REPORT

The WISDOM analysis tool: Best practices

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THE CENTER FOR PEOPLE AND FORESTS

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RECOFTC - The Center for People and Forests

Bangkok, Thailand

All photos courtesy of RECOFTC

This publication has been generously funded by the Ministry for Foreign Affairs of Finland. The views expressed in this publication are those of the authors and do not necessarily reflect the views of RECOFTC and our donor organizations.

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Summary

The recently completed Strengthening Sustainable Forest Management and Bio-Energy Markets to Promote Environmental Sustainability and to Reduce Greenhouse Gas Emissions in Cambodia (SFM) project carried out a Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM) analysis in order to understand the viability of fuelwood-based businesses in its target community forest (CF) sites and to assess their possible integration into an overall energy plan at the commune level.

The analysis was coordinated using the commune land use plans (CLUP) process and included the establishment of improved charcoal kilns from Group for the Environment, Renewable Energy and Solidarity (GERES).

The key results are:

- Using the standard framework prepared by the Food and Agriculture Organization of the United Nations (FAO), WISDOM analysis resulted in positive qualitative indications on the availability of fuelwood. Free, remotely sensed datasets were used and the methodology was relatively quick to use and cheap.
- At the commune level, all the factors and constraints affecting the pattern of fuelwood harvesting, use and commercialization may not have been fully covered because details required were extensive. For example, large amounts of fuelwood coming in from land clearings located in neighboring communes could not be accurately isolated using the analysis.
- The feasibility of fuelwood-based businesses depends on many social, technical and commercial factors (including policy barriers, available technology and market prices) that were not analyzed using the WISDOM method.

The conclusions, therefore, are that:

- WISDOM is a useful tool in the qualitative determination of fuelwood surpluses and deficits. The applied methodology resulted in accurate data and resource-efficient processes.
- Better integration of WISDOM in local and national land-use planning processes is suggested in order to implement an overall energy plan. Since WISDOM is particularly useful on a small scale, it should be carried out nationwide or province-wide before defining the areas of priority intervention on how a CF can be involved in the energy plan.
- The social, technical and commercial factors explained above are urgent aspects that need to be addressed at the community forest level. These have to be analyzed independently using WISDOM data to verify if fuelwood-based businesses are feasible.

Introduction

The United Nations Development Programme (UNDP) and the Global Environment Facility (GEF)-funded SFM project was implemented for three years between April 2012 and February 2015. The SFM project planned to achieve three technical outcomes. RECOFTC – The Center for People and Forests, in partnership with Mlup Baitong (MB), was the service provider of two of these technical outcomes (sub-project SFM1):

- National capacities and tools exist to facilitate the widespread implementation of sustainable community-based forest management; and,
- Community-based sustainable forest management is implemented effectively within the contexts of cantonment/province, district and commune levels, thus, planning and delivering concrete benefits to local communities.

The deliverables of the SFM1 project were:

- Community forest management plans (CFMP) and business plans for 30 community forest sites;
- Trials of three alternative community forest modalities (ACFMs): community conservation forestry (CCF), community-based production forestry (CBPF) and Partnership Forestry (PF); and
- Implementation of four CLUPs.

The implementing partner for SFM1 was the Forestry Administration (FA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF). The General Department of Energy of the Ministry of Industry and the Ministry of Land Management, Urban Planning and Construction (MLMUPC) also collaborated in support of the four CLUPs.

SFM1 was implemented in four provinces: Battambang, Pursat, Kampong Chhnang and Kampong Speu. These provinces constitute the Northern Cardamom Mountain Landscape (NCML), the landscape's buffer area and the southern Tonle Sap watershed. The 30 community forests supported under SFM1 cover a total of 10 879 hectares and 65 villages. The ACFMs cover 11 359 hectares and nine villages.

RECOFTC's Livelihood Improvement Through Generation and Ownership of Forest Information by Local People in Products and Services Markets (ForInfo) project, funded by the Ministry of Foreign Affairs of Finland, co-financed the SFM project. RECOFTC supported business development in the 30 community forests and four ACFM sites in addition to WISDOM analysis in three communes where the CLUP process was on-going.

GERES helped improve charcoal kilns in several community forests as part of the SFM sub-project, specifically in communes where the CLUP process was being implemented. Coordination to establish a successful charcoal business based on community forest fuelwood resources was recommended.

Trees and agricultural land in Pursat Province, Cambodia. About 30 villages in the Northern Cardamon Mountain Landscape supported by the Sustainable Forest Management project with this type of topography were used to try various alternative community forest modalities.

Methodology

WISDOM analysis is a spatial-explicit method for highlighting and determining priority areas of intervention and support in wood energy/bioenergy planning and policy formulation[1].

WISDOM was developed by FAO and can be applied in a variety of contexts. The main result of the analysis as used by the SFM project was a map showing deficit and surplus areas of fuelwood. ("Deficit area" is an area where the availability of a resource is lower than the local consumption while "surplus area" is an area where the supply is higher than the local consumption.) Most of the studies for the analysis were carried out in large areas with the objective of influencing land planners and policymakers during the preparation of regional or national energy plans.

