

TANNIN SHELTER LAND ROUNDWOOD LAC GRAZING INCOME FUELWOOD GUM AMENITY EMPLOYMENT SAWNWOOD CORK RECREATION MINERALS POLES FRUIT ECOTOURISM AGRICULTURE HURDLES NUTS CARBON SETTLEMENT SLEEPERS BAMBOO BIODIVERSITY DEVELOPMENT PLYWOOD RATTAN HUNTING SECURITY PARTICLEBOARD GAHARU WILDERNESS HERITAGE FIBREBOARD DYES NUTRIENTS PROTECTION VENEERS MEDICINE LVL HABITAT RESTORATION FLOORING BARK MICROCLIMATE FURNITURE FOLIAGE SPORT PULPWOOD WILDLIFE DETOXIFICATION ROOFING OILS BIOPROSPECTING BEAMS WATER EDUCATION JOISTS

# BEYOND SUSTAINABLE FOREST MANAGEMENT:

**OPPORTUNITIES AND CHALLENGES FOR IMPROVING FOREST MANAGEMENT IN THE NEXT MILLENNIUM**

INCOME FUELWOOD GUM AMENITY EMPLOYMENT SAWNWOOD CORK RECREATION MINERALS POLES FRUIT ECOTOURISM AGRICULTURE HURDLES NUTS CARBON SETTLEMENT SLEEPERS BAMBOO BIODIVERSITY DEVELOPMENT PLYWOOD RATTAN HUNTING SECURITY PARTICLEBOARD GAHARU WILDERNESS HERITAGE FIBREBOARD DYES NUTRIENTS PROTECTION VENEERS MEDICINE LVL HABITAT RESTORATION FLOORING BARK MICROCLIMATE FURNITURE FOLIAGE SPORT PULPWOOD WILDLIFE DETOXIFICATION ROOFING OILS BIOPROSPECTING BEAMS WATER EDUCATION JOISTS TANNIN SHELTER LAND ROUNDWOOD LAC GRAZING INCOME FUELWOOD GUM AMENITY EMPLOYMENT SAWNWOOD CORK RECREATION MINERALS POLES FRUIT ECOTOURISM AGRICULTURE HURDLES NUTS CARBON SETTLEMENT SLEEPERS BAMBOO BIODIVERSITY DEVELOPMENT PLYWOOD RATTAN HUNTING SECURITY PARTICLEBOARD GAHARU WILDERNESS HERITAGE FIBREBOARD DYES NUTRIENTS PROTECTION VENEERS MEDICINE LVL HABITAT RESTORATION FLOORING BARK MICROCLIMATE FURNITURE FOLIAGE SPORT PULPWOOD WILDLIFE DETOXIFICATION ROOFING OILS BIOPROSPECTING BEAMS WATER EDUCATION JOISTS TANNIN SHELTER LAND ROUNDWOOD LAC GRAZING INCOME FUELWOOD GUM AMENITY EMPLOYMENT SAWNWOOD CORK RECREATION MINERALS POLES FRUIT ECOTOURISM AGRICULTURE HURDLES NUTS CARBON SETTLEMENT SLEEPERS BAMBOO BIODIVERSITY DEVELOPMENT PLYWOOD RATTAN HUNTING SECURITY PARTICLEBOARD GAHARU WILDERNESS HERITAGE FIBREBOARD DYES NUTRIENTS PROTECTION VENEERS MEDICINE LVL HABITAT RESTORATION FLOORING BARK MICROCLIMATE FURNITURE FOLIAGE SPORT PULPWOOD WILDLIFE DETOXIFICATION ROOFING OILS BIOPROSPECTING BEAMS WATER EDUCATION JOISTS TANNIN SHELTER LAND ROUNDWOOD LAC GRAZING INCOME FUELWOOD GUM AMENITY EMPLOYMENT SAWNWOOD CORK RECREATION MINERALS POLES FRUIT ECOTOURISM AGRICULTURE HURDLES NUTS CARBON SETTLEMENT SLEEPERS BAMBOO BIODIVERSITY DEVELOPMENT PLYWOOD RATTAN HUNTING SECURITY PARTICLEBOARD GAHARU WILDERNESS HERITAGE FIBREBOARD DYES NUTRIENTS PROTECTION VENEERS MEDICINE LVL HABITAT RESTORATION FLOORING

Food and Agriculture Organization of the United Nations



**A summary of recent reports prepared for the FAO Forestry Department as an input to the World Bank Forest Policy Implementation Review and Strategy**

GAHARU WILDERNESS HERITAGE FIBREBOARD DYES NUTRIENTS TANNIN

# **BEYOND SUSTAINABLE FOREST MANAGEMENT: OPPORTUNITIES AND CHALLENGES FOR IMPROVING FOREST MANAGEMENT IN THE NEXT MILLENNIUM**

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## FOREWORD

Since 1990, defining and advocating sustainable forest management has been the centre of an extensive scientific, political, social and economic debate. In communities around the world, people are now discussing concepts such as sustainability, ecosystems and social and environmental benefits. Thus, the currently increased awareness of the fragile nature of our forest ecosystems is both appropriate and timely.

Commensurate with the current interest in forest issues at local, national and international levels, the United Nations Commission on Sustainable Development has embraced sustainable forest management as: “management to meet the social, economic, ecological, cultural and spiritual needs of present and future generations”. Throughout the 1990's, governments have discussed programmes and plans to achieve sustainable forest management. The interest in forests, their conservation and their utilisation has produced a large literature, ranging from highly technical modelling of forest ecosystems to editorial opinions on what should be done next.

It is against this background that, in 1998, FAO and the World Bank agreed that FAO should prepare a concise summary of the state of knowledge and experience concerning sustainable forest management, as an input to the World Bank's Forest Policy Implementation Review and Strategy. The summary has three broad objectives:

- to identify key reasons why the achievement of sustainable forest management remains such an elusive goal;
- to describe what can be done to move in the right direction; and,
- to examine the role for international assistance and development finance in supporting the efforts of countries to promote sustainable forest management.

To undertake this effort, FAO commissioned a series of studies that involved many professionals. Specific studies, which served as major inputs to the findings reported in this document, include:

- descriptions of various efforts to improve forest management across a broad range of forest types and locations, with management objectives ranging from purely timber production towards broader multipurpose forest management (Dupuy et al, 1999; Hagner, 1999);
- examinations of the manner in which evolving forest products markets, trade and emerging technologies are shaping the options for various types of forest management; (Whiteman et al, 1999; Brown, 1999; and Whiteman, in prep); and
- an assessment of the technical, economic and institutional feasibility of sustainable forest management and the conditions under which Governments, FAO, the World Bank and other international agencies can effectively support its implementation (Contreras, 1999).

FAO also hosted an expert consultation to discuss many of these issues (Technical consultation on management of the forest estate: issues and opportunities for international action by the World Bank and FAO, 28 - 29 April 1999, Rome, Italy).

This document provides a synthesis of the most important findings drawn from these studies, from the expert consultation and from the knowledge base and experience of the FAO Forestry Department. It presents a synthesis of views on several aspects of sustainable forest management and, perhaps most importantly, it raises several important questions about the future for sustainable forest management.

The document is structured as follows. The first section provides a thumbnail sketch that describes the important findings of the various studies and presents opportunities for action in a condensed form. The following six sections then elaborate on each of the main issues examined as part of the study

Section two examines what is meant by sustainable forest management and describes how this varies among different societies and how it has varied over time. Section three describes a range of regional experiences in implementing improved forest management practices under a variety of ecological, institutional and economic conditions. The fourth section summarises the outlook for forest resources and forest product markets, trade and technology and examines how these forces are shaping the options available to forest managers. The fifth section examines the ways in which markets, policies and institutions are currently failing to support the implementation of sustainable forest management. It should be noted that the paper focuses primarily on the management of forests that are used for wood production. The question of what, if anything should be done in the vast area of forests that are not used for wood production, is only partially addressed in this paper.

The last two sections identify some responses to these problems and options for FAO, the World Bank and others to consider as they develop strategies to encourage improved management of the global forest estate.

