches, including privatisation, will continue to motivate forestry changes in the future, along with environmental issues such as climate change.

Livelihoods:
Forests will continue to be very important in providing for basic needs of forest-dependent communities. This will be particularly significant during natural disasters such as floods, droughts, and pest and disease outbreaks.

There will also be a steady increase in demand for food, fibre, and fuelwood because of higher economic growth rates in developing countries. Industrial roundwood will remain by far the most important market value output from forests at global and continental scales. Wood will be the foremost source of energy in Africa and in many Asia-Pacific countries.

In the future, more income will come from the services related to forests, such us tourism in general and ecotourism in particular, NWFPs, and medicinal plants

Natural resources base:
The general trend implies that deforestation and forest degradation continue to be a phenomenon that seriously affects forest areas, mainly at a slightly decreasing rate.

Simultaneously, forest plantations of fast-growing species will increase to provide an increasing percentage of the raw material for the production of various forest goods.

The attention on natural forests – pristine, primary, and secondary – will continue to be relegated to the background, despite the growing interest in keeping vital forest ecosystem services. Therefore,

biodiversity conservation will continue to be an issue that will require increased attention and effort.

The importance of agroforestry systems and trees outside forests is rising, especially on marginal agricultural lands with low productivity.

Research and monitoring:
Global forest resources are currently facing serious challenges and menaces such as increased demand for forest products, massive forest land conversion to agricultural production and other purposes, impacts from climate change, and rising demand for wood for energy generation and other needs. However, an obvious corresponding emphasis on strengthening the scientific research required to provide satisfactory solutions to these demands is not noticeable at the world and regional scale.

Adoption of remote-sensing techniques will have positive impacts on forest management in the future. But the valuable information produced must be supported by accurate field inventory data. Vast amounts of spatial and temporal data can processed at high speed, and that will revolutionise forest management. Improvements in the resolution of satellite imagery and further development of software to interpret images will contribute to real-time monitoring of deforestation, pests and diseases, fires, and other potentially devastating calamities, while improving silvicultural practices and facilitating adaptive management.

The main difficulties encountered in drawing general conclusions and trends from the outlook studies are listed concisely here:

- The reference periods differ: the outlook of Africa was published in 2003 and the outlook reports for Europe, Russia, and North America were published in 2012.
- The geographical areas covered are different: some outlook studies provide a continental overview (Africa, Asia-Pacific, and Europe), but the Russian outlook refers only to the Russian Federation because of the continental scale of the country.
- The purpose and methodology used are different: two outlook studies are different from the others. The Latin America outlook includes general guidance for developing the countrywide outlooks. The North American outlook uses a modelling approach – the Global Forest Products Model (GFPM) – and focuses on trade and markets projections. Unlike other outlook studies, the report does not aim to thoroughly discuss problems related to policy and livelihood issues, which is the primary interest and focus of the current book.
- Some outlook studies (Africa, Asia-Pacific, Europe, and Russia) include alternative future scenarios. The assumptions set out to define various scenarios differ significantly between different regional studies and make it difficult to draw on global trends.
- It is often difficult to make a clear distinction between the natures of some of the identified trends, making it difficult to understand whether these have been objectively determined based on available scientific information or rather correspond to political recommendations for adopting decisions required to meet future developments.

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Linking global to local using multi-scale scenarios

Lauri Hetemäki

Abstract: The chapter focuses on how global and local forest sector issues can be linked to each other and how futures or foresight work can act as capacity-building tools for this. In particular, we focus on the *multi-scale participatory scenario* (MSPS) *approach*, showing how it has been used for this purpose and what it could offer for the forest sector to better link the global and local scales. The chapter is not a "review" article of MSPS but rather introduces the approach, presents practical examples of it, and elaborates the advantages and disadvantages of the approach. The purpose is also to illustrate how it may work as a capacity-building tool for futures thinking in SFM. Finally, research and policy implications are presented.

Keywords: Multi-scale scenarios, future, foresight, linking global and local, capacity-building

4.1 Background

Global environmental and forest-related policy-making and strategies involve many different interests, both governmental and non-governmental, the business and science communities, and local forest communities. The case studies in this book (Parts II and III) emphasise that Strong links and understanding between these actors and the global, national, and local policy-making levels in which they are involved are crucial. They demonstrate that for sustainable forest management (SFM) to succeed, it is essential to involve and have the support of people and actors also at the local level (villages, rural districts). For example, in more than half of the case studies, progress in implementing SFM is typically related to promoting stakeholder cooperation and participation, whereas in less successful cases, local actors tend not to have been empowered to take part in critical decisions regarding forest management and use. Similar conclusions can be drawn from success in enhancing economic benefits derived from forests and forest resources.

The drivers that influence forests, such as globalisation of markets and investments, including potential carbon markets (e.g. through REDD)[1], are strong forces steering forest-related development in most countries (Galloway et al. 2010). In some cases, these forces are leading to large-scale land concessions to the detriment of local forest-related development and livelihoods. In other cases, they provide employment, income, and new opportunities to engage local actors in forest-related production and ecosystem-services value chains. How globalisation affects forest management at the local level – whether it has positive or negative outcomes – seems to depend very much on the understanding, cooperation, and feedback among global, regional, national, and local levels. For successful SFM, each part in this multilevel social-policy value chain needs to be part of the solution.

In this light, how can the problems faced by the forest sector be solved and SFM enhanced? Lessons learned from the case studies (Part III), clearly indicate a need for capacity-building at the local level. Local communities tend to be increasingly impacted by global or national changes in the operating environment and the policies related to them, but they are often unprepared to respond to them. For example, climate change, globalised forest-products markets, international forest and environmental policies and

[1] REDD is a mechanism that has been under negotiation by the United Nations Framework Convention on Climate Change (UNFCCC) since 2005, through which countries reduce emissions from deforestation and forest degradation and foster conservation sustainable management of forests, and enhancement of forest carbon stocks.

strategies, and technological changes (like digitalisation) are high-level processes having manifold impacts at local levels. Think, for instance of the impacts of FLEGT[2] and REDD+ policies, or strategies to improve payments for ecosystem services. These global and national-level processes can only be successful if their meaning and implications are well understood at the local level and the actors at that level want to work to enhance these processes. But the challenge is not only to build capacities and empower actors to implement these policies at the local level but also to achieve better understanding of the local-level context at national, regional, and global levels.

The case studies from, for example, Argentina (Part II, chapter 2), Brazil (Part II, chapter 1), Bosnia-Herzegovina (Part II, chapter 23), Madagascar (Part II, chapter 20), Mozambique (Part II, chapter 21), or the US Pacific Northwest (Part II, chapter 10) suggest that to implement SFM, as well as forest communities being able to respond successfully to global challenges and opportunities, more local participation and community engagement are necessary. From these case studies and other literature (e.g. Bizikova et al. 2010, McKenzie et al. 2012, Mistry et al. 2013, Palacios-Agundez et al. 2013), it is also evident that this type of synergy and mutually supporting development between the global and local scale in SFM does not take place automatically. The success stories show that there have often been significant efforts before tension between the different scales could be overcome. Interestingly, the case studies also show that these issues are relevant both in the low-income regions, such as Africa, and in high-income industrialised countries, such as the United States, in the case of the Pacific Northwest (see Part II, chapter 10).

The focus of the case studies is mainly on past or current experiences in local forest management, that is, on developments, conditions, and structures already in place. But they are also valuable for preparing for future developments: we first need to know where we are today in order to build meaningful future scenarios. However, systematic foresight analysis is also necessary to be better prepared for the future (Glenn 2009, Hurmekoski and Hetemäki 2013). The rapid and evermore complex changes in global forest sector in the 21st century highlight this need (Part IV, chapter 2).

The objective here is to review useful foresight and scenario approaches in a context of the local-global interaction, and in particular, in addressing forest sector issues. We hope to show that using these approaches makes it possible to provide new foresight analysis, help solve the tensions between local and global perspectives, and build capacities for SFM at each level. The foresight process itself may also work as a bridging tool in integrating local and global perspectives and the increasing understanding and implementation of policies and programmes and, in the end, SFM. We focus on a foresight approach known as multi-scale participatory scenarios (MSPS). The chapter seeks to demonstrate through literature review that MSPS can help forest planning and negotiations, build capacity for futures thinking, and integrate global and local-level forest processes and strategies.

The structure is as follows: an introduction to the scenario concept and MSPS; examples of using MSPS; implications for the forest sector and how MSPS could possibly help solve some of the future challenges that emerge from the case studies in Part II; and, finally, general policy and research implications.

4.2 What are multi-scale participatory scenarios?

4.2.1 Scenarios

Systematic scenario planning is often claimed to have been started by Herman Kahn, who worked on military scenarios in the 1950s at the RAND Corporation (Kahn 1962, van der Heijden 1996). In the corporate world, the most well-known example is the scenario work done to help strategic thinking in the Shell company for more than 40 years (Wilkinson and Kupers 2013).

In scenario planning, the purpose has never really been about predicting the future but rather opening minds to previously inconceivable or imperceptible developments. *Scenarios* are plausible descriptions of how the future may develop based on a coherent and internally consistent set of assumptions about key relationships and driving forces (van der Heijden 1996). A scenario can be regarded as a story or, more precisely, a series of events leading to an end point. They can be constructed using many different methods or a combination of methods – qualitative and/or quantitative – and information on current and past conditions. It is important to stress that the purpose of a scenario is not to produce accurate forecasts or predictions but rather to consider a variety of possible futures. In fact, the time scales of scenarios are rather long, typically 10 to 50 years, for which it is not meaningful to try to generate "accurate" forecasts.

The fundamental dilemma related to all future-

[2] FLEGT stands for forest law enforcement governance and trade. The European Union's FLEGT Action Plan was established in 2003. It aims to reduce illegal logging by strengthening sustainable and legal forest management, improving governance and promoting trade in legally produced timber.

oriented research is: how can the future be studied when it does not exist? No method can yield correct or even reliable information about the future, since we do not know the future. Therefore, the more relevant question is: how useful are studies for addressing the future? The foresight literature and practical experience strongly points out that scenario studies are specifically useful for providing insights for longer-term developments, during which the factors shaping the future are highly uncertain and largely uncontrollable. For example, a recent survey by Rohrbeck and Schwartz (2013) found that scenario and foresight work has had clear benefits for companies, especially by enriching perception, the ability to interpret changes and to propose responses, and the capacity for organisational learning and influencing others.

