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**FOREST PRODUCTS UTILIZATION AND SUSTAINABLE DEVELOPMENT**

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**Abstract**

Goods and services from forests can contribute in various forms to sustainable development, such as through provision of subsistence for rural communities living in or around the forests, through generating employment and income in rural and urban areas, and through direct contributions to the GDP in the form of industrialised wood, fuelwood and non-wood forest products production and trade.

This paper analyses the role, opportunities and challenges of wood and non-wood forest products utilisation in sustainable development. It addresses wood and non-wood forest products' contribution to poverty alleviation, trends in wood utilisation and trade, as well as possible socio-economic and environmental impacts of wood products' substitution.

A brief overview of recent wood products industry trends affecting sustainable development is provided. Environmentally friendly forest harvesting practices (reduced impact logging) and efficient processing technologies are mentioned as steps taken by an increasing number of forest enterprises world-wide.

The document also highlights some key aspects related to the role of forest products utilisation and climate change, as potential sinks of one of the major green house gases, as substitutes for energy intensive materials and as substitutes for fossil fuels.

Finally, this presentation points out steps taken by the international community to better incorporate the sustainable use of forest resources into national and international development objectives.

*Keywords: forest products, wood and non-wood forest products, wood fuels, sustainable development, people-centred forestry, climate change*

## 1 Introduction

Forests and forest products are often prominent topics in the international agenda dealing with sustainable development. Loss of forest cover and forest degradation, forest products trade, contribution of forestry to GDP and employment, the role of forests and wood products for the mitigation of climate change, the environmental consequences of the substitution of conventional products for wood products, or the relation of forests, forest products and poverty alleviation are some of the specific topics, in which the interconnection of forest products and sustainable development is very relevant. This paper attempts to analyse some of the mentioned interconnections between forest products utilization and sustainable development, as a contribution to the formulation of strategies for the sound use of wood.

## 2 Role of forests and forest products within the discussion on sustainable development

Wood is the most important biogenic renewable material utilised by mankind with forests covering about 30 % of the earth land surface<sup>[1]</sup>. The role of forests in many natural global processes (carbon cycle, water cycle, etc.), is the most important contribution of forests to global biodiversity and to human socio-economy. When analysing and discussing strategies for the sound use of wood and its contribution to sustainable development, the following aspects related to wood as raw material should be considered:

Forest and trees:

- are the largest contributors to biodiversity;
- play an important role in the global carbon cycle
- they can contribute to, but also mitigate greenhouse gas emissions and thus climate change)
- protect watersheds and soils;
- provide wood as the most important renewable material used by mankind;
- provide fuelwood as the most important renewable energy source, particularly in the less developed regions of the world;
- contribute to livelihoods of indigenous people;
- provide a variety of other non-wood forest products, from (complementary) vegetal food and animals, medical plants, fodder for animals, fibres, tools to other items of daily life (e.g. [1]);
- are sources of income for social groups affected by poverty, either through direct trade of forest products (wood and non-wood) or through employment opportunities in forest companies;
- can constitute an alternative income or capital for farmers;
- represent an important landscape element;
- can have recreational functions;
- can have spiritual functions;
- could be a way of land-use competing with other activities, e.g. agriculture;
- are affected by industrial exploitation (species composition, age, structure, etc.).

### **3 Forestry contribution to GDP**

The trends of the forestry sector contribution to GDP is not only an indication of the relative economic importance of the sector in national economies or international trade, but it can also provide information about the development patterns of the primary and value added industry activities. Globally, forestry contribution is estimated to be a range between 1 and 4 percent, considering primarily wood and wood products and depending on the applied methodologies. Comparing trends of the last 20 years using the same methodology, preliminary results indicate that forestry share of GDP has decreased from 2 to 1,3 percent.<sup>[2]</sup> This, in spite of the increased value in absolute terms of forest products production. One of the reasons is the general decline of forest products export unit prices, in particular for solid wood products. On the other hand, this trend shows that the forestry sector has developed at a slower pace than other competitive sectors, partly substituting forest products.

