FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Forestry Department

WOODFUEL INTEGRATED SUPPLY/DEMAND OVERVIEW MAPPING (WISDOM) METHODOLOGY

The **Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM)** supports strategic wood energy planning and policy formulation through the integration and geographic representation of woodfuel production/consumption aspects and the highlighting of priority areas within a country.

The WISDOM methodology is the fruit of collaboration between FAO's Wood Energy Programme and the Institute of Ecology of the National University of Mexico (UNAM).

WISDOM was developed within the context of FAO country assistance and in consideration of the particular characteristics of wood energy systems.

Wood energy systems are site-specific

The patterns of woodfuel production and consumption, and their associated social, economic and environmental impacts, are site specific**.** Broad generalizations about the woodfuel situation and impacts across regions, or even within the same country, have often resulted in misleading conclusions, poor planning and ineffective implementation.

Adequately assessing the implications of the current patterns of woodfuel production and use and the sustainable potential of woodfuel resources, particularly within developing countries, requires a holistic view and a good knowledge of the spatial patterns of woodfuel supply and demand. There is a need to conduct spatial analyses of woodfuel supply and demand that are able to articulate the local heterogeneity at the regional and national levels. There is a critical lack of studies providing full-country coverage and based on a consistent integration of data at lower geographical scales.

Wood energy, nobody's child

The wood energy sector suffers from a widespread lack of recognition in national planning contexts, especially in forest and energy policies. This sort of "invisibility" results in fragmented information and keeps woodfuels outside the mainstream of national research agendas. A factor contributing to this problem is the complex cross-sectoral character of wood energy, which touches energy, forestry, agriculture and rural development, which translates into fragmentation of institutional competencies, thus leaving the wood energy issue "nobody's child".

Inadequate data or policies?

Another factor affecting the sector is that the woodfuel trade is almost entirely informal and goes largely unrecorded. Moreover, the existing information on woodfuel demand and supply belongs to separate agencies, which limits the development of holistic vision and the clear definition of priorities.

However, data inadequacy is more often the result (rather than the cause) of the absence of

sectoral policies. In most cases, the problem is not a lack of reliable data *per se*, but rather the lack of clear institutional responsibilities and of a comprehensive analytical perspective, which prevents the proper use of the information that exists in the forestry and energy agencies of most countries.

To enhance the recognition of the wood energy issue and to make it more readable to policy makers, there is a need for planning tools that harmonize and integrate data related to woodfuel production and consumption produced by forestry and energy agencies and other relevant socio-economic information.

WISDOM development

The WISDOM methodology is based on: a) the use of geo-referenced socio-demographic and natural resource databases integrated within a geographical information system framework; b) a minimum spatial unit of analysis at sub-national level; c) a modular, open and adaptable framework that integrates information of relevance to wood energy from multiple sources; and d) a comprehensive coverage of woodfuel resources (including non-forest resources) and demand from different energy users. WISDOM involves five main steps, as shown in Figure 1.

Rather than absolute and quantitative data, WISDOM visualizes wood energy situations, such as risk zoning or criticality ranking derived from relative/qualitative values, highlighting at the highest possible spatial detail the areas deserving urgent attention and, if needed, additional data collection. WISDOM should serve as an assessing and strategic planning tool to identify priority action areas.

WISDOM benefits

WISDOM provides several benefits: a) it allows a consistent and **holistic vision** of the wood energy sector over the entire country or region and helps to determine **priority areas** for intervention; b) it **collects existing scattered data** from different sources and **identifies data gaps** resulting from the thorough review and harmonization of wood energy data; c) it promotes **cooperation and synergies** among stakeholders and institutions (such as those from forestry, agriculture, energy and rural development) and consequently combats the fragmentation (of information, of responsibility) that so heavily limits the development of the sector; and d) it allows action to be concentrated on circumscribed targets and thus to **optimize the use of available resources** (human, institutional, financial, and others).