Scenario work has also been found useful in addressing complex environmental issues for example, shown in the review of literature by the European Environmental Agency (2011) and Bengtson et al. (2012). Environmental scenarios, outlooks, and other types of forward studies help us to address discontinuity and uncertainties of future developments and to design robust policies that can withstand the test of time. Scenario-based approaches can, for instance, provide a platform to reflect on different options for the future, identify uncertainties, frame policies by identifying priority and emerging issues, check whether and how targets can be met, develop robust measures and precautionary actions, analyse cause-effect relationships (driving forces), anticipate possible surprises, and facilitate long-term thinking in a structured way.

How scenario work has been used in the forest sector includes, for example, outlook studies (Pelli 2008, Hurmekoski and Hetemäki 2013). However, for the focus of this book, the most interesting scenario work in the forest sector relates to participatory scenario approaches applied in forest communities, i.e. at the local level (e.g. Wollenberg et al. 1999, Evans et al. 2014). The results of these studies indicate that participatory scenario approaches at the community level can lessen the resentment and uncertainty towards the future and lack of trust in governance regimes in addition to recognising communities as active participants in global and national forest issues.

The purpose of this chapter is to demonstrate that MSPS methods can be used to improve adaptiveness not only by responding to changes but also by anticipating them and linking the global and local-level processes. Important advantages of scenarios in futures analysis lie both in the actual process of constructing scenarios (capacity-building) and in the results of a systematic examination of how uncertainties and possible future paths interact (outputs).

4.2.2 Multi-scale scenarios

Based on the goal and objectives of a scenario study and the approach adopted, different spatial scales for scenario development are involved, ranging from the global to the very local scale, such as villages (Biggs et al. 2007, Zurek and Henrichs 2007). For example, Intergovernmental Panel on Climate Change (IPCC) climate scenarios are typically first generated at the global level but then analysed at a more detailed level, such as for region of a country. There are a number of reasons why linking these scenarios across different geographical scales may be desirable. First, the processes at different scales may directly depend on each other. For example, REDD+ is a result of a global policy process, but it is implemented at the local level. The objectives and phenomenon behind REDD+, climate change, is itself an issue that affects biophysical processes across the world, while regional and local socio-economic developments govern future climate trajectories to a large extent. On the other hand, it may be important for a regional or local decision unit to differentiate between developments that the local scale can or will influence from the ones to which it will have to adapt. Understanding which global or national factors are external to the local or regional system is important in order to set boundary conditions for developing responses and strategies.

According to Zurek and Henrichs (2007), scenarios can be linked across geographical scales in two ways: via *scenario development processes* or via the *scenario elements*. The processes by which scenarios are linked together can be carried out in various ways – for example, by starting from a global scenario process, which is then linked to national, regional, or local scenario processes. Second, the scenario elements or outcomes can be linked across different geographical scales. The linkages vary by the degree of interconnectedness, for instance, the scenario elements may be very closely linked or only loosely linked at different scales (Zurek and Henrichs distinguish five types of interconnectedness). Depending on the process and type of coupling of the elements, the cross-scale linking of scenarios will differ. They can range from fully equivalent scenarios developed in joint processes at different geographical scales to complementary scenarios developed via independent processes that share a common general theme.

The choice of the specific multi-scale scenario approach will depend on the purpose of the scenario exercise. For example, if scenarios are developed for research or academic work, a high degree of consistency or equivalence is often needed. Well-known examples of this are the IPCC-based scenarios for climate change. For these, the consistency between elements at global and regional level is essential.

Here the global scenario is the driver of the process to which regional scenarios adapt.

On the other hand, in supporting discussion and actions at a regional or local level, the issue of cross-scale consistency may be of less importance. Information from global scenarios may provide a useful background for regional-scale scenario development but may not capture or may even misrepresent some regional dynamics. The dynamics within a socio-economic system, particularly, are often driven primarily by regional-scale developments, such as forest ownership and income and employment opportunities. The higher-scale scenarios may provide a useful starting point, but eventually it may be more important to maintain regional relevance in the multi-scale scenarios. The scenarios are unlikely to be useful if they are not seen as relevant by the decision-makers at the local level.

The MSPS approach could especially be helpful for developing countries.[3] Although single-scale scenario planning typically engages stakeholders and considers factors operating at multiple scales, they are not considered MSPS. In a multi-scale scenario exercise, storylines are developed at several scales, for example, global and national, and are linked to one another to some degree (Biggs et al. 2007, Zurek and Henrichs 2007). Motivations for developing multi-scale scenarios are to engage stakeholders and help understand driving forces, processes, perspectives, and responses at different scales, as well as to get the stakeholders at different scales to own and be empowered by the scenarios. As stated by Biggs et al. (2007), "Multi-scale scenarios can better maintain relevance across multiple decision-making scales than, for instance, a single-scale global exercise, and thereby potentially enhance stakeholder engagement and use of the scenario results." From the perspective of this book, the MSPS approach can also link global and local-level forest issues and empower the local communities to implement SFM.

One caveat of MSPS is that they are challenging in many circumstances, and there is a need for systematic capacity-building before they can be used widely. For example, at the regional and local levels, there may be a lack of experience with scenario and strategic futures thinking, at least among some stakeholders, such as foresters, local officials, communities and indigenous groups, and small- and medium-scale operators. Since they may not have been exposed to foresight exercises and scenario work, they may not have a good grasp of its purpose, meaning, and implications for their own work and future opportunities and challenges. Consequently, the global or regional scenarios, such as those provided by the IPCC or the UN Food and Agriculture Organisation (FAO) forest sector outlook studies, may seem remote at the local level and their implications difficult to understand. It may be that even the language and concepts used in these studies are not clear to participants in MSPS exercises. So global policy processes and strategic long-term scenarios may not reach the regional or local levels in a meaningful way, despite their important implications, for instance, to national forest policies. On the other hand, local-level concerns and thinking may not show up in global policy processes or strategic futures thinking, such as the global scenarios. Therefore, there is a need to better link global and local levels, and MSPS can be one tool to accomplish that. Thus, the MSPS should also been seen as a tool for capacity-building for long-term planning and strategic futures thinking, for example, when countries are preparing their national forest programmes.

In fact, the Millennium Ecosystem Assessment (MEA) process can be seen as an important process sparking more interest in MSPS (Millennium Ecosystem Assessment 2003). For example, the MEA sub-global assessments were designed to meet the needs of decision-makers at the scale at which they are undertaken, strengthen the global findings with on-the-ground reality, and strengthen local findings with global perspectives, data, and models. Assessments at sub-global scales are needed because ecosystems are highly different across space and time and because sound management requires careful local planning and action. Local assessments alone are insufficient, however, because some processes are global and because local goods, services, and energy are often transferred across regions. The MSPS were applied for the MEA, for instance, by Biggs and Zurek (2007) and Palacios-Agundez et al. (2013).

The review of MSPS literature show some typical features associated with different scale MSPS studies (e.g. Biggs et al. 2007); some of the typical characteristics at different scales are summarised in Table IV 4.1.

The literature on MSPS is not yet large: the MSPS approach is still at its pioneering stage with respect to forest sector literature. But given the complexities of the forest sector issues and their multi-scale nature, one can expect its popularity to increase in the future.

Depending on the purpose of the study, scenarios at different scales may be loosely linked and share a common framework (e.g. MEA scenarios), or they may be very tightly linked and scientifically consis-

[3] The concept and meaning of multi-scale participatory scenarios is not yet well-established, and it cannot be regarded as a single approach. Indeed, at this writing (December 2013), there isn't even an entry in Wikipedia under this name. Also, the concepts of nested scenarios (Dermawana et al. 2013) or cross-scalar analysis (Mistry et al. 2013) are used for similar approaches. For an introduction of MSPS, see Biggs et al. (2007) and Zurek and Henrichs (2007).

Table IV 4.1 Typical characteristics of different scale scenarios. Based on Biggs et al. 2007

Global, continental, and national	Regional or village
Global or continental focus, with very little discussion about local implications.	Very detailed on local implications and no discussion on global implications.
Cover longer time scale (e.g. 20–50 years).	Cover shorter time scale (e.g. 5–15 years).
Perspective of international agreements, polices, institutions, and multinational companies form a strong basis for the scenarios.	Important driving forces of change in forests at the local scale are often outside the control of local stakeholders; for example, roundwood harvests may be determined by national or international markets.
High expertise and educational level of participants.	Low expertise and educational level of participants.
Communication and engagement are at broad stakeholder level, with formal dialog processes (seminars) and detailed presentations and reports geared toward the more specialised and highly educated stakeholders, who operate in international and national policy contexts.	Communication of the scenarios usually takes place within community-based or grass-roots organisations, and stakeholders often include people with varying levels of education and experience.

tent with each other (e.g. IPCC climate scenarios at different scales). According to Biggs et al. (2007), loosely linked scenarios may more effectively serve the goal of engaging stakeholders in an exploratory dialogue and allowing for more freedom to cope with the issues of concern to the stakeholders at each scale. Scenarios too tightly linked can even have unintended and undesirable consequences when they alienate stakeholders at different scales (Biggs et al. 2007). However, this is not an overarching rule-of-thumb but depends on the particular case, as the IPCC scenarios indicate.

From the perspective of practical implementation, MSPS can have the additional drawback that they tend to be rather resource intensive, typically engaging a large number of stakeholders, meetings, and preparatory work. However, depending on the case and resources available, less ambitious MSPS may be possible. Moreover, as the process of MSPS may itself be even more important than the outcomes or results, it should be seen not only as a means of generating foresight or futures information but also as a process for building capacity and mutual understanding.

4.3 Examples of MSPS in the forest sector

Multi-scale scenarios have been applied in several participatory scenario development exercises on many continents: Europe (Biggs and Zurek 2007, Özkaynak et al. 2010, Stratigea and Giaoutzi 2012, Brand et al. 2013, Palacios-Agundez 2013); Africa (Biggs and Zurek 2007, Kok et al. 2007, McKenzie et al. 2012); Asia (Dermawan et al. 2012, McKenzie et al. 2012, Stratigea and Giaoutzi 2012); South America (McKenzie et al. 2012, Mistry et al. 2013); North America (Shaw et al. 2009); and Oceania (Bohensky et al. 2011). The following section looks more closely at MSPS applications in the forest sector context and summarises some lessons learned.

Table IV 4.2 summarises some of the forest sector applications of MSPS, presenting a very short overview of the objectives and results of the studies. In order to provide deeper understanding of the contributions of these studies, two of the cases are discussed in more detail.

4.3.1 Socio-ecological scenarios of the Guiana Shield forest sector

The Mistry et al. (2013) study is an interesting example of MSPS use in the forest sector. It focuses

Table IV 4.2 MSPS studies including forest sector applications.