The document advocates careful reconsideration at both the technical and political level of why we are talking about sustainable forest management and what we are likely to achieve in that debate. Several timely questions are addressed: is improved forest management hindered by a lack of knowledge about silviculture and ecosystem management or by other uncertainties; is the pursuit of a consensus definition of sustainable forest management worth the energy currently being invested in this task; and do we already know enough to begin earnestly improving forest management on the ground?

A great deal of the intergovernmental dialogue has focused on the financial, institutional and economic steps that must be taken to achieve sustainable forest management. This document focuses on some practical first steps. Can we identify obvious impediments to the improvement of forest management? If we can identify the impediments, is there anything we can do about them? What are some of the options available to countries? If consensus on sustainable forest management remains elusive should we embrace, instead, a systematic approach to improving forest practices, as a process of continually improving forest management? Is this perhaps a practical alternative to waiting until global consensus is reached on the meaning and measurement of sustainable forest management?

FAO would like to express its gratitude to all the contributors to this paper and to thank everyone that has provided comments on earlier drafts of this work. FAO will continue to explore, with member countries, the ways in which sustainable forest management can be implemented with greater success and to assist with implementation through its technical and normative work programmes. In this respect, we would welcome comments on all aspects of this study from readers.

In summary, I urge you to read this synthesis. It challenges some of our current thinking. Together, let's stretch our imagination to think again about how we can improve forest management around the world to better the lives of this and future generations.

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## THE FINDINGS IN BRIEF

### *The policy environment*

#### **Forest resources**

**Forest resources continue to diminish, while being called upon to produce a greater range of goods and services.** There are many causes of deforestation and forest degradation and they vary by forest type, location and social and economic circumstances. The expected decline in forest resources is not likely to have a significant impact on the total volume of global wood supplies, but may result in scarcity in some locations and for certain grades of roundwood (particularly the higher grades found in the natural forest).

**Forest management for wood production is changing.** Low intensity systems are becoming more common in the natural forest in the pursuit of sustainability. In contrast, the importance of forest plantations for wood production (one particularly intensive system) is increasing.

#### **Forest product markets**

**Markets determine the range of economically viable options for forest management.** There is little scope, now or in the near future, for sustained real price increases in processed forest products. This is because of strong competition from substitute materials and the development of new wood processing technologies that can use recovered paper and small diameter wood.

**Much of the world's natural forest is uneconomic as a source of commercial wood supply.** This is likely to remain true for the foreseeable future. Increasingly, the forest processing industry relies on forest plantations and non-wood sources for raw materials. How far the balance of production shifts from natural forests to other supply sources will depend upon the area of forest that is brought under sustainable management and the effect that this will have on delivered wood costs. It is likely that additional costs associated with sustainable forest management in the natural forest will lead some wood producers to switch to alternative supply sources.

**Pricing policies related to the sale of wood raw material are important determinants for sustainable forest management.** In many countries, the prices charged for standing roundwood are set administratively rather than by the market. These prices are often set too low for a number of reasons. Artificially low prices encourage over-harvesting, discourage efficiency, prevent financial sustainability and generally make it difficult for countries to implement sustainable forest management.

**Markets do not exist for the many social and environmental services that forests provide.** Without regulation or monetary incentives, private sector operators and forest landowners are unlikely to take into account the non-market benefits of forests in their

management decisions. Governments also often fail to account for these benefits when setting their priorities.

## Policies and institutions

**Forestry must make a better case to justify increased financial allocations.** Faced with tremendous problems such as poverty, food insecurity and low incomes, forestry is often given a very low priority. This is also true in many countries where forests have significant non-market benefits and is even true in countries where the forestry sector could potentially be important to the economy. Thus, proposals to implement sustainable forest management must be accompanied by well-articulated and clearly demonstrated real benefits to the nation.

**Institutions are currently weak.** To guarantee that environmental regulations are followed and that the benefits of forest management are shared requires increased transparency and accountability in the governance of the forestry sector. Calls for sustainable forest management will simply go unheeded if the legal, policy and administrative environment do not effectively control undesirable practices.

### *The outlook for sustainable forest management*

## Knowledge and information

**Technical knowledge is not generally a constraint to the implementation of sustainable forest management.** The science of sustainable yield management (management for a sustained flow of wood from the forest) is well developed and tested in many regions. On the other hand, in natural tropical forests there is still some uncertainty about the sustainability of current forest management practices since these techniques have not been tested over several growing cycles.

**Knowledge about how to improve forest management is also widely available.** Implementation of better forest management lags because of uncertainty and disagreement about objectives and the scale and time period, which should be used to measure performance. In some countries, access to available technical knowledge is a constraint. Some nations lack even the most basic databases on which to base their forest management policies and regulations.

## The economics of sustainable forest management

**Sustainable forest management can be profitable, but unsustainable forestry practices are often more financially attractive in the short-term.** Many of the world's forests are already harvested according to principles of sustained yield, including privately owned forests in countries with few regulations. However, over-harvesting for short-term gain is also common, particularly where forest resources are abundant and development pressures are high.

However, sustainable forest management in its broadest sense means more than just simply cutting forests at a level of sustainable yield. It involves reducing the negative environmental impact of forest

operations and a fully participative management process ensuring that stakeholders receive continued social and economic benefits from the forests. This can include indigenous groups living in the forest, local communities living downstream from a forested catchment or future generations. The fulfilment of these additional demands on forest management will inevitably raise costs and lower the profitability of forest operations. The end result is likely to be more concentration and intensification of forest management. Therefore, an increasing share of forest will be un-economic for wood production. This will preserve some forests but it will also lead to increased conversion of some forests to other uses (deforestation).

### **Implications for action**

**Unsustainable forest practices have a visible corollary in redundant and inefficient processing capacity.** In a number of countries, improving forest management is burdened by an industry that employs vintage technologies that are resource wasting and polluting. These industries survive primarily on the availability of abundant cheap large logs. Radical restructuring of the sector and introduction of resource protecting and resource conserving technologies are needed to address this issue. For example, replacing vintage manufacturing technologies with modern equipment would reduce waste and increase the product output per log harvested from the forest. Another example would be to support adoption of technologies that extend the performance and life of wood products. These actions would be likely to temper total roundwood demand and would be encouraged by higher charges for harvesting standing roundwood.

**Over-harvesting is accelerated when ownership of forest resources is unclear.** Owners and managers are more likely to invest in forest management when ownership of the land and forest resource is clear and secure. Uncertainty about tenure and future access to the resource encourages over-harvesting in the short-term and discourages investment. Without control of the land or secured future use of the trees, forest resources are often rapidly liquidated to secure income that can be invested elsewhere. This partly occurs because the returns to reinvestment in the forestry sector are subject to shifting political and social uncertainties.

**Increased costs can not be passed on to consumers.** Due to market forces, it is unlikely that producers will be able to pass any costs of improved forest management onto consumers. Significant markets and price premiums for wood products from forests “certified” as sustainably managed are not likely to exist or persist. However, as noted above, there is already considerable “slack” in many forest charging systems that could cover some of these costs.

**The price outlook limits the scope for long rotation forestry.** The combination of flat real price projections and new wood processing technologies also has an important implication for sustainable forest management strategies that are based on extending the growing cycle. Generally, these strategies anticipate a market premium for the

production of large high quality logs to cover the costs of an extended investment period. While a niche market for select quality logs will always exist, economic forces are working against such strategies and will continue to encourage the production of lower quality fibre over ever shortening growing cycles.

### *Matching action to rhetoric*

**Where are we going?**

**Lengthy pursuit of a consensus definition of sustainable forest management is probably more of an impediment towards implementation than any limitation in our understanding of the ecological and social functions of forests.** The current debate about sustainable forest management encompasses a wide range of economic, social and environmental issues. Scientific evidence may eventually support agreement on some of these issues, new issues will arise and others may become less of a concern. Some issues may never be resolved.

**Perfection is the enemy of improvement!**

**Pursuing a consensus definition of sustainable forest management should not be used as an excuse for inaction.** There are many situations that we know are clearly poor management or at least management that falls below acceptable professional standards. We know that we can do much to “improve” management of the forest estate even if we cannot reach the ultimate “sustainable forest management”. Being less rigorous on the interpretation of this term may help us to unleash a whirlwind of effort to “improve” forest management and begin the journey forwards, even though the final destination is always changing.