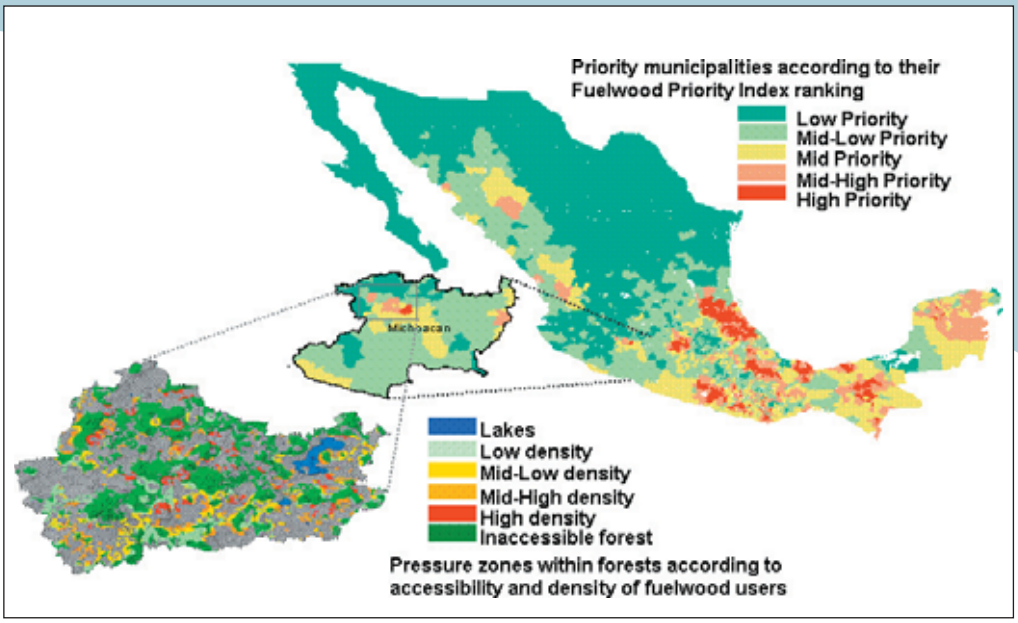
The WISDOM methodology has been implemented in case studies in three countries: in Mexico and Slovenia, it was conducted within the framework of FAO's Technical Cooperation Programme while in Senegal it was carried out as a Wood Energy Programme desk study.

Confronted with these very diverse contexts, WISDOM has proved to be flexible and adaptable, always able to consolidate fragmented knowledge and to produce clear perceptions of woodfuel production/consumption patterns. It is interesting to note that the priorities identified in the three cases are very different. For example, in Mexico the critical aspect is the sustainability of and access to fuelwood supply sources in specific users' contexts (fuelwood "hot spots"); in Senegal, the main issue is the trend in charcoal consumption in rural villages; whilst in Slovenia the identification of biomass resources available for energy purposes and the socioeconomic constraints that limit the access to such resources are the most relevant aspects. In each case, the analysis was based on the integration into WISDOM of information *already existing* in the countries, which highlights the cost-efficiency of the WISDOM approach.

WISDOM CASE STUDIES

Mexico

The objectives of the study were to determine fuelwood *hot spots* in Mexico for the year 2000 and to identify priority areas for action at a sub-municipal level at a previously identified hot spot. The analysis



focused on fuelwood consumption in rural areas households, where the country's woodfuel demand is concentrated.

The analysis was based on the integration of national geo-referenced multi-temporal databases that cover comprehensive information on woodfuel associated variables for 2 401 municipalities.

The analysis was conducted at two different scales:

- at the national scale, where it defined priority areas or fuelwood "hot spots". The analysis confirmed the high heterogeneity of fuelwood situations and identified 267 high-priority municipalities in urgent need of action to assure the sustainability of fuelwood use. These high priority municipalities cover approximately 10 percent of the country.
- at a sub-national scale in the "Purhepecha" Region (one of the priority regions), where it defined the different pressure zones within the forest area according to accessibility from the fuelwood gatherers' perspectives and to the spatial distribution and density of fuelwood users.

The results – in terms of the identification of priority areas or fuelwood "hot spots"– have been incorporated into national statistics by the National Forestry Commission, which plans to launch a program of efficient wood burning cook stoves and multi-purpose energy plantations for those areas.

In this multi-scale analysis, WISDOM demonstrated its potential as a national strategic planning tool, as well as an operational tool for sub-national planning.

Thematic maps of policy and scientific relevance, such as net CO_2 emissions derived from fuelwood use, were also produced using WISDOM.

Slovenia

WISDOM was used in Slovenia to assess the potential of wood energy as an economically and environmentally sound alternative or complement to fossil fuels and to identify the zones most or least suitable for the development and implementation of wood energy projects.

WISDOM Slovenia was based on the integration into a geographic information system of the rich but fragmented information on wood energy planning available in Slovenia. To fill a critical information gap, a national level survey of non-forest woody biomass was carried out using available aerial photos and field sampling.