Study	Scope and subject	Lessons learned
Brand et al. 2013	The case of an Alpine mountain region in Switzerland facing global change sheds light on the methodological question of how to produce multi-scale scenarios by combining expertise on global and national developments with knowledge on more specific regional developments. The second aim was to achieve a more systemic and stakeholder-based understanding of the study region by means of scenarios, i.e. illustrate possible futures of the Visp region.	Better understanding of the challenges and future development at the local level in mountain regions facing global change.
Dermawana et al. 2013	Testing a multi-scale scenario approach for smallholder tree plantations in Indonesia and Vietnam. Smallholder tree plantations are seen as a promising way to alleviate poverty and increase forest area in Southeast Asia. However, their establishment has been disappointing. MSPS approach is used to mitigate the risk of unwanted outcomes. In the MSPS process, the scenarios elaborated at higher scales provide a frame for scenarios at lower scales. However, not all of the larger-scale critical uncertainties are relevant at smaller scales or in a particular landscape, and so the approach does not fit in the category of methods that impose consistency across scales, rather it falls into the category of being complementary across scales.	The method presented provides a useful structure for the workshops on smallholder tree plantations and can be more widely applied to contexts where distinct driving forces act at different spatial scales and affect the analysis. The nested framework allows for local differentiation within a consistent set of scenarios. It is a modest but significant variation on the standard intuitive logic approach − modest because it can be grafted almost without change onto existing intuitive logic approaches, but significant because it can accommodate participants who are active at different scales in the initial development of a multi-scale scenario exercise. It therefore contrasts with multi-scale approaches that start with a high-level scenario and then ask participants to fit themselves within it. The method is also applicable if a set of high-level scenarios is constructed separately from those at lower-levels. Scenarios at the smaller scales might adopt all or only part of the scenario framework at the larger scales, depending on local conditions. The method is particularly useful in situations where the participants come from localities with different characteristics and in countries where policy-making is relatively decentralised.
McKenzie et al. 2012	The ecosystem-services outcomes of scenarios can be assessed using InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs). InVEST is a software tool for assessing how the location, quantity, and value of ecosystem services change under different scenarios. InVEST uses scenarios expressed as maps of land cover or coastal and marine uses. It can link scenarios at the different scales, and therefore is useful for MSPS. Many applications of using the InVEST scenario tool in MSPS can be found from different continents.	The process of scenario development and analysis can have as much − or more − impact on decision-makers than the final results. Local- and regional-scale land-use scenarios are more relevant for InVEST applications, but there have recently been a number of global environmental scenarios that may also be of interest to InVEST users. The IPCC's SRES* scenarios describe alternative paths for global greenhouse gas emissions and are now widely used by governments and NGOs to assess possible future implications and risks associated with climate change. These global scenarios can be part of multi-scale scenarios to frame storylines at the local, national, or regional scales where InVEST is being applied.

Table IV 4.2 Continued.

Mistry et al. 2013	Socio-ecological scenarios of the Guiana Shield. The conclusions drawn from the study show that there is a clear disarticulation between the local-national scales that focus primarily on governance and transparency issues and the regional-global scales that focus more on policies, attitudes, and approaches to different key areas (e.g. environment, society, markets, technology). This reveals a difference in the scales between policy-making and practice. Thus, there is a need to bridge the gap between the scales of policy making and governance.	It is important to use participatory approaches, such as MSPS, to successfully implement, for example, REDD+ and ecosystem payments schemes. National governance can play a key role in transferring best approaches from the international level to the local level. On the other hand, the best approaches from the local level should also have an influence at higher scales.
Palacios-Agundez et al. 2013	Ecosystem management policies related to Millennium Ecosystem Assessment (MA) in the Basque country The study describes scenarios for Basque country through 2050 in an integrated and participatory way by downscaling MEA global scenarios, analyses how ecosystem services and human well-being might change in a range of plausible futures, identifies management strategies for the territory through a back-casting process and explores the relevance of scenarios to policy-making. The purpose is to strengthen the link of the scenario process to policy-making and to achieve a real implementation of the research results in ecosystem management policies.	This participatory scenario description process, together with its associated management proposal and social learning, has been shown to be relevant for local policy development. In fact, it may lay the foundations for sustainable land-use planning in Biscay. Probably the most important thing that stakeholders learned during the scenario-planning process was to see different perspectives. They began to understand different points of view for example, public administration personnel explained to NGO members the different aspects regarding the pace and proceedings of administration while NGO members talked about relevant aspects that should be considered in ecosystem-based management. The MSPS represents a novel approach that facilitates consensus building and allows for saving both time and resources. Novel elements include: organising back-to-back workshops, creating coherent scenarios across scales, using visual elements to present exploratory scenarios, and combining exploratory scenarios with normative back-casting using a World Café methodology (for the method, see http://www.theworldcafe.com/method.html).

* Scenarios published in 2000 in the IPCC's Special Report on Emissions Scenarios (IPCC 2000) are termed the SRES scenarios.

on some of the current hot topics of SFM in developing countries, such as REDD+ and payments for ecosystem services. The study is based on the COBRA project, which is the acronym for Community-Owned Best practice for resource Adaptive management in the Guiana Shield, South America. COBRA's objective is to bring together South American and European organisations and scientists to find a community-owned solution and to manage and develop ecosystem services in a way that maximises social justice and ecological sustainability.

The Guiana Shield ecosystems offer many possible directions for the region's development. Large- and small-scale mining, logging, and agricultural activities that have been implemented in the region over the past decades could suggest possible future directions. However, international policies directed towards better protection of forests and other natural resources, such as schemes for payments for ecosystem services, may potentially prevent large-scale exploitation of natural resources.

The aim of the research was to identify a range of possible future scenarios with regards to the socio-ecological systems at the international, regional, national, and local community levels and to compile and prioritise a range of win-win, win-lose, and lose-lose options for local communities from the different scenarios.

A significant result of the study's multi-scale analysis is that there are extremely few synergies between the local and global scales: there seems to be no common vision between the smallest and biggest scales of analysis. At the global and regional scales, the focus is more on policies and how these can influence society and the environment, with public-private partnerships as the most promising strategies. At lower scales, the focus is on practices, the actual operationalisation and implementation of effective development and environmental management. More relevant future steps relate to education and capacity-building, mechanisms to safeguard natural resources, and communities joining government and private enterprises in decision-making.

In worst-case scenarios, the linkages from local level to higher levels are weak and the scenarios at one scale do not impact other scales. On the other hand, the few win-win situations identify a close link between the local and national scales. These scenarios underline issues of governance and highlight the importance and influence of effective and equitable power structures at the national level on local-level sustainable futures. Mistry et al. (2013) see the national scale as a key mediator between the local and regional-global scales, which can be seen in the case of REDD+ processes and its implementation. National governance plays a key role for the trickling down of best practices from the international level to their implementation at the local level. According to Mistry et al., however, the best approaches from the local level could remain at a local-national level without any beneficial influence at higher scales unless efforts are made at the global level to be more responsive to local perspectives.

In order to promote the development of win-win scenarios, what should politicians and practitioners focus on? The study shows t certain themes that constitute strong threads linking scales to one another: values, participative democracy, corruption, social policies, environmental policies, and dominant stakeholders. The development of participatory processes for policy development and implementation, involving stakeholders at all scales, could potentially be a key pathway for the trickling up of community values.

In summary, the study shows the importance of participatory approaches to natural resource management, such as SFM. In Table IV 4.2., a number of studies using MSPS in the context of SFM were described. MSPS could also be very much applicable to REDD+ and implementing other ecosystem payments schemes. A local understanding of and involvement in the processes is the key to positive outcomes through participatory scenario development, avoiding conflicts and the loss of value.

4.3.2 Swiss alpine region in the face of climate change

The background and motivation of the Brand et al. (2013) study relates, on one hand, to the regional and local structural changes in Alpine mountain areas of Switzerland, and on the other hand, to the potential impacts of global climate change on the regional ecosystem. Although not a specific focus of the study, the forest sector is part of the regional setting. According to the study, traditional sectors such as timber industries have declined whereas the service sector, particularly tourism, has become the economic backbone in many areas. These changes have been accompanied by a number of societal and economic transitions that have also tended to result in considerable changes in ecosystem services, such as scenic beauty, recreation, and avalanche protection. At the same time, the Swiss alpine regions have been projected to experience severe climate change impacts, such as decreased snow reliability, melting of glaciers, and a higher frequency of natural hazards.

Brand et al. (2013) argue that in order achieve a better understanding of these kinds of challenges, (besides basic research in natural science), there is a need for interdisciplinary frameworks that take into account the complexity of human-environment systems and relate natural to social-science knowledge.

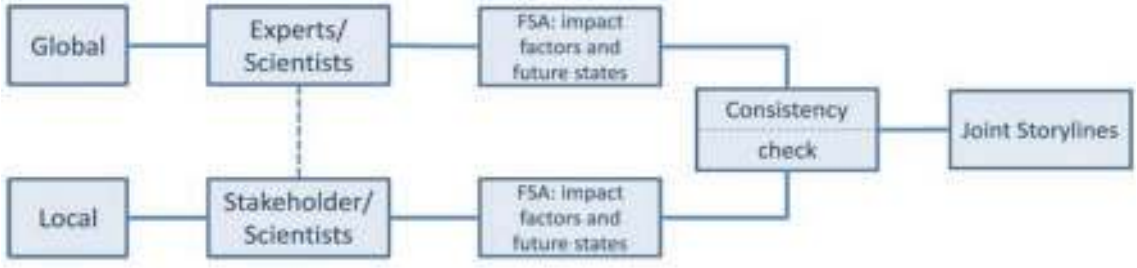

Figure IV 4.1 Illustration of the Brand et al. (2013) MSPS approach.

They see MSPS as a useful method for achieving these objectives. Behind this approach is also the view that scientists and practitioners are experts in different knowledge domains in which both sides may benefit from a mutual learning process through applying MSPS together. This type of learning process is likely to result in socially robust knowledge and a better understanding of the challenges and of future development for Swiss mountain regions facing global change.

Brand et al. (2013) set up local scenarios for the Swiss alpine region of Visp and linked them to scenarios developed for the global and national scales. Multi-scale scenarios were developed in close collaboration with key stakeholders from the Visp region, working in areas such as tourism, forestry, and administration. The multi-scale scenarios were produced by combining expertise about global to national developments with knowledge on more specific regional developments. Also, the purpose was to arrive at a more systemic and stakeholder-based understanding of the study region through scenarios of possible futures for the Visp region. The process is illustrated by Figure IV 4.1.