### *Implications for development assistance*

**Getting the right overall policy environment is critical to success**

**The most important impact that the World Bank could have would be to use its influence and resources to promote enabling conditions for improved forest management.** Implementation of existing policies and changes of practices supporting sustainable forest management often are resisted by the establishment which enjoyed privileges associated with the custody of a valuable resource. This may require a proactive approach by involved national and international stakeholders. The Bank could have an important catalytic role in this process. The reforms are not only restricted to the forestry sector itself. Many of the required reforms concern perverse policies and mixed signals in from associated sectors such as agriculture, industry and transportation.

**Improving forest charging systems is critical for success.** Establishing more realistic prices based on real values of wood or, preferably, introducing competitive means of selling roundwood, is a necessary condition for the successful implementation of sustainable forest management. Revenues from higher charges could also be used

to support more effective forestry institutions that, in many countries, are currently under-funded and largely ineffective.

**Strengthening forestry institutions is also a major priority**

**Investment to strengthen regulatory institutions and underpin administrative capacity is fundamental to improving forest management.** Improved forest management can only be observed in those countries where the legal, policy and administrative environment regulate undesirable practices and there is transparency and accountability in management and governance of the sector. Investments to strengthen regulatory and administrative capability in the forestry sector should be a priority and countries should be encouraged to increase transparency and improve governance of the resource.

**Improving data and the dissemination of information is a priority area for investment.** Countries can only improve their forest management when they have adequate knowledge and information on which to base their decisions. The World Bank and other international agencies should work towards strengthening countries' capacity to collect and analyse forest sector information and make wise land management decisions based on such information.

**But assistance should also look beyond the forest**

**Investing in sustainable forest management can take many forms and the Bank's strategy should look beyond the forest.** Credit-lines to finance changes in forest processing techniques and support regulations that demand better environmental performance in forest processing operations could have a substantial impact on the sustainability of the forestry sector as a whole. Viewed in the broader context of sustainable development, such support might be more worthwhile than some of the more traditional approaches to assistance that tend to focus on improving forest management and silviculture.

**Establishing or clarifying ownership or property rights to forests and trees is another potentially important area for assistance.** Forests are often cleared either because of uncertainty of tenure or in order to establish tenure. Investments to develop the legal framework for land tenure and titling and to support efforts to resolve more general land rights issues could have significant benefits to the forestry sector as well.

**There are a range of opportunities**

**There is no single strategy, policy or operational response that fits all situations.** We have the know-how to develop appropriate and responsive strategies and policies. Actions by the World Bank and FAO should have a solid technical base and be grounded in the environmental, social and economic realities that vary by country and forest condition. It is useful to recall that many of the issues raised in current discussions about sustainable forest management concern social equity. It is also worth stressing that forest management prescriptions are very weak tools to implement social policy. Still, in spite of these limitations, FAO, the World Bank and our many partners can do much with knowledge already at hand to provide

relevant support to the countries genuinely seeking to improve their forest management.

**The main impact that the World Bank could have in overcoming these problems would be to use its influence and resources to provide enabling conditions for improved forest management.**

This would mean financing of sufficient size and connection to the forestry sector to secure that required changes would be made. This suggests effective connections between the lending and institutional arrangements including public expenditures. This could be accomplished through non-lending activities and through any or a combination of the following means: the entire lending programme to a country; general structural adjustment lending; and sector structural adjustment lending. These lending tools can do the most good if they are based on sound technical, environmental and economic knowledge, some of which is available in the Bank and some of it not.

# 1 SUSTAINABLE FOREST MANAGEMENT REVISITED

The forestry and natural resources community has debated the concept of “sustainability” for decades. A high level of political commitment to advancing “sustainable forest management” was achieved at the United Nations Conference on Environment and Development (Rio de Janeiro, 1992). Considerable effort has been invested subsequently in intergovernmental processes to define criteria and indicators of sustainable forest management.<sup>1</sup> Beyond this, governments have committed staff, time and resources to develop a programme to advance sustainable forest management (e.g. the Intergovernmental Panel on Forests, the Intergovernmental Forum on Forests and the UN Commission on Sustainable Development). In spite of all these efforts, sustainable forest management remains an elusive goal. This section summarises why this concept is so difficult to identify and implement.<sup>2</sup>

Concerns about the way in which forests are used and managed are many and varied. Sometimes they are broad and global in scope, such as concerns about the potential impact of forest loss, degradation and fragmentation on climate, biological diversity or the survival of endangered species. At other times they are local or regional, such as concerns about the impacts of forest management on downstream water quality or access to traditional sources of forage. Many of these issues reflect more basic concerns about equity, ethics and uncertainty.

Forests cover just less than one-third of the world's land surface and around half of this area is used or is likely to be used for wood production.

Forest management in this document is defined broadly to encompass a set of actions taken over time to reach a forestry related objective. These management actions range from the use of fire to suppress competing brush to controlled removals of timber. Protection and enforcement actions taken by the state to accomplish forest management and conservation objectives can also be considered as forest management activities.

## 1.1 The objectives of sustainable forest management

References to sustainable forest management are universally vague and ambiguous. The lack of precision stems from a current inability to reach agreement on a complex set of issues that are largely determined by culture, personal values, and individual hopes, fears and concerns about uncertainty. Major questions that remain unanswered in the current debate about sustainable forest management, include the following:

- what should be the objectives of sustainable forest management;
- what is the relative importance of each of these objectives;
- what are the uncertainties associated with managing complex ecosystems such as forests; and
- what time frame and spatial context should be adopted when examining the sustainability of different forest management options?
- who should benefit from forests and their management?

<sup>1</sup> Although this paper focuses largely on the sustainable management of forests used for wood production, it should be noted that forestry policy should meet a broader set of objectives such as those specified in the phrase used in the 1992 Statement of Forest Principles: “the management, conservation and sustainable development of all types of forests”.

<sup>2</sup> Contreras (1999), a supporting document to this study, provides an in-depth look at this subject with numerous excellent examples.



Historically, forest management systems have tended to focus on one objective of overwhelming importance, such as the maintenance of a certain flow of timber, protection of a fragile watershed or provision of an attractive forest environment for outdoor recreation. In reality, this was mostly an analytical and operational simplification. Natural resource users and managers have always observed with awe the miracle of forests: they produce a multitude of goods and services, frequently at the same time and from the same piece of forest land and they often regenerate with minimal human intervention. Forest management attention has also generally shifted from management for a single objective (often wood production) to an ecosystem approach that tries to incorporate the production of multiple outputs into forest management decisions.

**An example of an attempt to define the objectives of sustainable forest management**

Participants at a conference on sustainable forest management (held at the University of California in March 1997) discussed the specific objectives of forest sustainability, starting with those from Agenda 21. These objectives included:

- to preserve biodiversity;
- to maintain economic productivity;
- to take advantage of present economic opportunities;
- to maintain future options;
- to respect inter-generational equity; and
- to respond to social and cultural needs.

Participants then added more objectives to those given above, including:

- to satisfy the values of indigenous peoples and local communities;
- to take into account aesthetics;
- to provide recreation opportunities;
- to avoid off-site consequences and the export of environmental problems;
- to satisfy existence values; and
- to provide flexibility.

Some participants suggested that the list should be broadened even further to include human and non-human issues, environmental rights, ethical restraints on behaviour, fair land tenure practices and the creation of political structures for environmentally sensitive development.

### *1.1.1 How can conflicting objectives be reconciled?*

The recognition of the hopes and aspirations of the many stakeholders interested in the future of forests is a positive step forwards. However, this raises the question of: how can this multiplicity of objectives be addressed once it is acknowledged that it is simply not physically possible to manage forests in a way that simultaneously achieves every aspiration? Increasingly complex modelling and valuation methodologies have been developed to quantify the range of diverse products and environmental services that forests can provide, but trade-offs or compromises still have to be made as policy advice moves from theory to practice. The community of forestry professionals and forest stakeholders continues to search for an acceptable method to reconcile different perceptions of the relative importance or value of each forest management objective.