WISDOM analysis was carried out in some of the communes where the CLUP process was being carried out. Another criterion was the integration of improved charcoal kilns with the SFM component and two GERES-selected CF sites. The objective was to verify the feasibility and constraints of running fuelwood-based operations in specific areas and how these activities could then be integrated in commune planning according to each site's relative fuelwood balance.

Table 1. Overview of WISDOM target sites.

Province	Commune	Total area (km^2)	Population	Community forests	CLUP process?	Partnership forestry?	Charcoal kiln?
Battambang	Ta Kream	229	19 713	2	Yes	Yes	No
Kampong Chnnang	Trapeang Chan	39	4 264	2	No	No	Yes
Pursat	Samroang	547	14 397	1	Yes	Yes	Yes

Ta Kream Commune lies on a major national road but all the communes are strongly rural in character. The villages are not well developed.

Implementation of the WISDOM analysis was carried out according to the standard FAO methodology[2]:

- Definition of the minimum administrative spatial unit of analysis.

  i. In this case, the three communes as described above.

1 http://www.wisdomprojects.net/global/index.asp
2 http://www.wisdomprojects.net/global/method.asp

- Development of the demand module.
  i. The first step was to execute the Remote Sensing analysis of free Landsat images to refine the existing Land Use/Land Cover (LULC) maps, which were provided by the local provincial agencies. Due to limited extension work in the area and presence of existing data, a visual interpretation was necessary to produce accurate LULC maps.
  ii. An existing biomass geographical dataset [3] was used to assign an average 'biomass per hectare' value to each LULC class. Using GIS techniques, the biomass dataset was then overlapped with the LULC map and average values for each class were extracted.
  iii. Rapid field sampling was carried out to verify the accuracy of such values using inventory plots, confirming the validity of this methodology.
  iv. Finally, the biomass stock values were transformed into biomass annual growth values, then eventually to the incremental amount of wood-fuel fraction using standard FAO coefficients.[4]
  v. For the agricultural LULC class, 'trees outside forest' were assessed using hi-resolution Google Earth images. The biomass values were multiplied by the percentage of tree cover[5] for the same forest type.
  vi. The final supply map indicates the 'annual increment of the woodfuel fraction' in each LULC of each commune.
- Development of the supply module.
  i. A random sample of households was interviewed in each village to understand the patterns and magnitudes of fuelwood collection and consumption around each settlement.
  ii. A fuelwood demand map was then produced, developed mainly to reflect the average distance of collection and the average collection rate per capita.
- Development of the integration module and selection of priority areas or woodfuel 'hot spots'.
  i. The supply and demand maps were overlapped using GIS techniques in order to identify the areas with either fuelwood deficit or surplus. The areas were then aggregated in qualitative classes (see Table 2).

3 Baccini, A, Goetz, S J, Walker, W S, Laporte, N T, Sun, M, Sulla-Menashe, D, Hackler, J, Beck, P S A, Dubayah, R, Friedl, M A, Samanta, S, and Houghton, R A 2012, "Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps". Nature Climate Change, Vol. 2, pp. 182–185.

4 FAO 2007, "Wood energy supply/demand scenarios in the context of poverty mapping: A WISDOM case study in Southeast Asia for the years 2000 and 2015," Environmental and Natural Resources Working Paper 27.

5 Drigo, R and Nzabanita, V 2010, "WISDOM Rwanda - Spatial analysis of woodfuel production and consumption in Rwanda applying the WISDOM methodology." FAO – Forestry Department – Wood Energy.

Table 2. Percentage of fuelwood surplus and deficit areas in each commune.

Commune	High deficit	Low deficit	Equilibrium	Low surplus	High surplus
Samroang	1%	5%	8%	23%	64%
Ta Kream	2%	44%	40%	13%	0%
Trapeang Chan	18%	26%	47%	9%	0%