The study generated six multi-scale scenarios that covered the global, national, and regional levels. The scenarios represented illustrations of how to form a systemic picture of the study region, anticipate possible futures, and point to strategies to cope with local and global challenges. Brand et al. (2013) conclude that the MSPS processes can build capacity, consensus, analytic mediation, and legitimisation of future changes in the Visp region in the face of future challenges. They show that the place-based knowledge and values of stakeholders are very important elements in broadening perspectives and in developing strategies geared towards more desirable states. In addition, using the MSPS helps the scientists to focus on problems that are relevant to the people in the study region.

The lessons one could learn from Brand et al. (2013) in the context of SFM at the local scale include the following. First, the participation (e.g. workshops with different local stakeholder groups) was necessary for building trust, consensus, and appreciation of the scenarios built during the process. As a result, the scenarios were not perceived as something delivered from above (or global scale), with no relevance to local actors. For example, the authors indicate that the scenarios succeeded in getting local stakeholders to also consider unwanted but possible (climate change) scenarios instead of only desirable or wishful scenarios. Building a realistic picture of the future (e.g. climate change), where the major driving forces may be global (instead of local), may also be essential for SFM to succeed.

4.4 Research and policy implications

This chapter has introduced and reviewed the MSPS as a tool to help address some of the problems faced when implementing SFM and link global to local levels, and vice versa. It is motivated by the results from the case studies of this book and many other studies in the literature (e.g. Biggs et al. 2007, Zurek and Henrichs 2007, de Oliveira et al. 2013). They clearly indicate that global policies and strategies, such as REDD+, may not necessarily succeed at the regional or local level if there is a lack of understanding, capacity, and ownership of the higher-level initiatives. On the other hand, the higher-level polices and strategies could benefit from better understanding of local-level perspectives. Indeed, this topic is at the heart of the entire book: local responses to global issues.

The MSPS approach is still rather new and evolving (e.g. Stratigea and Giaoutzi 2012, McKenzie et al. 2012). It is a tool that can be used to address some of the practical limitations of other scenario and foresight approaches when geographically different scales are involved in the issues studied and when local capacity-building and empowerment are essential to address future challenges. In recent years, increasing numbers of applications of MSPS have emerged, also in the forest sector (Table IV 4.2).

MSPS can also be an important tool to build capacity for general foresight or futures thinking at the

local level, where there is perhaps more likely to be a lack of it. MSPS can help build capacity to proactively assess future opportunities and challenges, rather than reactively act on them when they are already affecting local actors.

What are the lessons learned – the opportunities and the challenges – related to MSPS? What are the implications for decision-makers and stakeholders, and for further research needs?

First, and most important, MSPS clearly appear to be one promising approach and process for trying to help resolve some of the problems of implementing global or national-level polices, strategies, and SFM at regional and local levels. The practical case studies (Part II) and the research literature (Table IV 4.2 studies), clearly show that without local-level engagement, understanding, and ownership of the global and national policies and strategies, it is very difficult to implement SFM successfully. Furthermore, it is equally clear that these objectives will not be achieved automatically but require systematic efforts for capacity-building at the local level. However, it also appears that capacity-building is not only required from the global level to local level but also vice versa. That is, when global and national polices and strategies are planned, more attention should be devoted to understanding local-level conditions and realities than typically has been the case. MSPS may provide one useful tool for systematically addressing these shortcomings.

One important consideration of the MSPS approach is that it typically requires a significant amount of resources, time, and involvement at different scales, which may not always be available. MSPS, however, can be applied flexibly and be resource efficient when circumstances demand it. Undoubtedly, the MSPS approach can also be further developed in this respect with more research, experience, and practical learning. However, the MSPS approach is not a silver bullet and is unlikely to be useful in all circumstances. For example, Shaw et al. (2009) raise the difficulty of using MSPS in the case of trying to derive local-level scenarios from global-level climate change scenarios. Also, in some cases, there may simply be a lack of resources or interest among all of the relevant stakeholder groups for the series of scenario workshops typically needed. Thus, the suitability of using the MSPS approach needs to be carefully assessed for each case, and if it is chosen, preparation must be thorough.

Some of the MSPS case studies discussed analysed the future opportunities and challenges related to climate change scenarios, implementing REDD+, and payments for ecosystem services in the forest sector. All these issues are likely to be important in the coming decade, and their successful implementation at the regional and local levels can be enhanced with MSPS. The World Bank, national foreign aid agencies, and national governments should direct funding for implementing and facilitating MSPS in developing countries. Also, when FAO is conducting the outlook studies and scenarios at the continental level (Africa, Asian-Pacific, Europe, North America), it could explore the use of MSPS to compare trends at national and regional levels. This would link the FAO outlook studies better to national and regional forest-sector outlook studies and scenarios. How this linking could best be implemented in different studies requires further research.

In general, global policy-making involves many different interests, both governmental and non-governmental and business and scientific communities. It is necessary to ensure that there are strong links between these actors and policy-making at national and local scales. It is also important that plans, strategies, and decisions are made at the same scale at which they are implemented. This type of thinking is, for example, behind the European Union's subsidiarity principle, which aims at determining the level of intervention that is most relevant in the areas of competences shared between the European Union and member states. This may concern action at European, national, or local levels. In all cases, the European Union may only intervene if it is able to act more effectively than the member states. Similar principles could perhaps be used in implementing SFM, and it could be enhanced by using MSPS.

When reviewing the forest sector scenario literature, one interesting aspect that emerged was that the researchers also tend to work at different scales. Some researchers may mainly work at the local (community, region) level (e.g. Evans et al. 2008 and 2014, Dermawana et al. 2013), whereas others work more at the national or global level (many of the studies reviewed in Pelli 2008 and Hurmekoski, European Environment Agency 2011, and Hetemäki 2013). Accordingly, the models, methods, and approaches applied at different scales also tend to be different and reflect the perspective (scale) of the researchers. The national and global-level scenarios typically utilise more quantitative models and methods, whereas the local-level (community) studies are more focused on qualitative "soft" social science methods (Lynam et al. 2007). There is perhaps even a tendency to publish the results in different journals (this was not systematically analysed), for instance, the national-and-global-level scenario studies typically in journals focused on economics and policy, and the local-level (community) studies in the ecological or "soft" social science journals. Future challenges for the research community are to try to cross these scales and forums, enhance the dialogue between different approaches, and publish diverse approaches in journals. It can also be fruitful for researchers to integrate local and global perspectives more in their own research.

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PART IV – Chapter 5

Forest futures: Linking global paths to local conditions

Eric Kemp-Benedict, Wil de Jong, and Pablo Pacheco

Abstract: The chapter establishes links between elements of long-term global scenarios and the prerequisite conditions of sustainable forest management (SFM), as discussed in Parts I and III. It uses a component from a new global scenario exercise: the shared socio-economic pathways (SSPs), which are narratives that cover a spectrum of climate change mitigation and adaptation challenges. The chapter tests how different SSP narratives relate to the prerequisite conditions for SFM through two approaches: 1) by analysing how the prerequisite conditions are represented in the SSP narratives, and 2) by postulating prerequisite condition scenarios and linking those to the SSPs. Two SSPs that foresee high adaptation challenges foresee deteriorating social cohesion and reduced international cooperation in addressing shared global challenges linked to climate change. The narratives of these two SSPs both suggest several challenges for SFM. The SSP that foresees high mitigation challenges generally suggests positive trends for the prerequisite conditions but also progressive influence of market mechanisms with unpredictable outcomes for environmental management. A three-tier scenario for the prerequisite conditions and testing them against the SSP narratives suggests a fairly comprehensive alignment but also indicates a marked difference between the two SSPs that foresee adaptation challenges and prerequisite conditions of tenure rights and public administration.

Keywords: Shared socio-economic pathways, sustainable forest management, prerequisite conditions, MaxQDA Qualitative Data Analysis, scenarios

5.1 Introduction

Chapter 4 of Part IV makes clear that the current state of knowledge limits the scope of a multi-scale scenario analysis on how best to achieve the objectives of sustainable forest management (SFM). Nevertheless, the case studies in Part II of this book can help fill some of the gaps. In this chapter, we link global processes to local forest management in the context of different global futures by using the prerequisite conditions identified in Part I and analysed in Part III. Prerequisite conditions are social, economic, cultural, political, environmental and biophysical conditions that need to be in place for SFM to occur. We approach the connection between global paths and local conditions from two directions. First, we postulate that different global scenario narratives imply different trajectories for the prerequisite conditions, which suggest trends toward or away from sustainable use of forests. Second, we generate scenarios by specifying trends in the prerequisite conditions and verifying whether these are more or less consistent with one or more global scenario narratives. The approaches yield consistent but distinct results and are likely to be useful for different purposes. The second approach is called for in studies that begin with a community of forest experts creating its own set of scenarios in a participatory manner, while the first approach can be useful in multi-sectoral studies using a set of global scenarios.

Several well-known sets of global scenarios have been constructed. These include the Millennium Ecosystem Assessment (MA) scenarios (MA Scenarios Working Group 2005), the scenarios of the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES) (Nakićenović et al. 2000), and the Global Environment Outlook (GEO) scenarios of the United Nations Environment Programme (UNEP) (UNEP 2007), which were themselves based on the scenarios of the Global Scenario Group (GSG) (Gallopín and Raskin 2002, Raskin 2008). These global scenario studies have been used as the basis for several regional and global scenario exercises (Rounsevell and Metzger 2010), including in the forestry sector (FAO 2003). The MA, in particular, was concerned with

cross-scale issues and explored methods for linking scenarios across scales (MA 2003), and there has been considerable discussion of the need for cross-scale scenarios when considering possible futures for linked ecological and social systems (Wilbanks and Kates 1999, Cash et al. 2006, Biggs et al. 2007). Zurek and Henrichs (2007) provide a classification for cross-scale scenario exercises, where the degree of linkage can range from "hard" links using models to "no" links. The hard-link approach, in the context of land-use change, has seen considerable methodological development (Veldkamp and Lambin 2001). In contrast, while there have been several exercises that use a soft-link approach, methodologies are still in the early stage of development. In Zurek and Henrichs' classification scheme, many existing studies seek "coherence across scales," in that they use the same scenario framework at different scales, and sometimes "consistency across scales," in that they use identical drivers.