Knowledge about the contribution and trends of GDP to forestry can assist planners and policy makers in their efforts to shape their country development strategies and plans of action. Despite the importance of GDP as a economic and development indicator, there are serious limitations in many countries and at international level, to estimate the forestry contribution. Some of these limitations relate to the lack of reliable statistics and other information. For example, lack of:

- reliable price statistics;
- processing conversion factors;
- reliable statistics on value-added products;
- data base on major non-wood forest products (rattan, bamboo, medicinal plants)
- reliable statistics on fuelwood production, consumption and trade

Therefore, additional efforts are required at national and international level to improve the methodologies, collection, analysis and reporting on data needed to determine the forestry contribution to GDP.

Other aspects related to the role of forest products and sustainable development should be analysed in relation to the biophysical and socio-economic context. The contribution of forestry can differ and be manifold. The following considerations should will highlight particular aspects of forest products and sustainable development:

- Forests, trees and poverty alleviation;
- Environmental comparison of wood products with their substitutes;
- Wood products and climate change.

The analysis of these aspects should provide additional elements to recognize the role forest products can or should play in making progress towards sustainable development.

### **4 Forest resources and poverty alleviation**

Around the globe [2]:

- 60 million indigenous people living in the rainforests of Latin America, Southeast Asia and West Africa depend heavily on forests;
- 350 million people living in, or next to, dense forests rely on them for subsistence or income;

- 1.2 billion people in developing countries use trees on farms to generate food and cash.

As the world population grows, some people, urban or rural, remain isolated from the global economy. While trade, technology and information systems become more global, the world's natural forest area is declining—despite and because of the above-mentioned facts. Further, global climate changes are expected to have drastic impacts on forests and agricultural systems, affecting in particular the most vulnerable communities. This will have major implications for strategies aimed at achieving sustainable development in general, and poverty alleviation in particular.

On one hand, the world's rapid pace of change means increased challenges for the poor, but on the other hand, it can also provide new opportunities for improved livelihoods based on sustainable use of natural resources. If specific actions are taken, other than the traditional forest products producers, traders and workers can participate in local initiatives that offer employment and income.

At the conclusion of the World Food Summit (WFS) held in Rome in November 1996, the international community committed itself to eradicate hunger in all countries with the target of reducing by half the number of undernourished people by no later than the year 2015. The fundamental importance of national production and distribution of food, sustainable agriculture and rural development, fisheries and forestry, in achieving food security was reaffirmed at the “WFS five years later” and at the World Summit on Sustainable Development in Johannesburg in September 2002.

Forests and forest products “can better contribute” to achieve this goal in various ways. Products and services deriving from forest resources can contribute to poverty alleviation, generating employment and providing income opportunities, also for the poor; and thus they should play a more visible role to development objectives of policy makers.

What people can obtain from forests and trees to improve their livelihoods:

**Subsistence goods** such as fuelwood, medicines, wood for building, rope, bushmeat, fodder, mushrooms, honey, edible leaves, roots, fruits;

**Cash income through the sale** of the above goods, arts and crafts, timber and other wood products;

**Indirect benefits** such as land for other uses, social and spiritual sites, savings, environmental services, including watershed and soil protection, and biodiversity conservation.

Forests resources can thus directly contribute to improved livelihoods and can complement other sectors to progress towards poverty reduction such as food production, education and primary health care. The challenge is to support specific changes that will lead to a greater role for forest resources and forest products in the livelihoods of the poor.

A policy framework is required, which unleashes the poverty alleviation potential of forestry and forest products. It should facilitate poor people to gain access to and manage forest resources according to their needs: people-centred forestry puts people at the centre of development [3-6], and gives them the rights and means to manage forests and tree resources. FAO, in collaboration with DFID and other partners has

detected 4 areas of action for a people-centred approach to sustainable forest management [7]:

### **1. Strengthening rights, capabilities and governance:**

- support the poor' own decision-making power by fostering participatory forest initiatives that provide capacity building, strengthening of group organisations and local institutions;
- strengthen forest rights of the poor and the means to claim them, such as clear tenures rights, joint forest management agreements, long-term concessions, household forest allocations, etc.;
- recognise links between forestry and local governance such as representation, transparency, accountability, equitable taxation and increase civil society roles.

