FOREST LAND RESOURCES

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Contents

Summary

Forests are home to a great variety of animal and plant species. Traditionally, the foremost function of forests is considered to be their use as a regenerative source of timber and other products, such as resin, cork, mushrooms and berries: this is known as the raw-material function of forests. Besides their economic role, forests offer many other benefits which could be regarded as useful to society. Forest ecosystems remove air pollutants and emit oxygen, cycle nutrients, provide human and wildlife habitat, maintain watershed functions and biodiversity, sequester atmospheric carbon, provide employment, moderate weather extremes and impacts, generate soil, and contribute aesthetic beauty. Increasing leisure time, for instance, has made the recreational use of forests important socially. Environmental aspects associated with forests—protective functions, like biodiversity, local and regional climates, water and soil protection—are

highly valued. In mountain areas, avalanche control and protection against erosion are additional functions. Over the last decade of the twentieth century, the role of forests in the fixation of carbon oxides has grown in importance. Because forests generally perform several of these functions, their value is best illustrated by their multifunctionality. Due to this multifaceted role of the resource, sustainable forest management needs decision-making which recognizes and incorporates diverse ecological, economic and social processes, a multitude of variables, and conflicting aims and constraints. That means, for example, that in a forest essentially providing soil protection but which is also important for biodiversity and recreation, selective timber harvesting can be performed without any loss of the forest functions.

1. Introduction

The area of the world's forests, including natural forests and forest plantations, was estimated to be 3.454 million hectares in 1995, covering about a quarter of the world's land surface, excluding Greenland and Antarctica. More than 60% of the world's forests are located in seven countries, namely Russia, Brazil, Canada, the US, China, Indonesia and the Congo, and about 55% of them are located in developing countries. The world's forests are almost equally divided between tropical/subtropical forests and temperate/boreal forests. Only about 3% of the world's forests are forest plantations, and the remaining 97% are natural or semi-natural forests. Less than 40% of forests globally are relatively undisturbed by human action. The great majority of forests in the industrial countries, excepting Canada and Russia, are reported to be in "semi-natural" condition or converted to plantations.

Global forest cover has been reduced by at least 20% since pre-agricultural times, and possibly by as much as 50%. Between 1980 and 1995, the extent of the world's forests (including both natural forests and forest plantations) decreased by some 180 million hectares. There was a net increase of 20 million hectares in developed countries, but a net loss of 200 million hectares in developing nations (FAO 1997, *State of the World's Forests 1997*). Although the global loss of forests is still very high, the figures from inventories suggest that the rate of deforestation might be slowing.

The net increase in forest area in developed countries is largely a result of afforestation and reforestation, including natural regrowth on land abandoned by agriculture. This increase has more than compensated for the clearing of some areas of forest in various developed countries, mainly for urban expansion and infrastructure development.

The major causes of change in forest cover in the tropics appear to be expansion of subsistence agriculture in Africa and Asia, and large economic development programs involving resettlement, agriculture and infrastructure in Latin America and Asia.

The greatest threats to forest extent and condition are conversion to other forms of land use, and fragmentation by agriculture, logging, and road construction. Logging and mining roads appear to lead the way in opening up intact forest to pioneer settlement and to increases in hunting, poaching, fires, and exposure of flora and fauna to pest outbreaks and invasive species.

Information on the status of the world's forests—their extent, location, type and condition—is basic to efforts to improve forest management worldwide and for assessments of the ability of forests to provide the goods and services demanded of them.

2. Forest Resources

Talking about "resources" makes sense only when human interest gave them that role. Thus, forestland resources are all those attributes of forests that have any kind of present or potential value to people. The available resources are continuously changing because culture and knowledge change and evolve. Some resources become obsolete, and on the other hand, some resources emerge and develop with new needs and knowledge.

The UN Conference on Environment and Development held in Rio de Janeiro in 1992 has given forests an increasingly important role in the context of sustainable development and environmental conservation. The concept of sustainable forest management has been recognized as a fundamental guiding principle by all participating countries.

One of the main principles of the Chapter 11 of Agenda 21 (combating deforestation) promotes the sustainability of the multiple roles and functions of all types of forests, forestlands and woodlands.

3. Forest Products

3.1 Wood and Energy from Forests

3.1.1 Wood

Forests and woodlands currently generate products that form the basis of an important integrated industrial sector based on wood as a natural renewable resource. Wood harvested from forests is consumed mainly for the production of sawnwood, fiberboard, chipboard, veneer, or pulp and paper.

Generally good global data on industrial roundwood production by country are published annually by international organizations such as the Food and Agriculture Organization (FAO) or the International Tropical Timber Organization (ITTO). Production is recorded by value and by volume in cubic meters per year. Forest inventory data, recording annual rates of tree growth, tree mortality, size and age of stands, and harvest rates, are generally available for industrial countries, but are incomplete and must be estimated for many developing countries.