Chapter 4 (Part IV) also made clear that scenarios should be participatory if they are to address local and regional challenges in SFM. In general, local and regional scenario exercises are used more often for insight in participatory settings, while in global exercises the scenarios are more often an end in themselves (Stratigea and Giaoutzi 2012), so not only social and biophysical processes but also the goals of the exercise may change. This chapter applies two methods to link global scenarios to local and regional ones, one top-down and the other bottom-up. The top-down approach aims for coherence across scales in the typology of Zurek and Henrichs (2007), in that it takes a global scenario frame and applies it to the forestry sector. In this approach, we use qualitative data analysis to analyse narratives, an approach that has rarely been applied in foresight studies (Stratigea et al. 2012 being the only exception we found). This is a bit surprising, given the popularity of textual analysis – to discover trends (e.g. Kostoff et al. 2001) – and discourse analysis (e.g. Burt 2010). The bottom-up approach is an example of complementarity across scales, in that a scenario framework for the forestry sector is developed independently of the global scenario and subsequently linked to it.

While any of the existing global scenario studies cited provide a wide range of socio-economic scenarios, we have chosen to use one component of a new framework for generating climate scenarios (Ebi et al. 2014), the shared socio-economic pathways (SSPs) (O'Neill et al. 2014). For brevity, in this chapter we will sometimes refer to the SSP narratives as "scenarios," but it is important to note that they are part of a scenario framework for generating scenarios and not a set of scenarios proper. The SSPs build on the experiences of previous scenario activities, are being developed with substantive input from researchers from diverse fields, and are intended to provide a common basis for future work on impacts, adaptation, and vulnerability (van Ruijven et al. 2014). The SSPs are currently being created as one component of a new round of climate scenarios intended to replace the SRES scenarios (Moss et al. 2010). Unlike the SRES scenarios, the SSPs and other components of the new round of scenarios are being elaborated by the global research community rather than under the auspices of the IPCC. However, they are being developed in consultation with the IPCC and are likely to be used in future IPCC publications. One innovation of climate scenarios currently being developed is that they keep greenhouse gas and socio-economic pathways separate, reflecting the reality that there is not a one-to-one correspondence between socio-economic trends and greenhouse gas emissions, only a more or less plausible interconnection (van Vuuren et al. 2012). In contrast to SRES, which includes socio-economic conditions and greenhouse gas trends in a single scenario, each SSP, which describes socio-economic conditions, can be combined with one or more representative concentration pathways (RCPs) to reflect greenhouse gas trends (Kriegler et al. 2012, O'Neill et al. 2014).

Using the SSPs has additional advantages over using other global scenarios. Many of those involved in SSP development were previously involved in the SRES, MA, GEO, and GSG scenario exercises, bringing the lessons they have learned to the development of the SSPs. The analysis will take advantage of developments in scenario methodology and thus should remain fresh for several years. Also, the SSPs are following a more open and dynamic process of development than previous global scenario exercises (O'Neill et al. 2014). These advantages can be weighed against the climate focus of the SSPs, which may not align with SFM. However, as previously noted, the SSPs are socio-economic pathways that are distinct from climate trends. They have already been applied in a study on health futures (Ebi 2014), in which narratives were constructed for the health sector that were consistent with the global SSP narratives (an example of coherence across scales; see Zurek and Henrichs 2007). As will be seen later in this chapter, adaptive capacity aligns well with potential for SFM. The SSP narratives should therefore be relevant for forest futures, and since they are likely to be widely used in the future, it can permit forest futures to be more easily integrated with other studies.[1] Also, unfortunately, including greenhouse gas

[1] There is also a database of quantitative drivers at national level that is being maintained by the International Institute for Applied Systems Analysis (IIASA): https://secure.iiasa.ac.at/web-apps/ene/SspDb.

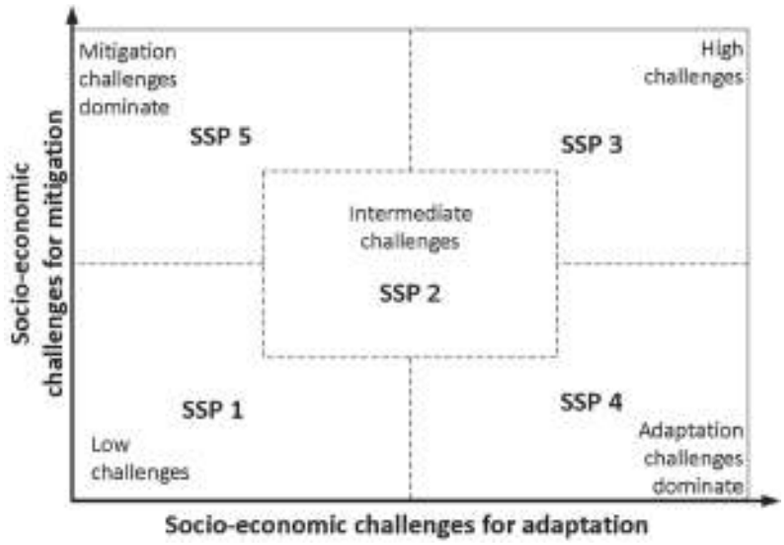

Figure IV 5.1 Scenario framework for the shared socio-economic pathways (SSPs) (from O'Neill et al. 2014).

trajectories (RCPs) may be essential in future work because the possibility of disruptive climate change seems increasingly likely (World Bank 2013).

For the SSPs, a core scenario set (the "basic SSPs") provides a common reference point for disparate studies on society and climate change while allowing particular studies to elaborate on the framework itself for different social, economic, and ecological systems at various scales by developing multiple "extended SSPs." For example, a study may focus on the management of a fishery, a major river system, or the socio-economic development of a city, country, or region. By using the SSPs in this volume, which explores possible ways to foster SFM, it is possible to inform the global process of climate-change-scenario development. The openness of the SSP process to local and topical specificity was adopted in large part to overcome the difficulties of applying global scenario narratives to impact, adaptation, and vulnerability (IAV) studies (Rothman et al. 2014, van Ruijven et al. 2014), including IAV studies related to forests.

The IAV community works at a wide range of scales and with diverse methods (Wilbanks and Ebi 2014). The benefit of a common framework should be a greater degree of comparability between studies. If combined with a multi-scale, participatory scenario technique (Part IV, chapter 4), the SSPs can be used in a participatory approach to generate locally relevant scenario narratives.

5.2 The scenario space

The SSPs fill a scenario space as illustrated in Figure IV 5.1. As shown in the figure, the scenarios are framed in terms of socio-economic challenges to both mitigation and adaptation. This framing reflects their origin in the climate community, as the scenario narratives are meant to span a range of uncertainties relevant to climate studies on both mitigation and adaptation. Importantly, the scenario space is defined along outcome axes, a departure from past studies that focused on inputs, such as technological change. However, the framing in terms of socio-economic challenges for mitigation and adaptation is also a fruitful starting point for elaborating more general socio-economic scenarios for environmental and natural resource futures, which is how we use the SSP framework in this chapter. The climate emphasis of the SSPs is incidental to our purpose – the focus of this chapter and of the book as a whole is SFM.

The SSPs are still in development although a great deal of work has already gone into defining them. We use narratives that were drafted at an international meeting (O'Neill et al. 2012); these drafts are currently being revised in response to critiques and suggestions from an open comment period. In this chapter we use the full narratives from O'Neill et al. (2012) to explore possible future trends in prerequisite conditions. The summary versions from the same paper are shown in Box IV 5.1.

Box IV 5.1 The SSP Summary Narratives

SSP1: Sustainability

This is a world making relatively good progress towards sustainability, with sustained efforts to achieve development goals while reducing resource intensity and fossil-fuel dependency. Elements that contribute to this are rapid development of low-income countries, reduction of inequality (globally and within economies), rapid technology development, and a high level of awareness regarding environmental degradation. Rapid economic growth in low-income countries reduces the number of people below the poverty line. The world is characterised by an open, globalised economy, with relatively rapid technological change directed towards environmentally friendly processes, including clean-energy technologies and yield-enhancing technologies for land. Consumption is oriented towards low material growth and energy intensity, with a relatively low level of consumption of animal products. Investments in high levels of education coincide with low population growth. Concurrently, governance and institutions facilitate achieving development goals and problem-solving. The Millennium Development Goals are achieved within the next decade or two, resulting in educated populations with access to safe water, improved sanitation, and medical care. Other factors that reduce vulnerability to climate and other global changes include, for example, the successful implementation of stringent policies to control air pollutants and rapid shifts towards universal access to clean and modern energy in the developing world.

SSP 2: Middle of the Road

In this world, trends typical of recent decades continue, with some progress towards achieving development goals, reductions in resource and energy intensity at historic rates, and slowly decreasing fossil-fuel dependency. Development of low-income countries proceeds unevenly, with some countries making relatively good progress while others are left behind. Most economies are politically stable, with partially functioning and globally connected markets. A limited number of comparatively weak global institutions exist. Per-capita income levels grow at a medium pace on the global average, with slowly converging income levels between developing and industrialised countries. Intra-regional income distributions improve slightly with increasing national income, but disparities remain high in some regions. Educational investments are not high enough to rapidly slow population growth, particularly in low-income countries. Achievement of the Millennium Development Goals is delayed by several decades, leaving populations without access to safe water, improved sanitation, and medical care. Similarly, there is only intermediate success in addressing air pollution or improving energy access for the poor, as well as other factors that reduce vulnerability to climate and other global changes.

SSP 3: Fragmentation

The world is separated into regions characterised by extreme poverty, pockets of moderate wealth, and many countries that struggle to maintain living standards for a strongly growing population. Regional blocks of countries have re-emerged with little coordination among them. This is a world failing to achieve global development goals and with little progress in reducing resource intensity and fossil-fuel dependency or in addressing local environmental concerns such as air pollution. Countries focus on achieving energy and food security goals within their own region. The world has de-globalised, and international trade, including energy resource and agricultural markets, is severely restricted. Little international cooperation and low investments in technology development and education slow down economic growth in high-, middle-, and low-income regions. Population growth in this scenario is high as a result of the education and economic trends. Growth in urban areas in low-income countries is often in unplanned settlements. Unmitigated emissions are relatively high, driven by high population growth, use of local energy resources, and slow technological change in the energy sector. Governance and institutions show weakness and a lack of cooperation and consensus; effective leadership and capacities for problem-solving are lacking. Investments in human capital are low and inequality is high. A regionalised world leads to reduced trade flows, and institutional development is unfavourable, leaving large numbers of people vulnerable to climate change and many parts of the world with low adaptive capacity. Policies are oriented towards security, including barriers to trade.