**Same forest - different values!**

The same forest is valued by different persons and by the same person, as any and many of the following:

- a source of raw materials for industry
- a source of fuelwood
- an agent for the protection of watersheds
- a place of unique natural beauty
- a sink for carbon sequestration
- a site for recreation and education
- a source of foreign exchange
- a place to hunt wild animals for food
- a space for a large forest plantation
- a place for settlement of poor people
- a place for grazing
- a place to find unknown species
- a source of medicines
- a place of worship

In the allocation of market goods, prices are the main indicator upon which production, consumption, savings and investment decisions are taken. Thus, because so many of the outputs of forest ecosystems do not pass through markets and are public in nature, many argue

that market solutions result in far too little investment in the conservation and management of forests. However, to decide on a different course of investment and conservation, the trade-offs implied must be analysed within the framework of a commonly accepted value system. Values determine the “weight” or importance of each one of the objectives in sustainable forest management, but values vary enormously between different people and are seldom expressed in terms that would provide clear operational guidance. To summarise, if there is little agreement about objectives and their relative importance, it is not possible to conclude whether a forest is sustainably managed or not.

### *1.1.2 Uncertainty*

Reconciling conflicting objectives for forest management is compounded by uncertainty. It may take fifty years or more for a forest to develop a preferred habitat for certain types of wildlife or to produce timber of a desired size. This is a long time compared to most other crops or manufactured goods and it adds further complexity to the problem of defining sustainable forest management. Technical specialists seldom hold a universal view about the eventual impact of a management practice on the forest ecosystem. Partly, this is because the forest ecosystem is enormously complex but this uncertainty also stems from the fact that it takes years, if not decades, to obtain reliable results from field-tests of interventions.

### *1.1.3 Spatial and temporal issues*

The spatial and temporal dimensions of sustainable forest management are additional issues that complicate matters. There are wide-ranging discussions, often between stakeholders with similar points of view, about the spatial dimensions of sustainable forest management. Is the appropriate scale for evaluating sustainable forest management a single stand of trees, a watershed, a landscape, a nation, or the world as a whole?

People have been modifying forests for a very long time. Available anthropological and ecological evidence points to the fact that people have been living in and modifying forest ecosystems to their advantage for centuries.

Similarly, the planning period for sustainable forest management is equally ill defined. Should the forest manager be looking for sustainability over 50, 100 or 150 years, or in perpetuity? While the implicit perception is in perpetuity, it is very important to recognise that forest ecosystems are not static. With or without direct human intervention, forests continue to evolve in the face of the forces of natural change – fire, drought, pest and disease. Even without human intervention, the present forest estate is not what would exist in fifty years from now or even in twenty years time in some cases.

Finally, responses to the shifting trends in public opinion about how forests should be managed have to take into account the long production period. In the last twenty years, there have been substantial shifts in opinion about the role of forests in the economy, in the environment and in societies. In principle, alternative options for forest management should be judged against the long-term objectives of sustainable forest management. These objectives should reflect the values of society, but this raises the question of: should these objectives reflect the values of today’s society, future generations or a mixture of the two? Often,

#### **Forest ecosystems are not static**

Forests and forest ecosystems continue to evolve in response to natural and human-induced change. They often undergo measurable change even if humans do not intervene. Active management of forest ecosystems is required to meet almost any set of conservation and development objectives

proponents of sustainable forest management refer to the values, wants and needs of future generations, but is there really any feasible way of estimating these?

#### ***1.1.4 Equity***

Finally, the debate on sustainable forest management reflects expressions of concern about equity or the fairness in which the benefits of forests are distributed. While there are many equity aspects to forest management; most reflect the fact that the poorest people in developing countries tend to live in or near forests. The implications for equity of sustainable forest management, however, vary depending on the type of improvement to forest management that is being considered.

For example, improving commercial forest management and harvesting would benefit large numbers of poor people (through, for example, reductions in off-site environmental costs) while the costs would be borne by a small number of (usually powerful) stakeholders. However, stopping the widespread clearance of forests by small-scale farmers in order to reduce deforestation could have negative implications for equity. As these examples show, sustainable forest management can have both positive and negative implications for equity.

The relative weakness of forest policy to address equity issues remains a major challenge for the wider implementation of sustainable forest management. The discussion is furthered compounded by strongly held views on the tools needed to resolve these equity concerns: market, policy or institutional reforms. While technical and economic analysis may play some role, the equity of market outcomes is largely determined through political resolution. It remains useful to recall that attitudes and definitions of equity differ, sometimes widely, among cultures and stakeholder interests.

### **1.2 The need to focus on a process of continuous improvement in forest management**

In view of the difficult conceptual issues related to sustainable forest management, it seems likely that it will remain an imprecise concept. Given this, many analysts have suggested that forestry policy should promote forest management decisions that will contribute incrementally to sustainable forest management (whatever that may mean) or that will, at least, avoid forest management practices that are clearly unsustainable. This “continuous improvement process” or “use with minimal damage” can be viewed as a set of “goal posts” that are based on the best (but still imperfect) information that is currently available and can be used to practically guide forest management decisions. This view is appealing to those, such as forestry policymakers that are more concerned with the practical application of sustainable forest management and less with the theoretical details.

## 2 A SUMMARY OF EXPERIENCE WITH DIFFERENT FOREST MANAGEMENT SYSTEMS

The background papers produced as part of this review have examined a number of different forest management systems that can, if implemented properly, be termed sustainable yield systems. The systems examined include complex shelterwood systems such as the Plenterwald in Central Europe and the Malaysian Uniform System in the tropics, to clearfell and replanting systems employed throughout much of Western Europe and North America.

The systems examined all aimed at the sustainable production of wood, with little or no consideration of the many other objectives often associated with the broader interpretation of sustainable forest management. If only this limited objective is considered, most specialists agree that, in many cases, the forest management systems that have been developed were technically sound, despite the fact that the empirical evidence of sustainable wood production remains incomplete and is mostly limited to evidence of successful regeneration.<sup>3</sup>

### Sustainable forest management

#### in moist tropical forests

Moist tropical forests generate a significant number of global externalities. However, of all the forest types in the world, moist tropical forests probably also present the greatest technical challenges to implementing sustainable forest management. Many experiments conducted to examine sustainable forest management have taken place in this region. Most, however, have been marred by non-technical obstacles and events that materialised before conclusive empirical evidence of the technical feasibility of sustainable forest management could emerge. Most of the obstacles that have appeared have mainly been related to a number of economic, institutional and social factors. These have appeared not only due to the technical complexity of tropical forest ecosystems, but also due to a range of other factors, including:

- the length of time required for tropical trees to achieve commercial size;
- the use of inappropriate harvesting systems;
- economic pressures to repeatedly log areas in which regenerated trees have not yet matured;
- encroachment pressures from migratory communities that survive by practising slash and burn agriculture; and
- conflicting land use claims, including settlement schemes and infrastructure developments.

The Asian experience shows that forest management of moist tropical forests for sustainable wood production is technically feasible but that most experiments have not lasted for long enough to eliminate all doubts. In Latin America, various researchers believe that sustainable wood production is technically feasible, at least in some ecosystems. For example, Barros and Uhl (1995) contend that sustainable wood production is feasible in the Brazilian Amazon, especially in the floodplains where the diversity of timber species is lower, the volume per hectare of commercial species is relatively high, growth rates are also high and logging does relatively less damage to the remaining vegetation and to the soil. Southgate (1998) reports that the forest management system used in the Palcazú project in Peru is probably biologically sound on the basis of the evidence of abundant regeneration after harvesting. However, the project itself could not be sustained because of security concerns and the poor economic results, which were due to a relative abundance of alternative wood supplies in the area. In Africa, plans to practice sustainable forest management have similarly shown promise but have been plagued by political, social and economic turmoil. It is interesting to note that, in the latter two regions, success has not been determined by the forestry sector but by events outside the sector. This is a common occurrence in forestry.

<sup>3</sup> Dupuy *et al* (1998), Hagner (1998) and Contreras (1999), supporting documents to this study, provide a comprehensive review of the experiences with forest management systems for most common forest ecosystems.

The little evidence that there is generally points to the fact that the forests under examination are either evolving as the researchers expected them to, or that any technical failures could easily be corrected with existing knowledge. In fact, the balance of the technical evidence is quite positive and the numerous studies and projects already completed provide a solid base for technically sound forest management for sustainable wood production in most of the world's moist tropical forests.