Almost one and a half billion cubic meters of roundwood are harvested annually. Harvesting has risen by nearly 50% since 1960. There are also more than 1.8 billion cubic meters of wood consumed from forests as fuelwood or charcoal.

The overall patterns of production and consumption of wood products are very different between developed and developing countries taken as a group.

Developed regions dominate heavily in production and consumption of industrial wood products. They account for 70% of the total world production and consumption of industrial wood products. In most industrial countries, net annual tree growth exceeds harvest rates.

Many developing countries rely on timber for export earnings, but in many regions, more trees are removed from production forests than are replaced by natural growth. It is important to notice that developing countries produce and consume about 90% of the world's fuelwood and charcoal, which are the major household energy sources in many of these nations.

FAO has projected that demand for fuelwood is expected to continue to increase at a rate of about 1.1% per year between 2000 and 2010, while demand for industrial roundwood will increase by 1.7% annually driven both by population increases and economic growth. In 2010 roundwood production is expected to rise over 1.8 billion cubic meters. Fiber scarcities are not expected in the foreseeable future. Factors that will influence the ability to meet the increasing demand include:

- The continuous improvement in the management of forests for wood production.
- Increased sources of wood such as trees outside forests, particularly on agricultural land, and plantations. The latter currently supply more than 20% of industrial wood fiber and this share will increase in importance in the future.
- Technological improvements in wood processing which will increase the efficiency of use of raw material.
- The increasing use of recovered paper, wood residues and fibers from "non-forest" species (e.g., rubber, oil palm). This is expected to rise globally to over 500 million cubic meters.

While these factors are assumed to allow supplies to meet the demand globally, the situation will vary among countries and will depend greatly on market conditions, government policies, technological improvements, and human resource development.

Trade will continue to help balance wood deficits in one place, with surpluses elsewhere, and this contribution is expected to increase. Harvesting from natural forests will also continue, leading to younger and more uniform forests.

Certification of sustainable forest production remains a high-profile but complex and often controversial issue. Various international, regional and national certification systems have been developed. The area of forests certified has increased considerably in the past two years, although significant volumes of certified products apparently are not yet entering the market. It is unclear whether the demand for certified wood will increase and whether certification will, in fact, significantly contribute to improved forest management where deforestation is greatest, i.e., in developing countries.

3.1.2 Energy

As has been stated above, much of the wood harvested in the world each year is used for energy production. Some 63% of the wood harvested in 1995 was used as woodfuel. While in developed countries only 33% of the wood produced was used for energy purposes, in developing countries woodfuels accounted for 81% (91% in Africa, 82% in Asia, and 70% in Latin America) of the wood harvested. The figures illustrate the importance of woodfuels in total wood production, and their relevance for the forestry sector.

Woodfuels consist of fuelwood, charcoal and black liquor (a by-product of pulp and paper production). Woodfuels account for an estimated 7% of the world's total energy supply. In developing countries, however, where fuelwood is a major source of fuel for household use, the average share of woodfuels in total energy use is 15%. The use of fuelwood is concentrated among the poor, especially in countries of sub-Saharan Africa, Central America and continental Southeast Asia. In 34 developing countries, fuelwood and charcoal supply more than 70% of national energy demand. Fuelwood collection is responsible for much local deforestation in parts of Asia, Africa, and Latin America, although two-thirds of all fuelwood may come from roadsides, community woodlots, and wood industry residues, rather than from forest sources. While fuelwood is the predominant form of wood energy used in rural areas of developing countries, charcoal remains a significant source of energy for many African, Asian and Latin American countries, mainly for urban households.

Woodfuel consumption in developing countries has increased steadily along with growth in population, although the share of woodfuels in the national energy balance of these countries has progressively diminished as a result of the increased use of fossil fuels such as oil, coal, and gas. That is the reason why human dependence on woodfuel in developing countries is largely inferred from information on availability and price of other energy sources.

In industrial countries most wood energy is derived from industrial wood processing residues. Nevertheless, woodfuels account for only 2% of the total energy used in these countries. This figure, however, conceals great differences in use at the national and subnational levels. For example, in Europe, relatively small quantities of woodfuel are used in Belgium, Germany, and the UK, while large amounts are consumed in the densely forested countries of Austria, Finland and Sweden. In Finland, wood energy supplies an estimated 17% of the national energy demand. Black liquor accounts for a high proportion of the total woodfuels used in most developed countries; it is used by large pulp and paper industries to meet their needs for heat and power.