SSP 4: Inequality

This pathway envisions a highly unequal world both within and across countries. A relatively small, rich global elite is responsible for much of the emissions, while a larger, poorer group contributes little to emissions and is vulnerable to impacts of climate change in both industrialised and developing countries. In this world, global energy corporations use investments in research and development as a hedging strategy against potential resource scarcity or climate policy, developing (and applying) low-cost alternative technologies. Mitigation challenges are therefore low due to some combination of low reference emissions and/or high latent capacity to mitigate. Governance and globalisation are effective for and controlled by the elite but are ineffective for most of the population. Challenges to adaptation are high due to relatively low income and low human capital among the poorer population and to ineffective institutions.

SSP5: Conventional Development

This world stresses conventional development oriented towards economic growth as the solution to social and economic problems through the pursuit of enlightened self-interest. The preference for rapid conventional development leads to an energy system dominated by fossil fuels, resulting in high greenhouse gas emissions and challenges to mitigation. Lower socio-environmental challenges to adaptation result from attainment of human development goals, robust economic growth, highly engineered infrastructure with redundancy to minimise disruptions from extreme events, and highly managed ecosystems.

Source: O'Neill et al. 2012

5.3 Matching prerequisite conditions to scenarios

The SSP narratives do not specifically mention forests. Neither do they mention any particular resource other than energy, as they are meant to be used in a wide range of applications. Nevertheless, they do have implications for forests, as well as other resources and social-ecological systems, through such general phrases as "a high level of awareness regarding environmental degradation" and "little progress in reducing resource intensity." To make the connection, we match narrative elements from the SSPs with the prerequisite conditions identified in Part I and analysed in Part III, which are narrative elements relevant to SFM. We take two approaches: the first starts from the SSPs and explores their linkages with forest management while the second explores the same linkages the other way around, starting from a forest management perspective, and scaling this up to the SSPs. In the first approach, we carry out a textual analysis of the SSP narrative sketches. Using the MaxQDA Qualitative Data Analysis (QDA) software (VERBI Software 2014), we coded excerpts of the SSP narratives with the prerequisite conditions for SFM. In the second approach, we developed a consistent scenario framework for SFM, with no reference to the SSPs, using the cross-impact balance (CIB) method (Weimer-Jehle, 2006). We then connected the scenario framework to the SSPs. The CIB method has been applied to the SSPs themselves by Schweizer and O'Neill (2014).

5.3.1 From SSPs to prerequisite conditions

When applying the first approach that explores the presence of prerequisite conditions in the SSPs, we coded the narrative sketches for SSPs 1, 3, 4, and 5 with the prerequisite conditions developed in Parts I and III. The SSP2 (middle of the road) narrative has ambiguous implications for each of the prerequisite conditions, so while it might well be a useful scenario for discussing SFM, the description was compatible with divergent trends for each of the prerequisite conditions. Because the prerequisite conditions themselves do not (with rare exceptions) appear explicitly in the narrative sketches, the coding unavoidably requires personal judgment. What the QDA method supplies is a degree of rigour, in that the analyst codes individual passages (Table IV 5.1), focusing on their wording rather than reporting an impressionistic account of the narrative. Also, the assignments are traceable – the codes for each excerpt are recorded and can be reviewed and scrutinised by others.

The coding is provided in Table IV 5.1, which shows the assignments of prerequisite conditions to narrative excerpts. Generally, challenges to SFM align with challenges to adaptation. Unsurprisingly, the SSP1 (sustainability) narrative implies largely positive outcomes for SFM; however, we note some ambiguity in the impact on forests. It is possible, for example, that a push for biofuels could initially place pressure on forest resources, with a need for strong, forest-specific policy responses in order to maintain forests (Pacheco et al. 2013).

The SSP3 (fragmentation) and SSP4 (inequality) narratives generally imply a more challenging environment for SFM. Both scenario narratives feature high challenges for climate change adaptation, and the conditions required for high adaptive capacity are generally also the conditions that could result in improved forest management. The SSP5 (conventional development) narrative generally correlates well and shows positive trends with the prerequisite conditions of SFM, yet it has negative effects on the long-term commitment to SFM and ambiguous effects on long-term ecosystem management. This ambiguity arises because SSP5 features a drive towards sustainable development that relies heavily on market mechanisms that may not necessarily proved effective for managing environmental effects.

Another way to look at the same information is shown in Table IV 5.2. There it can be seen that SSP3 (fragmentation) features negative impacts on livelihoods combined with worsening inequalities and the poor enforcement of laws and regulations, both of which are associated with negative outcomes for SFM (Part III). SSP3 also features a lack of access to capital and influence. In contrast, SSP5 (conventional development) emphasises technology, human capacity, and leadership, consistent with its focus on technological and management solutions to problems. The SSP1 (sustainability) narrative does not strongly emphasise any one prerequisite condition; rather, it suggests a broad improvement across many prerequisite conditions.

The general conclusions from Table IV 5.2 are illustrated in Figure IV 5.2. As shown in the figure, negative trends for prerequisite conditions for SFM are more strongly aligned to the SSP axis "socio-economic challenges for adaptation" than they are to "socio-economic challenges for mitigation." This makes sense because of the relationship between mitigation and adaptation challenges as pictured in the SSPs and constraints on SFM. Within the SSPs, challenges to mitigation are higher mainly because economic development is more material-intensive. In contrast, the mitigation challenge in forests is to maintain carbon pools in standing stock and soils, which has more to do with forest management than

Table IV 5.1 Matching SSP narrative elements to prerequisite conditions.[a]

SSP	Segment	Category	Enabling condition	Direction
SSP1	A world making relatively good progress towards sustainability, with sustained efforts to achieve development goals while reducing resource intensity	Policies, institutions, governance	Long-term commitment to SFM	Positive
	Countries cooperate to achieve common development and environmental goals		Influence of regional and global processes	Positive
	Governance and institutions facilitate achieving social, environmental, and economic development goals and problem-solving			Positive
	High level of awareness regarding environmental degradation	Natural resource base		Positive
		Policies, institutions, governance	Long-term commitment to SFM	Positive
	High levels of diversity that confer resilience to societal and environmental changes	Natural resource base	Extent and condition of forest resources	Positive
	Improved regional livelihoods, a renewed emphasis on regional production	Livelihoods, cultural, socio-economic	Contribution of forests to livelihoods	Positive
	Natural resources used efficiently, with high awareness of the environmental consequences of choices		Landscape and ecosystem management	Positive
			Technical, managerial, leadership	Positive
	Rapid economic growth in developing countries		Access to capital	Positive
			Commercial opportunities	Positive
	Reduction of inequality (globally and within economies)	Policies, institutions, governance	Land tenure	Positive
	Strong investment in research and development	Research and monitoring	Research programmes	Positive
	Technology development directed towards environmentally friendly processes, including clean energy technologies and high productivity of land	Livelihoods, cultural, socio-economic	Technical, managerial, leadership	Positive
		Research and monitoring	Research programs	Positive
SSP3	A world failing to achieve global development goals and with little progress in reducing resource intensity	Policies, institutions, governance	Long-term commitment to SFM	Negative
	Development proceeding slowly, with high inequalities	Livelihoods, cultural, socio-economic	Access to capital	Negative
		policies, institutions, governance	Land tenure	Negative
	Disadvantaged populations continuing move to unplanned settlements around large urban areas	Livelihoods, cultural, socio-economic	Contribution of forests to livelihoods	Negative
	Governance and institutions relatively weak	Policies, institutions, governance	Enforcement of laws and regulations	Negative
			Public administration	Negative
	Low investments in research and development and in human capital	Research and monitoring	Research programs	Negative
	Little international cooperation	Policies, institutions, governance	Influence of regional and global processes	Negative
	Low investments into technology development	Livelihoods, cultural, socio-economic	Technical, managerial, leadership	Negative
		Research and monitoring	Research programs	Negative
	Policies oriented towards security	Livelihoods, cultural, socio-economic	Security and conflict	Negative
	Serious degradation of the environment	Natural resource base	Extent and condition of forest resources	Negative

Table IV 5.1 Continuted.

SSP	Segment	Category	Enabling condition	Direction
SSP4	Absence of sustainability regulations	Policies, institutions, governance	Long-term commitment to SFM	Negative
	Access to markets limited, increasing vulnerability for non-connected population groups	Livelihoods, cultural, socio-economic	Commercial opportunities	Negative
			Contribution of forests to livelihoods	Negative
	Corporations acquiring the necessary land-resources in developing countries to grow energy crops,	Policies, institutions, governance	Land tenure	Negative
			Reconciliation of land uses	Negative
	Governance dominated by regulatory capture		enforcement of laws and regulations	Negative
			Public administration	Negative
	Hedging against resource scarcity perhaps a strong push for bioenergy by global energy corporations		Influence of regional and global processes	Negative
	Land ownership unevenly distributed and land-use management also left to the global elite		Influence of regional and global processes	Negative
			Land tenure	Negative
			Reconciliation of land uses	Negative
	Low social cohesion	Livelihoods, cultural, socio-economic	Security and conflict	Negative
		Policies, institutions, governance	Participation	Negative
	Poor people having the hope, and sometimes the opportunity, to become a member of the elite but mostly trapped in their conditions	Livelihoods, cultural, socio-economic	Access to capital	Negative
			Commercial opportunities	Negative
	Productive areas of the world dominated by industrialised agriculture and monocultural production		Role of industrial forestry	Negative
		Natural resource base	Trees outside the forest and agroforestry	Negative
	Reduced options for adaptation for local communities and for nature conservation	Livelihoods, cultural, socio-economic	Contribution of forests to livelihoods	Negative
			Landscape and ecosystem management	Negative
	Vulnerable to the impacts of climate change in both developing and industrialised countries, and concentrated in rural areas and large mega-cities		Contribution of forests to livelihoods	Negative

Table IV 5.1 Continued.

SSP	Segment	Category	Enabling condition	Direction
SSP5	A global "development first" agenda enforced		Access to capital	Positive
			Commercial opportunities	Positive
			Security and conflict	Positive
		Policies, institutions, governance	Influence of regional and global processes	Positive
	Preference for individual mobility, meat-rich diets, and tourism and recreation	Livelihoods, cultural, socio-economic	Commercial opportunities	Positive
			Landscape and ecosystem management	Positive
	Agro-ecosystems highly managed, building on strong technological progress in the agricultural sector		Contribution of forests to livelihoods	Negative
			Role of industrial forestry	Positive
			Technical, managerial, leadership	Positive
	Environmental consciousness on the local scale and focused on end-of-pipe engineering solutions for local environmental problems, such as air pollution	Policies, institutions, governance	Long-term commitment to SFM	Negative
	Very high investments in technological innovation, with a focus on increasing labour productivity, fossil energy supply, and managing the natural environment	Livelihoods, cultural, socio-economic	Landscape and ecosystem management	Positive
			Landscape and ecosystem management	Negative
			Technical, managerial, leadership	Positive
		Research and monitoring	Research programmes	Positive
	Land-use management generally very resource intensive	Livelihoods, cultural, socio-economic	Landscape and ecosystem management	Positive
			Landscape and ecosystem management	Negative
	Regional governance improving in parallel, leading to effective governance structures	Policies, institutions, governance	Enforcement of laws and regulations	Positive
			Public administration	Positive
	Social cohesion strengthened	Livelihoods, cultural, socio-economic	Security and conflict	Positive
		Policies, institutions, governance	Participation	Positive
	Strong push for development in developing countries that follow the fossil- and resource-intensive development model of the industrialised countries	Livelihoods, cultural, socio-economic	Access to capital	Positive
			Commercial opportunities	Positive
			landscape and ecosystem management	Negative

[a] The segments have been modified slightly for readability (e.g. by changing the tenses of verbs) without changing the meaning.