In dry tropical forests, the context for sustainable forest management is completely different to that in moist tropical forests. Forests are more highly valued for their non-timber services. There are a few examples of the successful implementation of sustainable forest management (e.g. Nepal and India) and it is generally believed that sustainable forest management is technically possible. However, for sustainable forest management to work in this type of forest it is essential that forest managers secure the participation of rural people, by integrating their activities with the rural economy and with other activities that sustain the livelihoods of local people. In addition, as in the case of other experiences in the tropical region, it is generally too early to judge whether or not the few approaches, which currently appear to be successful, will be sustainable in the long run.

Experience in the boreal forest region is limited by the fact that there have been few attempts to advance from purely timber oriented forest management systems to more ecosystem-orientated sustainable forest management systems. The few attempts that have been made are all fairly recent and are surrounded by long-term uncertainties. However, despite these *caveats*, it is believed that enough technical knowledge is currently available to practice sustainable wood production in the boreal forest, or at the very least, to identify and avoid the most unsustainable practices.

Similar conclusions can be drawn from experience in the temperate forest zone. It is somewhat difficult to generalise from the experience that has been gained in the temperate forest zone because of the many different types of forest ecosystem within this zone. However, it is believed that, in most cases, there is generally enough technical knowledge and experience to manage most of these forests for sustainable wood production and to avoid the most excessive examples of unsustainable practices.

Finally, there is adequate technical knowledge to establish forest plantations that produce a sustainable flow of wood, but there is less certainty about the sustainability of current forest plantation practices in the broader sense (e.g. in terms of water quality and local land rights). There is also insufficient evidence to report on how successful reforestation projects in degraded tropical forests have been or will be in the future.

### 3 THE OUTLOOK FOR FOREST RESOURCES AND FOREST PRODUCT MARKETS

The size and composition of forest product markets and forest resources are important factors that influence the ability of countries to implement sustainable forest management. Increasing income and population will continue to result in greater demands being placed on forest resources for the production of industrial roundwood and fuelwood. However, at the same time, these same pressures will also increase the demands placed on forests for the production of non-wood goods and services and for the conversion of forests to other land-uses.

Despite these many and often conflicting pressures on forests however, changes in forest management techniques and forest products processing technologies will continue to present a range of options to resolve this dilemma. These will, in turn, present a range of opportunities and challenges for the improvement of forest management and these are briefly described below.

It is important to realise that the relationship between forest resources and forest products markets is a two-way relationship. For example, changes in resource availability affect delivered wood costs and products prices in the market. On the other hand, changes in markets can lead to new afforestation or harvesting of species that were once considered non-commercial. The following analysis presents the outlook for forest resources first then the outlook for forest products markets, but it should be remembered that each affects the other.

#### 3.1 Current and future status of forest resources

The latest estimate of the global forest area is 3,454 million hectares (see Table 1). Developing countries contain 2,810 million hectares or 81 percent of this area, of which 1,805 million hectares (52 percent of the global total) is in tropical developing countries. Current forest loss is estimated to be around 11 million hectares per year, nearly all of which occurs in the tropics. In contrast, forest areas in developed countries and non-tropical developing countries are generally increasing. If forest loss continues at the same rate, the global forest area would decline to 3,285 million hectares in 2010. As nearly all of this loss would occur in the tropics, the area of tropical forest could be expected to decline by 155 million hectares to a new level of 1,650 million hectares (or 91 percent of its current area).

**Table 1: Forest area in 1995  
by geographical region**

Region	Forest area (m ha)	Annual change	
		('000 ha)	(%)
Africa	520	-3,748	-0.7
Asia	503	-2,901	-0.6
Oceania	91	-91	-0.1
Europe	933	+519	+0.0
North and Central America	536	-274	-0.1
South America	871	-4,774	-0.5
World total	3,454	-11,269	-0.3

The factors leading to deforestation are complex, variable and defy generalisation. For example, a recent analysis of the demand for agricultural land indicates that agricultural needs might only account for less than half of the projected decline (about 65 million hectares). Other factors contributing to forest loss include: overgrazing; over-harvesting of industrial roundwood and wood fuel; forest fires, pests and other natural losses; and urban and industrial development. Different factors are relatively more or less important in different areas and there is tremendous variation in the way in which these challenges can be met.

As noted above, the outlook for forest products markets will affect the scope for implementing improved forest management and will, in turn, be affected by and have an impact on the current and future status of forest resources. In particular, the following four variables will probably have the most influence on future wood supplies:

- the overall area and type of forest resources in the future;
- the proportion of forest resources that will be available for wood production;
- the way in which these areas will be managed for wood production; and
- technological improvements in forest management, afforestation, harvesting and processing.

In addition to these variables, new research, technology, and ever changing political and social forces will continue to redefine the goals of forest management and the methods of meeting these goals. The main challenge for the forestry policymaker will be to adapt to these changes without losing the momentum to improve forest management.

The depletion of the forest resource base suggested above will not be significant enough to have a major impact on the supply of forest products or prices at the global level, although it may have significant local impact in some areas, particularly on the supply of large high quality logs and fuelwood. However, another variable that must be considered is the amount of the forest resource that can be used for wood production in the future.

The amount of the forest resource that can be used for wood production is affected by two broad sets of forces moving in opposite directions across the forest landscape. Developments in forest product markets and advances in harvesting and processing technology constantly expand the boundary of the forest area that is economically viable. More remote areas become economically operable or nearby forest species formally considered unuseful suddenly become marketable. On the other hand, government forestry and environmental policies tend to operate in the opposite direction, by placing greater areas of forest into legally protected areas and implementing other regulations that restrict the areas of forest that can be used for wood production.

Currently, slightly more than half of the global forest area is considered as unavailable for wood supply (1,653 million hectares) due to either: legal restrictions on harvesting; low stocking of commercial species; or economic inaccessibility. Legally protected forest areas cover about 300 million hectares (or around 8 percent of the total forest area) and the total area of legally protected areas (of all types) is increasing at a rate of slightly over four percent per year. However, in spite of that and given the magnitude of the forest area that is not currently used for wood production, it seems likely that there is scope to meet demands for industrial roundwood production and for the reservation of forest areas for other non-extractive uses within the foreseeable future.

Although the broad availability of forest resources in the future might not affect future supply and demand by very much, the way in which those resource are managed may have a more pronounced impact on future supply and demand. This is particularly the case in the temperate and boreal forest zones, where the area of forests is stable or increasing but there is currently controversy in some of the world's largest wood producing nations about how these resources should be managed. Two clearly discernible trends are currently identified (which could broadly be called intensification and extensification) and these will each tend to influence roundwood production in different directions.

The main example of the trend towards more intensive forest management is the increasing importance of forest plantations as a source of industrial roundwood supply. The most recent estimate of the global forest plantation area is just under 120 million hectares, or 3.5 percent of the total forest area. Almost half of this area is located in Asia and at least 70 million hectares of this area will be used for industrial roundwood production. Industrial roundwood production from forest plantations currently is estimated to be roughly 370 million cubic metres or about 25 percent of total production. Many of the current forest plantations are quite young and without any expansion in area, it is reasonable to anticipate an increase in output to 560 million cubic metres by 2010 (or roughly 30 percent of projected industrial roundwood production in this year).

Over the longer term, the importance of forest plantations as a component of industrial roundwood supply will depend upon the growth of industrial roundwood production and consumption and the rate at which the forest plantation area expands. It seems likely however, that the share of global industrial roundwood production that will come from forest plantations will remain at least 30 percent and it would not be unrealistic for industrial roundwood production from forest plantations to grow to 50 percent of world production or even more.

Acting in the opposite direction, there is increasing pressure to modify harvesting practices and silvicultural regimes within both natural and planted forests that are used for wood production. Indeed this has been a focus of much of the debate about sustainable forest management. Many of the measures that are likely to be promoted as more sustainable are likely to reduce the volume of wood that can be taken from any particular forest site.

**Measures likely to be encouraged as sustainable forest management in both natural and planted forests**

1. More planting of native species and mixtures in forest plantations;
2. longer rotation ages or cutting cycles;
3. smaller overall cutting blocks;
4. reductions in the use of artificial inputs such as fertiliser and pesticides; and
5. requirements to leave larger areas untouched around watercourses and other sensitive sites.