Fossil fuels have continued to fulfill most of the increased demand for energy in most developed countries. Actions by many countries to deregulate, liberalize and privatize energy markets over the last two decades of the twentieth century have stimulated competition among energy suppliers and have presented new opportunities for other, non-fossil fuel, energy sources. Some countries have also raised taxes on fossil fuels, prompting decreased use of these fuels, and in some cases increased use of other energy sources. These changes in energy policies have favored the potential of woodfuels to

become more competitive with fossil fuels in certain situations, both for economic reasons (because fast-growing fuelwood plantations, thinnings from timber plantations, and residues from forest industries, serve as locally available and inexpensive sources of energy), and for environmental reasons (woodfuels are a renewable energy source with potential to mitigate global warming).

The European Commission's recently adopted "White Paper" gives special attention to bio-energy (including both woodfuels and agricultural energy crops), and constitutes a framework for the future development of renewable energy within the 16 European Union countries. In 1994, the Finnish Government established objectives for the promotion of wood energy with the aim of increasing its use by 25% by 2005. Similar initiatives are being adopted in other countries.

In Denmark, 50% of households are on district heating fuelled by biofuels. The Netherlands has launched a special investment programme for the promotion of power and heating plants using woody biomass as fuel. The Canadian Forest Service began an initiative in 1995 to facilitate the introduction of bio-energy (mainly wood energy) for power generation in the remote First Nations communities in northern Canada.

The purpose was not only to provide more energy to these isolated areas but also to create employment and foster self-reliance of the indigenous communities. Several successful bio-energy programs have been established in developing countries such as Indonesia, Malaysia, the Philippines, Thailand, Chile, Nicaragua, and Honduras.

In addition, the development and adoption of more efficient combustion devices; new biomass energy technologies, and new technologies for the production, transport, handling and storage of woodfuels are improving the economic feasibility of wood energy, and are helping to make woodfuels considerably more cost-competitive energy sources, particularly in countries that are heavily forested and have well-established wood processing industries. In Sweden, the price of energy generated with fossil fuels doubled between 1980 and 1997 because of increased taxes on fossil fuels, whereas that of wood energy remained stable.

The Framework Convention on Climate Change has recognized the potential role of woodfuels as part of a substitution strategy to reduce emissions of CO_2 from fossil fuels. The Kyoto Protocol of the FCCC, if ratified, has the potential to play a catalytic role in the further development of wood energy.

In response to these recent developments, both the forest and energy sectors are likely to give increased consideration to woodfuels in the future. Improved planning will depend in part on a sound information base, but at the beginning of the twenty-first century the global information on woodfuels is extremely weak.

Continued efforts to improve information collection and analysis will be essential, as will be further assessment of the relative costs and benefits of woodfuels, fossil fuels, and alternative sources of fuels, as economic conditions and environmental commitments evolve.

3.2 Non-Wood Forest Products

While wood is the predominant commercial product from most forests, increased attention is being paid to the actual and potential economic role of non-wood forest products (NWFPs), whose main importance currently lies in their contribution to household and local economies, particularly among the poor in developing countries.

Meeting the needs for wood and non-wood forest products, while at the same time fulfilling demands for environmental and social services from forests remains a major challenge.

Recent regional and international fora have addressed the needs to conserve non-wood resources while ensuring local peoples' equitable access to and use of the resources, to improve market information, and to develop appropriate and fair pricing mechanisms for NWFPs (including royalties on intellectual property rights).

People have innumerable uses for the many plant and animal resources found in forests, and although several species have been domesticated and integrated into agricultural production schemes over the centuries, others, referred to as non-wood forest products, continue to be gathered from wild sources. In many parts of the world NWFPs provide food (bushmeat, mushrooms, fruits, nuts, animal fodder), construction materials, raw materials for different purposes (cork, resin, rubber), fibers (bamboo, rattan, palm leaves), medicines and other health care products, and goods of religious or spiritual significance.

While the bulk of these products are gathered for household use or for sale in local markets, some enter national and international trade in significant quantities. NWFP production is often characterized by a large number of suppliers, each with a small scale of operation and a lack of industrial development. A global overview of major NWFPs, summarizing known information about their production status, value and trade and factors affecting their development was provided in the FAO's *State of the World's Forests 1997*. Various issues related to NWFPs are currently being discussed in regional and international fora. One issue relates to the need to ensure the conservation of forest-based biological diversity while still ensuring equitable access to forest resources (including NWFPs), particularly by local people. The development of appropriate and fair pricing methodologies for NWFPs (including royalties on intellectual property rights) is another need. Difficult access and/or insecure tenure rights to the resources, and the absence of relevant market information, including fair market access, are among the key constraints faced by the subsector.

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Biographical Sketches

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