Table IV 5.2 Frequency of occurrence of prerequisite condition code in SSP narrative.[a]

		Enabling condition	SSP1	SSP3	SSP4	SSP5
Positive	Policies, institutions, governance		5			4
		Influence of regional and global processes	1			1
		Long-term commitment to SFM	2			
		Reconciliation of land uses				
		Enforcement of laws and regulations				1
		Participation				1
		Public administration				1
		Land tenure	1			
	Livelihoods, cultural, socio-economic		6			13
		Landscape and ecosystem management	1			3
		Role of industrial forestry				1
		Security and conflict				2
		Access to capital	1			2
		Technical, managerial, leadership	2			2
		Commercial opportunities	1			3
		Contribution of forests to livelihoods	1			
	Natural resource base		2			
		Trees outside the forest and agroforestry				
		Extent and condition of forest resources	1			
	Research and monitoring		2			1
		Monitoring programmes				
		Research programmes	2			1
Negative	Policies, institutions, governance			5	10	1
		Influence of regional and global processes		1	2	
		Long-term commitment to SFM		1	1	1
		Reconciliation of land uses			2	
		Enforcement of laws and regulations		1	1	
		Participation			1	
		Public administration		1	1	
		Land tenure		1	2	
	Livelihoods, cultural, socio-economic			4	9	4
		Landscape and ecosystem management			1	3
		Role of industrial forestry			1	
		Security and conflict		1	1	
		Access to capital		1	1	
		Technical, managerial, leadership		1		
		Commercial opportunities			2	
		Contribution of forests to livelihoods		1	3	1
	Natural resource base			1	1	
		Trees outside the forest and agroforestry			1	
		Extent and condition of forest resources		1		
	Research and monitoring			2		
		Monitoring programmes				
		Research programmes		2		

[a] Note that in some cases the total category score is greater than the sum of scores for each enabling condition within the category. This is because a passage was coded with the category as a whole, rather than with a specific enabling condition within the category.

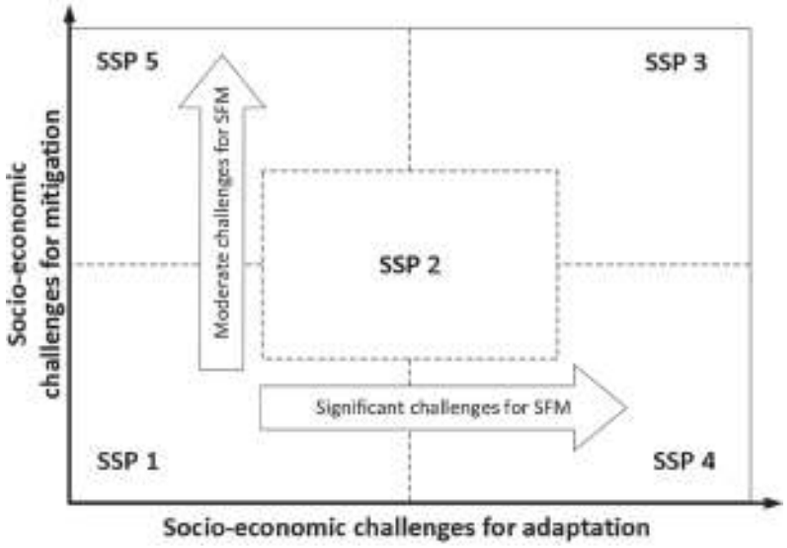

Figure IV 5.2 Challenges for sustainable forest management in the SSPs.

it does with more or less carbon-intensive lifestyles outside the forest sector. Thus the challenges to (global) mitigation in the SSPs are only weakly aligned with the potential for adopting SFM practices. In contrast, the challenges to adaptation in the SSPs align strongly with challenges to implementing SFM: pressures on ecosystems, weak social and institutional capacity, and high levels of inequality.

5.3.2 From prerequisite conditions to SSPs

In the second approach introduced earlier, we started with the prerequisite conditions. To each of the prerequisite conditions, we assigned three possible states. We then constructed a scenario "kernel" or "logic" (Bishop et al. 2007) by creating separate combinations of states for different prerequisite conditions. This does not represent an entire scenario development process. Rather, it generates a central output from such a process using an approach similar to that of the popular method developed within Royal Dutch Shell in the 1970s and 1980s (Wack 1985, Schwartz 1996) and applied within a forest context by Dermawan et al. (2013).

The SSP space shown in Figure IV 5.1 can be thought of as representing a scenario kernel, in that there are two conditions – challenges for adaptation and challenges for mitigation – and each has three states: low, medium, and high. In fact, the SSP space is richer than that implies, because each combination defines a zone within which a large number of scenarios can be placed. However, the scenario space of Figure IV 5.1 provides a useful example of the scenario-kernel approach. With two conditions, each with three states, there are $3^2 = 9$ possible combinations, yet there are only five SSPs. This illustrates an important step in constructing a scenario kernel, to filter the large number of possible combinations to a manageable set of interesting scenarios. What is interesting depends on the particular application, but generally the scenarios should be internally consistent and span a broad space of possibilities (Kemp-Benedict 2012).

In contrast to the two conditions that label the SSP axes, a total of 11 prerequisite conditions were identified in Part I of this volume. With three possible states each, the number of possible combinations is $3^{11} = 177\ 147$. This is a daunting number of possible scenarios to examine for consistency, breadth, and interest. However, we observed that the prerequisite conditions are somewhat imbalanced, in that some tend to dominate others. We therefore chose six, leaving $3^6 = 729$ combinations. The six selected prerequisite conditions and their possible states are shown in Table IV 5.3.[(2)] This number of possible combinations is less daunting but still quite challenging to evaluate. To assist in the task, we used the cross-impact balance analysis (CIB) (Weimer-Jehle 2006), a technique for constructing consistent scenario kernels that specify the degree of direct influence of each possible state of each condition on each state of every other condition, using the scores shown in Table IV 5.4.

[(2)] In Weimer-Jehle (2006), the enabling conditions are called "descriptors" and the states are called "variants." We chose terminology that better matches that used in the rest of this book.

Table IV 5.3 States for prerequisite conditions.

Category of prerequisite condition	State 1	State 2	State 3
Tenure rights	Clear diversified tenure rights	Ambiguous tenure rights	Corporate land appropriation
Law enforcement	Effective and legal law enforcement	Sector poorly regulated and poor enforcement	Sector largely deregulation and auto-regulation
Public administration	Improved capacity, little bureaucracy, and minimal corruption	Inadequate administration and persistent corruption	Over-regulation but less effective and efficient
Market opportunities	Increasing demand for diversified forest-related goods and services	Demand for timber and some NTFP but stagnation for other services	Forest products substituted and forest services replaced by others
Industrial forestry	Sector diversified, including complementary subsectors	Sector diversified, but subsectors compete among each other	Dominance of few conglomerate-like players characterised by vertical integration
Technical managerial leadership	Effective self-organization and adequate capacity of forest owners	Mercantilisation of forestry services limiting access to the services	Vertical integration of sector, including production and services and top-down leadership

Table IV 5.4 Cross-impact judgments and scores.

Score	Cross-impact judgment
+3	Strongly promoting direct influence
+2	Promoting direct influence
+1	Weakly promoting direct influence
0	No direct influence
–1	Weakly restricting direct influence
–2	Restricting direct influence
–3	Strongly restricting direct influence

For consistency of the method, the scores for each condition must sum to zero. If they do not, it is an indication that the states listed for each condition do not exhaust the possibilities. For the states given in Table IV 5.3, filling in the CIB table involves a total of $(3\times6)^2 - (3\times6) = 306$ assignments. This is less than half the number of possible combinations, and the cognitive requirements are much less; rather than evaluate an entire scenario, the analyst only specifies how the conditions influence one another. Also, as for the QDA technique described earlier, the assignments are traceable and do not depend on the analyst's overall impression of a scenario.

After each of the judgment scores was entered in the table, the CIB software ScenarioWizard (Weimer-Jehle 2014) was used to generate a ranked set of internally consistent scenarios. From these, we chose scenarios that were either fully or marginally consistent and that tended to span the space delimited by the states in Table IV 5.3. For each scenario, the ScenarioWizard calculates the total impact score for each state as a sum of the cross-impact judgments. The sum of the impacts across states is the scenario's total impact score. Every state has a best alternative to the one in the scenario, with a corresponding impact. To calculate a scenario's consistency, the impact score for the best alternative for each state is subtracted from the impact score for that state, and then the minimum of the differences is selected. That is, a scenario's consistency is determined by the consistency of its least-consistent state. More details can be found in the ScenarioWizard technical documentation (Weimer-Jehle 2014).

The results are shown in Table IV 5.5. We selected three scenarios, two of them featuring two variants that differed in the state of only one of the prerequisite conditions. With the variants included, all but one of the states shown in Table IV 5.3 appear in the scenarios. The one exception is the state "deregulation and auto-regulation" for the law enforcement prerequisite condition. That state did not appear in any consistent or marginally consistent scenario, perhaps because the states for other prerequisite conditions implied a degree of institutional capacity that is inconsistent with deregulation and auto-regulation. In Scenario 3, all but one of the

Table IV 5.5 Selected scenarios.[a]

Prerequisite condition	Scenario 1	Scenario 2	Scenario 3
Consistency score	1/–1	1/–1	–1
Total impact score	70/56	42/42	19
Closest SSP	SSP1 (sustainability)	SSP4 (inequality)/ SSP3 (fragmentation)	SSP3 (fragmentation)/ SSP4 (inequality)
Tenure rights	Clear diversified tenure rights	Ambiguous tenure rights	Corporate land appropriation
Law enforcement	Effective and legal law enforcement	Poorly regulated and poor enforcement	*Effective and legal law enforcement*[a]
Public administration	Improved capacity, less bureaucracy, and corruption	Inadequate administration and persistent corruption	Over-regulation but less effective and efficient
Market opportunities	Increasing demand for diversified forest-related goods and services	Demand for timber and some NTFP but stagnation for other services	Replacement of forest-related goods and services largely replaced
Industrial forestry	Diversified sector with complementary subsectors	Dominance of fewer players and much vertical integration/ *Diversified sector but with increased competition*[a]	Dominance of fewer players and much vertical integration
Technical managerial leadership	Self-organization and capacity of forest owners / *Mercantilisation of forestry services limiting access*[a]	Vertical integration of sector and top-down leadership	Vertical integration of sector and top-down leadership

[a] Text in italics represents states that received weak support, in that they had a (small) negative impact score. They are the reason that some consistency scores are negative.

states for the prerequisite conditions were consistent. The (marginally) inconsistent state was "effective and legal law enforcement" for the law enforcement prerequisite condition.