### **2. Reducing vulnerability**

- Make safe nets not poverty traps, as forests constitute vital buffers absorbing agricultural risk and reducing vulnerability;
- Support tree planting outside forests to satisfy subsistence needs to generate additional income;
- Cut the regulatory burden on the poor and make regulations affordable;
- Reduce unfair obligations in forest management, especially for small-scale forest managers.

### **3. Capture emerging opportunities**

- Remove the barriers to market entry of small-scale producers of timber and non-timber products, e.g. costly controls when harvesting, transporting and selling such products (in contrast to subsidies to large-scale producers);
- Base land-use decisions on true value of forests; this includes to take into account the opportunity costs of renewing forest resources, or the role of rural people in producing and providing forest goods and services;
- Ensure that markets for environmental services, such as carbon storing, watershed protection, or biodiversity conservation, benefit the poor;
- Support associations and financing for local forest businesses to improve the capacity of local forest businesses to access markets and match supply to demand.

### **4. Working in partnership**

- Simplify policies and support participatory processes, cutting the trends of increased forestry laws and regulations as well as over-structured and under-resourced forest departments to implement them;
- Promote multisectoral learning and action to poverty reduction;
- Enhance interagency collaboration to co-ordinate national development programs and strategies;
- Make NGOs and the private sector partners in poverty reduction.

For poverty alleviation, the focus can not only lie on forestry and forest products, given the increasing population and decreasing forest surface. Improved agricultural production and processing practices can be further vital factors for the conservation and sustainable management of forests as sources of wealth and welfare of the poor.

## 5 Environmental comparison of wood products with their substitutes

In Europe and Northern America, environmental concerns have more and more entered the public discussion and thus also the marketing strategies of many producers. Since the late 80s, industrial sector exposed to public environmental concerns, such as the cement, aluminium or plastics industries, have systematically assessed and communicated the environmental relevance (and advantages) of their products. The forest and wood based industries were much more reluctant in accepting quantitative analyses of their energy and mass flows, because of the common judgement that wood is such an inherently environmentally sound material that no quantitative analysis is needed to influence consumers' perceptions. This opinion—although correct if the sustainably managed resource is considered—neglected the fact that most modern wood products are combinations of different materials. Adhesives, paints, impregnation agents, connectors, fasteners, plastic overlays and other types of secondary products are used to produce the high-quality and reliable wood-based products demanded by the market.

To get a clearer view on isolated negative impacts of some wood-based products, such as VOC emissions of paints, formaldehyde emissions from adhesives, toxic emissions of preservatives, many initiatives have been undertaken—mainly in Europe and Northern America—to assess the environmental relevance of wood products compared to conventional products (e.g. [8-19]).

These comparisons are based on a methodology called life cycle assessment (LCA). In LCA, the material and energy flows related to the production, use, and disposal/recycling of a product “from cradle to grave” are inventoried and assessed based on their environmental relevance.

Up to now, wood-related studies cover comparisons of windows, railway sleepers, floorings, electricity poles, doorframes, paper, constructive elements in landscape architecture, roof and wall constructions, insulation materials, etc.

The results of these studies can be summarised as follows:

- Wood products tend to have environmentally favourable profiles, compared to functionally equivalent products of competing materials;
- Fossil fuel consumption, the potential contributions to climate change and quantities of solid waste are lower for wood products in many cases;
- Impregnated wood products tend to be seen more critically in relation to toxicity issues than their substituting products;
- Incineration of wood products can lead to higher acidification and/or eutrophication effects than conventional products, although thermal energy can be recovered;
- While composite products made e.g. out of fibreboard or particleboards make use of a greater portion of round log raw materials than solid wood products, the embodied energy associated with production of wood-based composites is generally quite high. The energy generation for the production of these products can be significant from an environmental point of view.