Studies of the impact that such measures might have on total wood production are few, so it is difficult to generalise from their results. However, the few studies that have been completed to date all seem to suggest that harvested volume per hectare with more sustainable forest practices might be reduced by at least 10 percent and some studies suggest reductions of up to 50 percent in the short-term.

While this may appear substantial at first glance, a significant reduction in harvesting volumes per hectare would occur in only a very small proportion of the global forest area. It is important to recall that in any given year or even any decade, only a tiny fraction of the world's forest is entered for purposes of commercial harvest. Even the widespread introduction of less intensive harvesting in tropical natural forests would affect only 20% of global wood supplies. In this case, reduced harvest in the natural forest is likely to be more than offset by the more intensive production expected from tropical forest plantations. Consequently is expected that, on balance, measures to reduce the intensity of forest management and harvesting will not be significant enough to counteract the effect of intensification in other areas. Adoption of measures to improve forest management are not predicted to have a major impact on global forest products markets.

The other main factors that will influence future wood production and consumption and the interaction between forest products markets and the utilisation of the forest resource, are



future changes in technology. It is difficult to forecast how efficiency improvements and the introduction of new and better technology might occur in the future. Therefore, the analysis presented below only takes into account two likely developments: the greater use of plantations to supply industrial roundwood; and the greater use of recovered paper as a substitute for wood inputs. There are likely to be, however, a much larger number of technological changes both within the forest harvesting and processing sectors and outside the forestry sector, that will reduce the demand for wood, make wood products more price competitive or cheaper to produce and more environmentally friendly than they already are. Four broad developments are likely to have the most positive impacts on forest management.

Firstly, forest processing technologies are constantly improving to utilise smaller sized trees, currently non-commercial species and recycled material. This presents opportunities to recover more utilisable material each time a forest is harvested and to utilise forest areas that may otherwise be considered as unavailable for wood production due to species composition. It also allows processors to diversify their inputs to include more material from non-forest sources.

Secondly, technology is constantly improving to recover a greater proportion of utilisable product per cubic metre of wood input. Furthermore, improvements in areas such as pulp and paper processing technologies are continuing to increase the efficiency with which other inputs are used in the manufacturing process. These developments continue to reduce waste at source and improve the environmental performance of the forest processing sector as a whole.

The third improvement is in the development of new products to meet a given end-use. The gradual substitution of reconstituted panels (e.g. chipboard) and engineered wood products for traditional sawnwood and plywood is also likely to increase the efficiency of wood use, because the former tend to use less wood input per cubic metre of output.

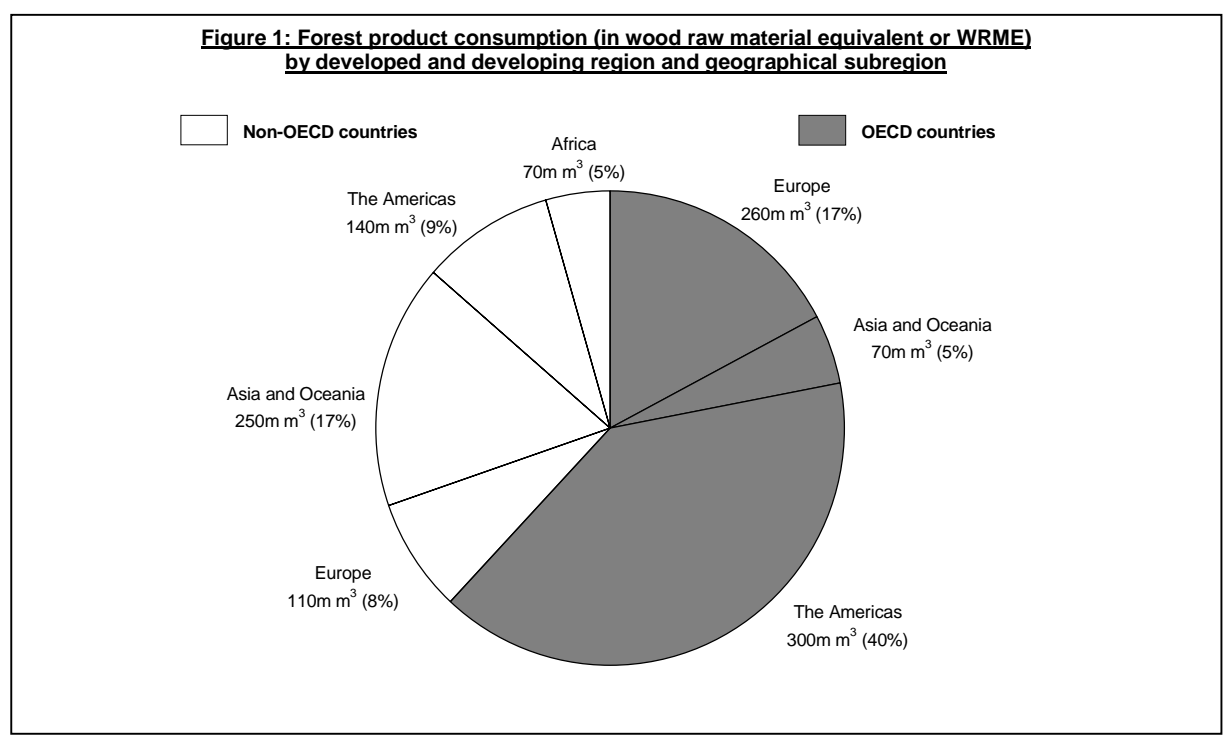
The final example of technological change is changes outside of the forestry sector that will reduce the overall demand for wood products. Improvements to products such as PVC windows and doors and the expansion of these materials into new product markets will continue to exert downward pressure on the demand for wood. While this may not be a sustainable development in a general sense (wood, after all, is a natural and renewable resource whereas plastic is not), it may reduce wood demand and make the goal of sustainable management much easier to obtain.

### 3.2 Current status of forest products markets

Industrial roundwood production in 1996 was 1,490 million cubic metres. This is equal to about 0.26 cubic metres per capita or 0.43 cubic metres per hectare of forest. Developing countries<sup>4</sup> produced about 565 million cubic metres of industrial roundwood, or 38 percent of this total. Of this, 300 million cubic metres (20 percent of the global total) was produced in tropical developing countries and the remainder was produced in temperate developing countries.<sup>5</sup> Furthermore, industrial roundwood and forest product production is concentrated in a small number of countries. For example, the ten largest industrial roundwood producers supply 72 percent of the global market (see Table 2).

**Table 2: The top ten industrial roundwood producers in 1996**

Country	Production	
	(in million m <sup>3</sup> )	(as % of world total)
USA	407	27.3
Canada	183	12.3
China	109	7.3
Brazil	85	5.7
Russian Federation	67	4.5
Sweden	53	3.6
Indonesia	47	3.2
Finland	43	2.8
Malaysia	36	2.4
Germany	36	2.4



Wood product consumption in developing countries in 1996 was equal to about 490 million cubic metres of industrial roundwood inputs, or about one-third of total global consumption (see Figure 1). The remaining 75 million cubic metres of industrial roundwood produced in developing countries was exported to developed countries in the form of industrial roundwood and wood products.

<sup>4</sup> The split into developed and developing countries used here is based on membership of the OECD, on the assumption that this is the easiest way to separately identify the countries that are most likely to be potential clients of the World Bank.

<sup>5</sup> The countries of Eastern Europe, the Russian Federation, China and temperate countries in Africa and Latin America (e.g. South Africa and Argentina).

In terms of the markets for processed products (i.e. sawnwood, wood-based panels, pulp and paper) the share of global consumption held by developing countries is even lower than the figures quoted above, ranging from 31 percent for sawnwood down to only 25 percent for pulp.<sup>6</sup>

International trade is an important component of forest products markets (see, for example, Table 3). However, again, the largest global trade flows of forest products are mostly between developed countries. Major regional trade flows<sup>7</sup> in 1996 were from North America to Europe, North America to Asia and Europe to Asia. The only notable trade flows from developing regions to OECD countries were from Eastern Europe and the Russian Federation to Western Europe and from Southeast Asia to Japan.

In terms of the main processed forest products, just under half of world industrial roundwood production was used for the production of sawnwood, a further 35 percent was used for the production of pulp and the remainder was used for the production of wood based panels (see Table 4).