Also shown in Table IV 5.5 are assignments of forest scenarios to the SSPs. The assignments were developed using the summary information in Table IV 5.1 and Table IV 5.2. The most consistent scenario, Scenario 1, is closest to SSP1 (sustainability). It features effective institutions and equitable access to resources. Scenarios 2 and 3 can each be seen as consistent with either SSP3 (fragmentation) or SSP4 (inequality). However, Scenario 2 is closer to SSP4, while Scenario 3 is closer to SSP3. The fit between the scenario structure proposed here and the SSPs is not perfect. This is partly a reflection of the origin of the SSPs in the climate community. As noted in the previous section, the axis "socio-economic challenges to adaptation" is more strongly aligned with SFM than is the axis "socio-economic challenges to mitigation." This can be seen in Table IV 5.5, where there is a distinct difference between SSP1 and a cluster aligned with SSPs 3 and 4, with a weaker distinction between SSP3 and SSP4 and no clear representation of SSP5. More generally, a local set of scenarios does not have to perfectly align with a set of global scenarios in order to use the global scenarios as a frame. Indeed, it can be interesting and a valuable exercise to explore local developments that diverge from global developments.

5.4 Discussion

As emphasised in chapter 4 of Part IV, it is important for scenarios to be participatory in order to achieve meaningful outcomes and to be acceptable by con-

stituencies that will be guided by the scenarios; forest scenarios should also take cross-scale interactions into account. In this chapter we have demonstrated two techniques that can be used to link global-scale scenarios to forest scenarios meant to be applied at a local scale. The approach that starts with generating scenarios of prerequisite conditions is suitable for a participatory scenario activity. The multi-scale nature of the exercise can come in a second step, not carried out here, in which the implications of the local scenarios are explored in the context of global scenarios defined by, for example, the shared socio-economic pathways (SSPs). This step also opens the way to linking with earlier scenarios, because the SSPs have been mapped onto existing scenario sets by van Vuuren and Carter (2014). Thus local scenarios can be aligned with the recent SSPs as well as the more familiar GEO, MA, or SRES scenarios. The prerequisite conditions defined elsewhere in this volume provide a useful frame for local scenario studies. The scenario kernel developed here and shown in Table IV 5.5 may also be interesting in its own right. Either the scenarios of Table IV 5.5 or scenarios developed through a longer process could provide a common set for regional and global forestry foresight studies. Having a common set allows for greater comparability between different studies.

The exercises described in this chapter provide examples of linking global to local scenarios, an important goal of the current round of climate scenarios. These examples address three of five future research directions identified by Ebi et al. (2014) regarding the SSPs: 1) determining the relevance of the SSP narratives for different problems, scales, and research questions; 2) downscaling socio-economic scenarios; and 3) linking local and sectoral scale scenario development to global narratives. This chapter is therefore an early, and concrete, example of how the SSPs can be used in a sectoral analysis.

The bottom-up scenarios demonstrate a path towards improving the coherence and comparability of forest resource scenarios. Existing forestry scenarios make divergent, or at least quite different, assumptions from each other, making it difficult to compare or combine their outputs (Hurmekoski and Hetemäki 2013). As shown in this book, an organising framework that focuses on causal links (the prerequisite conditions) naturally supplies the raw material for a scenario kernel. The steps involved are, first, to decide on possible states for each of the elements of the organising framework and then to use a method such as CIB to construct an internally consistent scenario kernel. That kernel can then be used in diverse studies. If the scenario alternatives within the scenario kernel can be linked to global scenarios, as we attempted in this chapter, then it makes it easier to embed forestry scenarios into other scenario activities at different scales. Indeed, this is the approach taken by the Forestry Outlook Study for Africa (FAO 2003), which used the GEO scenario framework (UNEP 2007) as a scenario kernel (see also Part IV, chapter 3).

There remains the question of how the prerequisite conditions scenario kernel as developed in this chapter could be used. There are many options. Scenario 1 can be seen as a desirable future from the point of view of SFM and could be elaborated as a possible end-state in a participatory backcasting exercise (Robinson 2003, Vergragt and Quist 2011, Kok et al. 2011). In such an exercise, participants explore strategies for reaching a desired end-point and consider the challenges that may arise when implementing those strategies. Alternatively, a community that wishes to implement an SFM plan may wish to consider external trends that could either support or thwart that ambition. In other words, they want to know how the prerequisite conditions might change in future. In that case, they might consider all of the scenarios in a wind-tunnel exercise, in which participants seek policies or strategies that are robust against external changes (Wack 1985, Kass et al. 2011). Such an exercise might ask how the community could successfully implement an SFM programme even when the prerequisite conditions are not favourable. Qualitative scenarios can also be used to select values for quantitative parameters in models (Alcamo 2008, Kemp-Benedict 2010). Finally, a scenario kernel can form the basis of a set of scenario narratives. Such narratives can be used to communicate alternative possibilities for the future, whether by creating memories of the future that shape people's responses to changing conditions (Allan et al. 2002, Rasmussen 2005) or by drawing attention to possibilities outside the range of current experience (Booth et al. 2009).

5.5 Conclusions

Scenarios are popular because of their flexibility and applicability to different purposes. The essential core of a set of scenarios is the scenario kernel, or "logic," and using a common kernel across scenario exercises increases their coherence. This chapter demonstrates techniques for using a sector-specific conceptual framework and a global scenario kernel to generate a scenario kernel for SFM exercises. The techniques can be used in future participatory exercises to develop a common platform for forestry scenarios that can be linked to other scenario activities at diverse scales.

The particular set of global scenarios, the shared socio-economic pathways, or SSPs, were chosen because they are very recent, likely to be used in the future, and are the result of a large community effort.

Many of the people who helped develop previous global scenarios are involved in SSP development. However, this chapter found only partial alignment with the SSPs. Generally, adaptation capacity was found to correspond strongly to positive prerequisite conditions for SFM, while the link to mitigation capacity is weak. This is not a serious problem because, as this chapter also demonstrates, it is possible to develop sector-specific scenarios that make no explicit connection to the global scenarios and subsequently demonstrate how the sector-specific scenario kernel corresponds to the global scenario kernel. That is, the outcome of a bottom-up, participatory process for the forestry sector, as described in the previous chapter, can then be mapped onto a global scenario framework, making it easier for global, multi-sector studies to incorporate scenario elements appropriate to the forestry sector.

The chapter also demonstrates that the prerequisite conditions developed throughout this book are a useful starting point for developing scenarios for the forestry sector. The essential steps were to first assign possible states for the prerequisite conditions and then explore the causal links between different prerequisite conditions. That was sufficient to identify a consistent scenario kernel.

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Acronyms and abbreviations

ACOFOP	Association of Forest Communities of Petén
AFISAP	Integrated Forestry Association of San Andrés, Petén
BIH	Bosnia and Herzegovina
BRL	Brazilian real
C&I	Criteria and indicator
CATIE	Tropical Agricultural Research and Higher Education Center
CBD	Convention on Biological Diversity
CBFM	Community-based forest management
CDM	Clean Development Mechanism
CF	Community forest
CFE	Community forest enterprise
CFM	Community forest management
CIFOR	The Center for International Forestry Research
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
CITES	Convention on International Trade of Endangered Species
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CONAFOR	National Forest Commission
CONAP	Guatemala's National Council of Protected Areas
CSR	Corporate spcial responsibility
DBH	Diameter at breast height
DOF	Department of Forestry
EFI	European Forest Institute
ENGO	Environmental non-governmental organisation
ES	Ecosystem service
ETB	Ethiopian Birr
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Statistics Division of the Food and Agriculture Organization of the United Nations
FBIH	The Federation of Bosnia and Herzegovina
FCPF	Forest Carbon Partnership Facility
FGD	Focus group discussion
FLEGT	Forest Law Enforcement, Governance, and Trade
FM	Forest management
FMP	Forest management plans
FOSA	Forestry Outlook Study for Africa
FSC	Forest Stewardship Council
GDP	Gross domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
GPS	Global Positioning System
HCVF	High conservation value forests
ICRAF	World Agroforestry Centre
IIED	International Institute for Environment and Development
ILO	International Labour Organization
IMFN	International Model Forest Network
IPCC	Intergovernmental Panel on Climate Change
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
IUFRO	International Union of Forest Research Organizations
LEI	Lembaga Ekolabel Indonesia (Indonesian Ecolabel Institute)
MBR	Maya Biosphere Reserve
MEA	Millennium Ecosystem Assessment
MF	Model Forest
NGO	Non-governmental organization
NPR	Nepali Rupee
NTFP	Non-timber forest products
NWFP	Non-wood forest product
PES	Payments for environmental services
PR	Prereguisite condition
PROCYMAF	Community Forestry Development Program
PROFOR	World Bank's Program on Forests
RAN	Registro Agrario Nacional
RECOFTC	The Center for People and Forests
REDD	Reducing Emissions from Deforestation and Forest Degradation
RRI	Rights and Resources Initiative
SFB	Serviço Florestal Brasileiro
SFM	Sustainable forest management
SIDA	Swedish International Development Co-operation Agency
SVLK	Sistem Verifikasi Legalitas Kayu (Timber Legality Assurance System, TLAS)
TLAS	Timber Legality Assurance System
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
US	United States
USAID	United States Agency for International Development
USD	United States Dollar
USPNW	United States Pacific Northwest
WCCD	World Commission on Culture and Development
WCED	United Nations World Commission on Environment and Development
VPA	Voluntary Partnership Agreement
WRI	World Resources Institute
WSCSD	World Business Council for Sustainable Development
WTO	World Trade Organization
WWF	World Wildlife Fund