Industries based on non-renewable raw materials have become increasingly aggressive in recent decades with respect to challenging traditional wood markets, not only with environmental arguments. This tendency is likely to continue, and self-righteousness of the wood industry related to the environmental relevance of their products would be misconceiving actual market challenges.

## 6 Carbon sink and substitution effects of wood products

In the context of the United Nations Framework Convention on Climate Change (UNFCCC; 1992) and the corresponding Kyoto-Protocol (1997), forests, timber and wood products have appeared in a novel perspective.

The forest sector can contribute towards stabilizing green house gases (GHG) in the atmosphere and thus help mitigating climate change in three ways:

- Reducing or avoiding greenhouse gas emissions;
- Sequester carbon;
- Substitute carbon.

Table 1 shows a sample of potential mitigation activities in land use, land-use change and forestry (LULUCF); not all of them have been accepted under the Marrakech Accords.

Project type	Activities
<u>emission avoidance</u>	<ul style="list-style-type: none"> <li>• <u>Forest conservation, reduction of deforestation</u></li> <li>• <u>Lengthening rotations and reducing annual cuts</u></li> <li>• <u>More natural, uneven-aged, selective forest management</u></li> </ul>
<u>carbon sequestration</u>	<ul style="list-style-type: none"> <li>• <u>Revegetation</u></li> <li>• <u>Afforestation and reforestation</u></li> <li>• <u>Agro-forestry</u></li> <li>• <u>conservation agriculture, soil management</u></li> <li>• <u>Enhance carbon stores in wood products (mainly in long-lived products)</u></li> <li>• <u>Improved cropland and grazing land management</u></li> </ul>
<u>carbon substitution</u>	<ul style="list-style-type: none"> <li>• <u>Fuel switch to C-neutral, renewable bio-energy</u></li> <li>• <u>Switch to wood energy from sustainable sources</u></li> <li>• <u>Increased use of wood substitutes</u></li> </ul>

Table 1: Project types and activities for the LULUCF sector. ([27.])

As an instrument aimed primarily at reducing emissions of GHG in an efficient way, the Kyoto Protocol defined three flexible mechanism; one of them, the Clean Development Mechanism (CDM), includes sustainable development in its dual objectives. Through the CDM, industrialised countries can fulfil a certain percentage of their commitments through carbon offset projects, which also promote sustainable development in the "host countries". In the Marrakech Accords (2001), only afforestation and reforestation have been accepted as eligible activities in LULUCF under the CDM. Currently, definitions and modalities for these activities are being discussed. Decisions will be taken at COP 9 in Milan, Italy, at the end of 2003.

That forests can remove carbon from the atmosphere and that bio-fuels, e.g. wood-fuels from sustainable forest management can substitute fossil fuels is recognised, even though methodological and technical questions remain. That a larger pool of wood products also helps to mitigate climate change is less well known. However, w

ood products, particularly those with a long life cycle, or those with a high turnover rate and widespread use, may play multiple roles.

**Wood products as carbon sinks:** Carbon will remain stored in wood products for their life span.

**Substitution of non-wood products:** stimulating use of wood products, e.g. through fiscal policies, may substitute high-energy non-wood products, e.g. cement, glass, steel, aluminium. Wood products tend to require considerably less energy than comparable non-wood products; therefore, less carbon is emitted for a certain application.

**Substitution of fossil fuels via wood and bio-energy from scrap lumber after its service life:** waste wood can substitute fossil fuels, if harmful by-products of combustion are avoided.

**Fossil fuel use during the life cycle of wood products:** Wood products require some energy during production, distribution, maintenance and disposal, e.g. fertilizers, chain saws and skidders, gas, lubricants, glues and coatings. Thus, some greenhouse gases are emitted during production.

Ample research on the role of wood and wood products in mitigating climate change is available( [20-27]). A recent study for the construction sector shows, that the sink capacity of lumber is of relatively subordinate importance, given the balance between forest products and carbon stored in the forest and CO<sub>2</sub>-emissions over the life cycle of lumber ([21]). Furthermore, the sink in wood products from a fixed area of sustainably managed forests can only be increased up to an equilibrium state which is reached, when the decay of wood products just counteracts new additions to the carbon pool. Much more important in the long-term are continuing carbon savings related to the substitution of high-energy materials, and—most important— the effective and efficient recovery of thermal energy from scrap wood after its useful life.