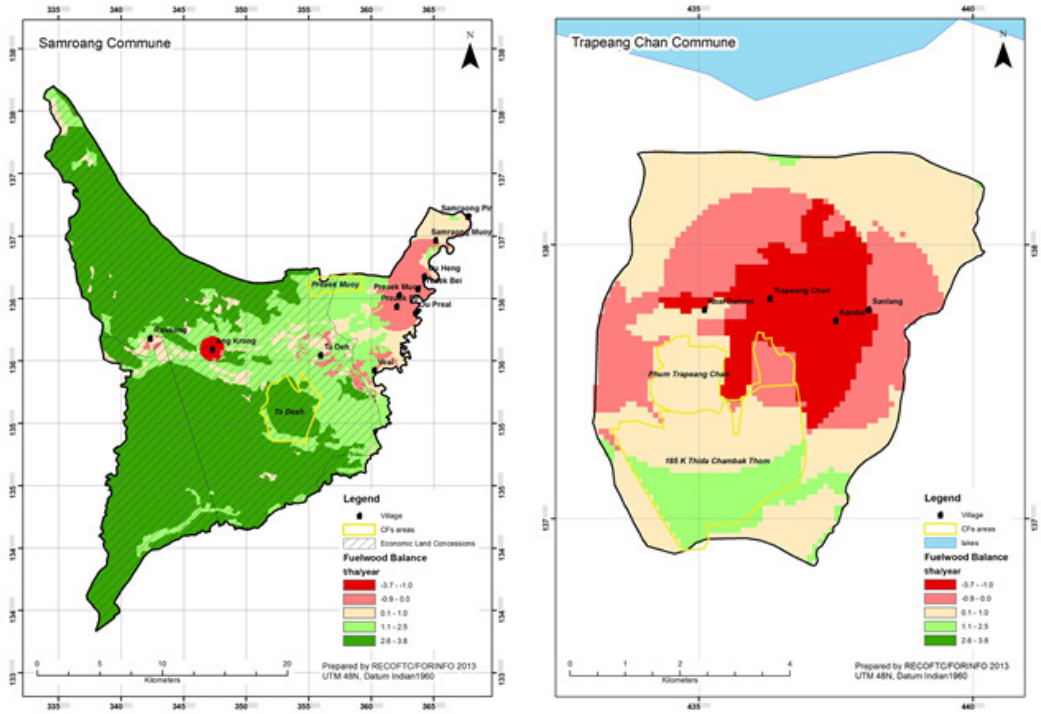

Figure 1. Example maps showing fuelwood surpluses and deficits.

Discussion

WISDOM analysis revealed positive qualitative indications on the availability of fuelwood, which were verified by local observations and were consistent with country trends.

- Respondents claimed to be willing to travel 2-5 km to collect fuelwood. Around 30 percent of fuelwood is sourced from agricultural areas, 'trees out of forest', general agricultural residues, or clearings for new farms. Almost all the households (98 percent) collect their own fuelwood, purchasing a small amount only in necessity.
- This common pattern of fuelwood collection gives rise to deficit areas around villages. Surplus areas, if present, are mostly found in remote mountain ranges. Since areas around villages are already being overexploited, if no substitute fuel is found soon, the range of fuelwood collection will expand into the surplus areas.
- Biomass values were consistent with local observations of the status of the forest in question suggesting that the GIS framework used in this study was accurate. The tool was also inexpensive as only government data and free datasets were used to produce the supply map.

At the commune level, it was difficult to quantify and represent the patterns of fuelwood harvesting, use and commercialization on a map. For example, it is widely known that a large quantity of fuelwood is coming from land clearings due to Economic Land Concessions (ELCs) located in neighboring communes. Illegal fuelwood harvesting is quite widespread and operators usually move large quantities of fuelwood across various communes.

Regarding operational community forest planning, the feasibility of fuelwood-based businesses ultimately depends on various social, technical and commercial factors and constraints not analyzed by the WISDOM tool. According to the WISDOM data, and as other results of the SFM project show, the present condition of the fuelwood value chain is not very profitable for community forests, even in surplus areas.

Strong collaboration with local officers is needed during all implementation steps of WISDOM analysis. The integration of WISDOM into the CLUP process, which is already in place by virtue of government regulations, sometimes causes confusion among stakeholders.

Conclusions

WISDOM is a useful tool to analyze areas in which there is either a deficit or surplus of fuelwood. The methodology used in the SFM project proved to be both accurate and inexpensive. However, depending on the area to be observed or studied, some legal and illegal processes can happen across boundaries, which cannot be accurately incorporated into the analysis. Moreover, the rapid LULC and biomass assessment described here may not be feasible at the national level.

Better integration of the WISDOM analysis tool in local and national land-use planning processes is suggested in order to implement a sustainable energy plan. Since WISDOM is particularly useful at higher levels, it should be carried out nationwide or at least province-wide before defining the areas of intervention or how community forests can be involved in energy planning. It can provide important information even at CLUP level.

The WISDOM framework, however, does not capture other social, technical and commercial factors and constraints, which must be investigated and addressed before planning a community forest fuelwood-based business. For example, allowed harvesting systems, collection methods, local fuelwood prices and other specific aspects of the value chain are critical, but these could not be assessed during the WISDOM analysis. At the community forest level, due to the costs and difficulties involved in implementing WISDOM analysis, a more efficient and smaller-scale assessment using traditional methods of evaluating forest resources and the value chain is suggested.

RECOFTC
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RECOFTC engages in strategic networks and effective partnerships with governments, nongovernmental organizations, civil society, the private sector, local people and research and educational institutes throughout the Asia-Pacific region and beyond. With over 25 years of international experience and a dynamic approach to capacity development – involving research and analysis, demonstration sites and training products – RECOFTC delivers innovative solutions for people and forests.

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