The production of paper is a major and rapidly expanding component of forest product markets. For example, global production and consumption of paper and paperboard in 1996 amounted to 284 million metric tonnes, making this the second largest market segment (after sawnwood) by weight and value. However, producers of paper are now using less wood for every tonne of paper they produce. For example, wood pulp accounted for 80 percent (by weight) of the raw material inputs to the papermaking process in 1970 and the remaining inputs then were mostly non-fibre inputs such as fillers, clay and coatings. In contrast, by 1996, the amount of wood pulp used in paper production had fallen to only 55 percent and recovered paper is now a major component of the total fibre input.

The other major use of roundwood is as a source of fuel. Statistics about wood fuel production and consumption are only partial and are unreliable in many cases. However, current consumption of wood fuel is believed to be around 1,800 million cubic metres or somewhat more than the total consumption of industrial roundwood. Developing countries in Asia account for just over half of this consumption, followed by African countries, which account for a further 24%. In contrast, developed countries account for less than eight percent of total estimated global wood fuel consumption.

**Table 3: Top ten exporters of forest products in 1996**

Country	Exports	
	(in million US\$)	(as % of world total)
Canada	25,529	18.9%
USA	16,775	12.4%
Sweden	11,012	8.1%
Finland	10,322	7.6%
Germany	9,669	7.2%
Indonesia	5,216	3.9%
Malaysia	4,379	3.2%
Austria	4,296	3.2%
France	4,249	3.1%
Russian Federation	2,977	2.2%

**Table 4: Production by type of forest product in 1996**

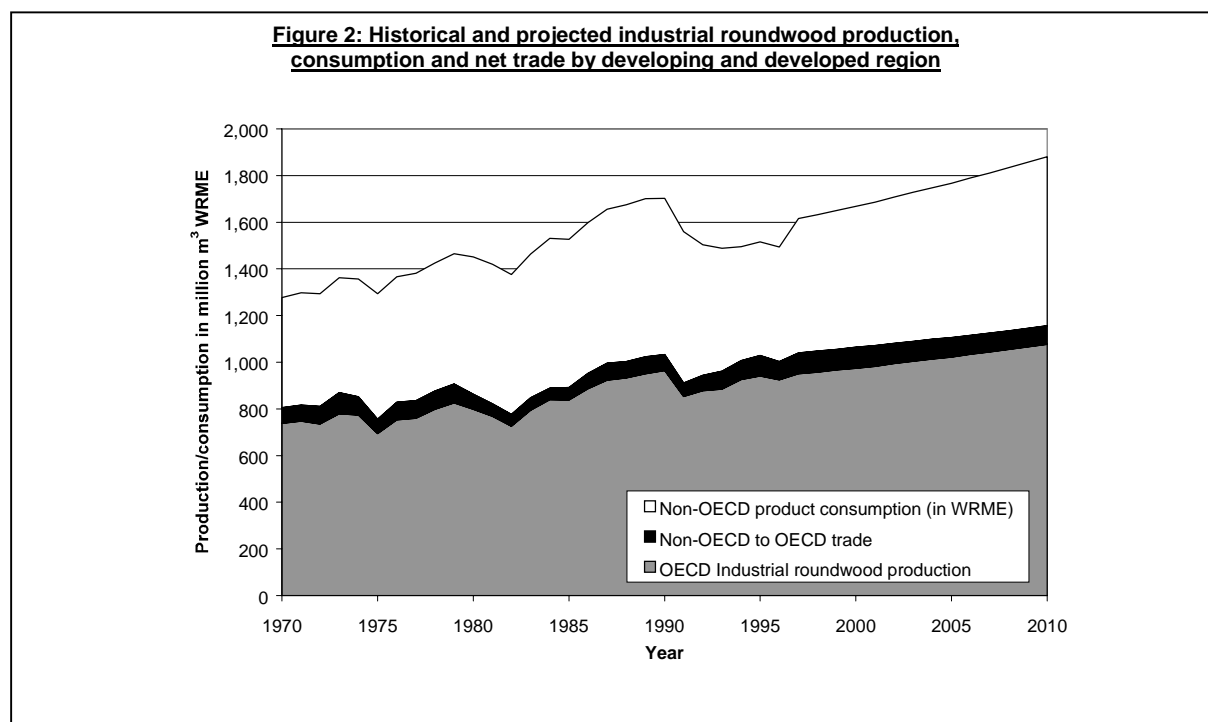
Product	Production		
	(in mill m <sup>3</sup> /MT)	(In mill m <sup>3</sup> WRME)	(as % of world total)
Sawnwood	426	728	48.9
WBP	149	242	16.2
Pulp	179	520	34.9
Total		1,490	

<sup>6</sup> The developing country share of product consumption is less than their share in terms of industrial roundwood inputs because of their generally lower processing efficiency rates.

<sup>7</sup> Trade flows of over US\$ 5 billion per year.

### 3.3 The outlook to 2010 for forest products markets

By 2010, total global production and consumption of industrial roundwood is expected to reach around 1,870 million cubic metres, a figure that is roughly 25 percent higher than in 1996 (see Figure 2). The dominance of developed countries in global forest products markets is not expected to change by very much, although the share of production and consumption held by developing countries is expected to increase by, at most, 5 percentage points in most of the main forest products markets. The only exception to this is paper and paperboard, where the developing country share of global production and consumption is expected to remain about the same.



The net flow of industrial roundwood and wood products from developing to developed countries is expected to increase very slightly to around 100 million cubic metres per year. However, patterns of international trade are also expected to continue to change. For example, trade is expected to continue to shift away from trade in commodity grade products, such as pulp and rough sawnwood, into further processed products, such as paper, mouldings and furniture, as countries continue to try to increase domestic processing of their forest resources. Another change that is expected, is that some of the currently large forest product exporters in developing countries (e.g. in Southeast Asia) will start to export less as their domestic markets expand due to continuing economic growth. This will create new opportunities for other developing countries (e.g. in South America) to expand their export markets.

In terms of individual product markets, the highest rate of growth in production and consumption over the period is expected in the market for paper and paperboard, with a projected total increase of 40 percent. Consumption of wood-based panels is expected to increase by about 20 percent, sawnwood by 17 percent and pulp by only 10 percent. The divergence between growth in the paper and paperboard markets and the markets for pulp reflect the expectation that recovered paper will continue to increase in importance as an input for papermaking. For example, by 2010, it is anticipated that the use of recovered paper will increase to around 50 percent (by weight) of the total raw material inputs to the papermaking

process. Total wood fuel production and consumption over the period is expected to grow by 23 percent to 2,210 million cubic metres.

All of these developments are expected to take place against a background of continuing strong competition from non-wood products in the main forest product markets. Consequently, it is unlikely that prices of processed forest products will increase in the near future. This does not mean that prices of individual types or grades of product will not increase, but rather that users will continue to switch to cheaper alternatives within each product aggregate as producers use technology to develop new products that meet a given end-use. Producers of forest products will also continue to diversify their sources of raw material inputs to include cheaper sources of wood and fibre, including: recycled paper; lower quality and smaller sizes of wood; and non-wood fibres. Consequently, there will be little scope for industrial roundwood price increases at a broad level although, again, prices for some grades of industrial roundwood (particularly the higher grades) and in some regions may increase.

### **3.4 Implications of the outlook for sustainable forest management**

Given the availability of forest resources and the range of possible options for managing these resources, future roundwood production will be well within the capacity of the world's forests to supply these needs without significant increases in overall prices in the foreseeable future. Scarcity will increase for some products and in some regions, but markets will adapt, trade (in the absence of new restrictions) will continue to resolve problems of regional imbalance and consumers will continue to switch between products to meet their given needs. New technology will also continue to present opportunities for manufacturers to cope with local supply scarcity. These changes will be gradual and difficult in some cases, but they will inevitably occur. The main conclusion from the broad assessment of future markets therefore, is that the future for sustainable forest management is not so much a question of will there be enough wood supply, but rather a question of where it should come from, how will it be produced and who should produce it?