The analysis was based on 2 696 administrative units (Cadastral Communities), which represent the basis of Slovenia's territorial structure and a reference for both forestry and demographic statistics. The integration and elaboration of data from existing statistics (forestry, census, land use, etc.) and from the new survey of woody biomass outside forests resulted in a rich data set of over 100 parameters related to woodfuel consumption and supply. In addition, point data revealed the distribution of

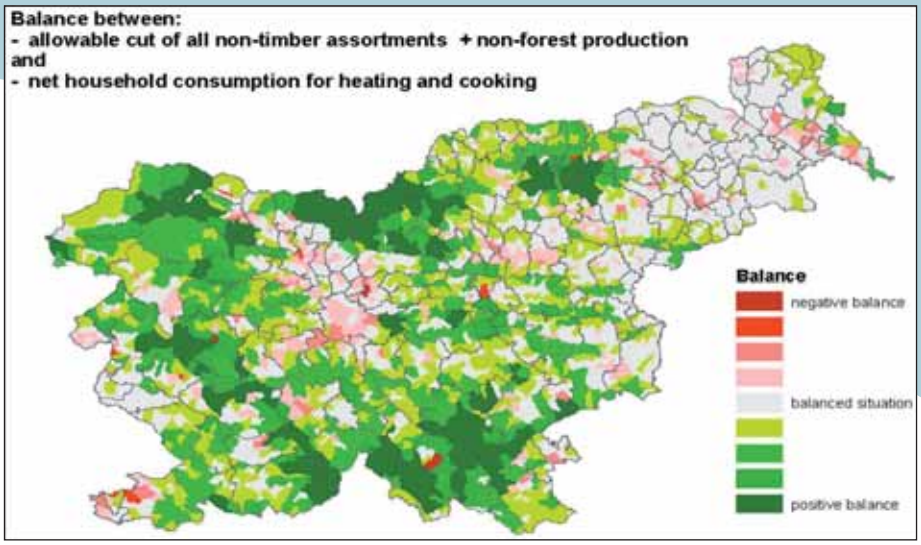


FIGURE 1.
Fuelwood potential

settlements but also wood industries, biomass plants, district heating systems and associated parameters.

WISDOM gave a holistic vision of the wood energy sector, and its national-level aggregation of key parameters constituted the main input into the Slovenia Wood Energy Information System. As a planning tool, the value of WISDOM derives from its spatial characteristics. In fact, its fine spatial and thematic resolution makes it a flexible tool to represent Slovenia's fuelwood production/consumption situation in different locations and, in synthesis, for the definition of priority areas under a wide variety of perspectives.

One such aspect is the potential sustainable production of fuelwood shown in Fig 1, which combines the allowable cut of low-quality wood suitable for energy use (nowadays largely under-exploited), the estimated fuelwood production in non-forest lands and the current household consumption of fuelwood. The overall balance is estimated to be over 1.1 million m^3 of wood per year. The darker green areas indicate the locations with highest woody biomass surplus, where new wood energy systems could be located.

In another example of priority zoning shown in Figure 2, three aspects that influence the future development of this sector were combined to identify the areas of the country where specific action may be implemented. In this case, the high priority areas are based on the concurrence of high property fragmentation of forest estates, high fuelwood productivity (from forests and non) and a high fraction of forest stands requiring sylvicultural treatments (i.e. thinning).

WISDOM Slovenia will serve as a support, and basis, for the preparation of a new National Programme and Action Plan for use of wood biomass, which should be prepared by the end of 2005.

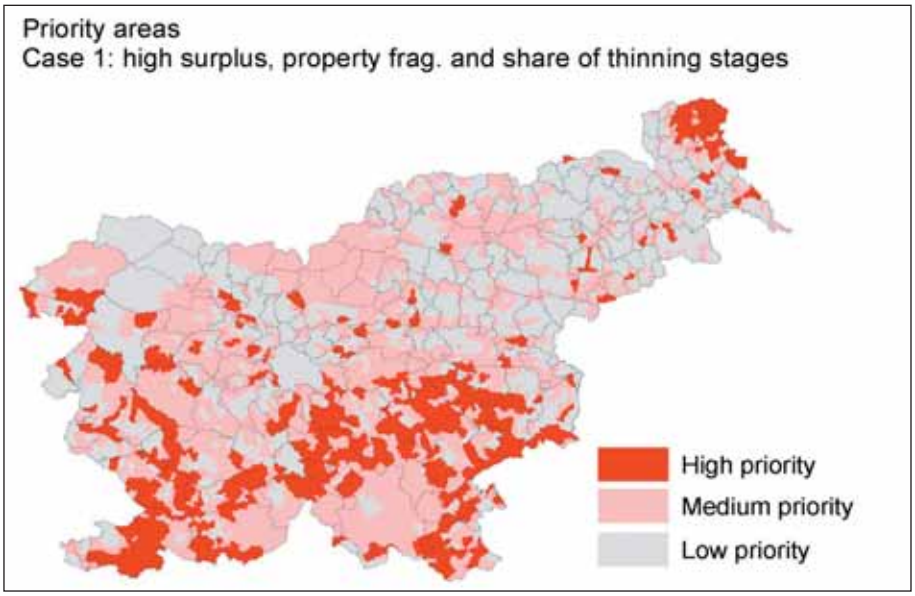


FIGURE 2.
Priority zoning

For additional information:
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