## **7 Strategies for a sustainable use of wood**

Wood is an important raw material globally and will almost certainly be of vital importance in the sustainability equation. Current substitution trends of wood products, the steadily increasing standing volume in temperate and boreal forests, the declining forest areas, in particular in tropical countries, as well as the close relation of rural livelihoods with forests, mainly in the tropics and subtropics, are increasing challenges for the forestry and in particular the wood products sector. The following strategies might help to enable and consolidate the role of forestry and wood products on our way to sustainable living patterns.



### **7.1 Sustainable forest management**

With regard to sustainable forest management practices:

- Provide an equitable long-term access, use and tenure rights for people living in and around forest resources;
- Continue efforts to increase national capacities in the development and implementation of forest management plans;
- Strengthen technology transfer in forestry related activities, such as harvesting, processing, trade and marketing of forest products;
- Develop, use and promote the commercialisation of a variety of wood and non-wood products, including other environmental and social services of forests;
- Develop and promote agroforestry systems

### **7.2 Sustainable use of non-wood forest products**

With regard to the role of non-wood forest products:

- Finalize and test the development of methodologies for the NWFP resources assessment;
- Continue progress in the harmonization and/or elaboration of terms and definitions of NWFP;
- Promote and investigate the production and use of non-wood forest products and their equitable redistribution of benefits;
- Improve statistical information on the production, consumption and trade of NWFP

### **7.3 Wood and wood-based products**

With regard to wood and wood-based products:

- Continue development of wood and wood-base products that are technically sound, functional, cost-effective and with low maintenance requirements (“competitive products”);
- Reduce embodied energy and overall life cycle negative environmental impacts of wood-based products;
- Improve service life (or use span) as aesthetic, functional products with low maintenance needs and easy reparability;
- Improve disassemblability of wood-based products, aiming at maintaining the incineration potential and better substitute fossil fuels;
- Improve recycling technology and systems for reusing materials (under consideration of wood availability and market forces);
- Develop production processes suitable for processing increased proportions of juvenile wood in fast grown species and in small diameter logs;
- Develop technologies for using agriculturally derived fibre alone and in combination with wood to form structural and non-structural composite materials;
- Strengthen ongoing research and associated technology transfer to ensure continuous improvement in wood production, conversion efficiency, product performance, and environmental efficacy;

- Investigate structural and biophysical properties of lesser used species (and especially lesser used tropical species);
- Characterize wood and other bio-based materials to determine fibre qualities and chemical nature;
- Provide easily understandable technical information for architects and other decision-makers to prevent sub-optimal utilization of wood.

#### **7.4 Institutional framework**

The following points should be considered when redefining the institutional framework of forestry and forest products, including research needs:

- Reinforce and build capacities of the forest administration at national level;
- Provide support for the development and implementation of national forest programmes;
- Promote the application of a people-centred approach on forest management;
- Provide financial access to small-scale entrepreneurs for the development of market niches for wood and non-wood forest products in rural areas;
- Foster cross-sectoral approach to achieve development objectives<sup>1</sup>;
- Continue the development of instruments to better recognize the economic value related to the conservation of natural forests, under consideration of environmental and social services;
- Promote the implementation of the instruments provided under the Kyoto Protocol, in particular the Clean Development Mechanism;
- Improve the recognition of watershed and soil protection aspects of forest and trees, in particular in mountainous regions;
- Sustain education efforts to increase the public understanding of forestry and its role in contributing to sustainable development;
- Improve the investigation of socio-economic and environmental relevance of wood products compared to non-wood products in tropical and subtropical countries;

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<sup>[1]</sup> without regions under permanent iceshields

<sup>[2]</sup> GDP including forestry and forest products industry (i.e. sawnwood, panels, pulp and paper mills), without the inclusion of non-wood forest products or fuelwood