The rapid development expected in the reconstituted panels, pulp and paper sectors and the opportunities that new technology provide will allow the forest industry to diversify inputs towards a much wider range of materials including: smaller and lower quality wood inputs; non-wood fibres, waste wood and recovered paper. Therefore, reliance on the natural forest as a source of wood supply can be reduced as trees outside of forests, forest plantations and non-forest resources become relatively more important sources of raw materials. Most of these developments will have environmental benefits and could have social benefits as well. These developments could have at least as much impact on forests as changes in the way that forests are managed and, from the broader perspective of sustainable development, should be encouraged.

The outlook for forest resources suggests that there is still scope to increase the area of forests in protected areas or subject to other types of restrictions on harvesting. For the areas that will continue to be used for industrial roundwood production, it should also be possible to accommodate modest reductions in harvesting volumes per hectare. It would be difficult to implement significant reductions in harvesting volumes per hectare, not so much because of concerns about total wood supply, but rather due to the impact that this would have on production costs. In areas where sustainable forest management would require such

reductions, it may be more appropriate to take these areas out of production altogether, with perhaps some intensification (e.g. forest plantations) in other areas to compensate for this.

Prices are a powerful indicator of scarcity and it is likely that prices of some products, particularly high quality roundwood and products, may increase in the future. However, due to competition from wood substitutes, the outlook for prices of most grades of roundwood and forest products suggest that significant price increases are unlikely. Consequently, in the majority of cases, it will not be possible to pass on any increased costs from the implementation of sustainable forest management practices to consumers of forest products. There may however, be situations where these costs could be accommodated within operating profits (see below).



## 4 FAILURES OF MARKETS, POLICIES AND INSTITUTIONS

As the above analysis has shown, the technical knowledge to develop sustainable forest management practices is available and global forest products markets are not a major constraint, indeed they offer a range of opportunities to pursue sustainable forest management goals. However, sustainable forest management is not widely implemented, particularly in tropical forests. This occurs because markets fail to support sustainable forest management practices. Furthermore, market failures are often compounded by policy and institutional failures that make it even more unattractive to manage forests sustainably. New initiatives such as “model forests”, forest product certification and the development of criteria and indicators for sustainable forest management are currently working to address some of these failures, but there is still a considerable way to go.

### 4.1 Market failure

Markets may fail to yield economically efficient investment in natural resource management when:

- there are non-market impacts from production that are not taken into account in private production and consumption decisions (i.e. *externalities* and *public goods*);
- property rights are poorly defined or enforced and investment is discouraged while consumption is often higher than the optimal level (the *common property* problem); or
- there is imperfect competition and producers or consumers, acting out of self-interest, fail to arrive at levels of production that maximise welfare.

Perhaps the most noticeable way in which markets fail in the forestry sector is in their failure to take account of the significant externalities associated with forest management. Forests produce a range of locally consumed goods that are difficult to measure such as food, fuelwood, and construction materials. Forests also produce a variety of services that are hard to market. Some of these are fairly localised: e.g. soil protection, water quality protection, wildlife, recreation, and views.

Other services can be demanded both locally and even internationally: e.g. biodiversity conservation and carbon sequestration. These externalities are difficult to manage because they vary physically across ecosystems and because they have different values in alternative economic settings and cultures. Consequently, the best forest management regime for each type of forest can only be determined on the basis of local conditions.

Sustainable forest management requires forest managers to invest in the production of some of these outputs. Some of these investments could be financially viable (e.g. low impact harvesting techniques), but do not occur because of policy failures elsewhere (e.g. where governments set artificially low stumpage prices). Others will result in little or no financial gain to the forest manager (e.g. curtailment of harvesting activities on sensitive forest sites). A number of studies have predicted that the cost of implementing sustainable forest management will be large. However, it should be noted that most of the cost of implementing

**Examples of some of the major externalities of forests**

1. Carbon storage;
2. biodiversity and habitat;
3. forest recreation;
4. visual amenity;
5. water quality and quantity;
6. soil stability;
7. social and cultural significance; and
8. existence values.



sustainable forest management is not a financial expenditure, but rather a limitation on revenues through the restriction of some harvesting activities. In other words, sustainable forest management is not unprofitable, but rather less profitable than unregulated harvesting.

The third way in which markets often fail in the forestry sector is where common property problems arise in the management of the forest resource, when multiple parties share the resource. Shared ownership of forests has often led to the resource being degraded (the tragedy of the commons) because people have little incentive to invest in the forest. Typically, this results in over-harvesting and under-management of the resource. One response to this problem is to allocate property rights for all, one or a specific bundle of forest outputs (e.g. water, timber and forage). However, issues of equity complicate these assignments of rights.

## **4.2 Policy failure**

The typical response to market failure is to design and implement government policies to attempt to either regulate production or create markets for some of the externalities. Thus, for example, many countries have a large body of forest legislation identifying areas of forest that can be used for different purposes and describing how they should be managed. Others have subsidies to support desirable interventions and fines or penalties to discourage bad practices. However, other policies within and outside the forestry sector often counteract or diminish the effect of these policies.

One of the major problems in many countries is the incorrect pricing of forest outputs. Such policies, often implemented with the aim of stimulating development of the forestry sector, typically price standing roundwood at a level that is much lower than would be obtained in a competitive market. Pricing policies are often also poorly designed in terms of their structure as well as the level of charges imposed and may not be strictly enforced.

There is considerable evidence of under-pricing and low levels of fee collection around the world. Such policies discourage efficiency in harvesting and processing, discourage the development of alternative wood and fibre sources and lead to inefficient allocation of scarce development resources (land, labour and capital) towards the forestry sector. In other words, they act against the improvement of forest management. An associated problem is bans on the export of raw or semi-processed forest products that depress local prices for felled roundwood and forest products. These have similar impacts to under-pricing of the standing trees.

Most of the subsidy given to the forestry sector (in the form of artificially low prices for forest resources) is captured by forest concessionaires and processors, although some of the benefits from activities such as illegal logging (where no fees are paid) are passed on to consumers. This subsidy supports very inefficient operators at the margin, while the others earn high levels of profit. The forest industry often claims that they can not afford to pay higher stumpage rates or invest in sustainable forest management, but there is plenty of independent evidence to suggest that this is not the case. Consequently, it seems likely that large parts of the forestry sector could afford to invest in better forest practices, even though they are unlikely to be able to pass the cost onto consumers, if only they were compelled to do so.

There are also a number of examples of policies outside the forestry sector having a detrimental impact on the management of the forest estate. Policies that encourage the development of other land-uses such as: mining; agriculture; roads; and urban development,

are typical examples. These can often be justified on the grounds of economic efficiency (i.e. they represent a higher value land-use), but sometimes they can not. Broader structural adjustment programmes have also been shown to sometimes have a negative impact on forest management. To some extent, the current debate about sustainable forest management is futile in this respect. Countries will continue to convert forestland to other uses where it is more profitable to do so. Forestry policymakers are largely powerless to stop this. A more constructive approach may be to seek improvement in overall land-use planning and compensation when such changes occur, to support improved forest management in remaining areas.

The other major area of policy failure in the forestry sector is in the legal framework governing land tenure and titling. National laws and regulations sometimes conflict with each other or with local legislation and such laws often fail to take into account traditional or customary laws, which often have more impact on the way in which forest land is managed in remote areas. The uncertainty that this creates further exacerbates the common property problems referred to above. In some cases, laws governing land tenure and titling even encourage deforestation. This occurs in situations where the first steps towards legal property rights over public land forest can be obtained if individuals demonstrate that they have improved or invested in the land in some way. Legal precedence in many countries has shown that one common way to do this is to clear the forest cover and replace it with another crop.

### **4.3 Institutional failure**

Institutional failure occurs where countries have adequate existing forestry policy and legislation in place to support the implementation of various aspects of sustainable forest management, but still nothing occurs on the ground because these policies are not implemented. Indeed, the lack of implementation of existing government forestry policies is often seen as a more important cause of the continuation of poor forestry practices than the quality of the policies and legislation already in place.

In many respects, institutional failure can be seen as an extension of market failure. Governments, often fail to adequately fund forestry administrations to carry out the tasks they are expected to perform and sufficiently train their staff. The common property problems associated with forestry apply to government institutions as much as they do to private individuals. Thus, it is not uncommon to see different government agencies offering rights to perform incompatible activities (e.g. mining, peat extraction, oil palm estate development and forest harvesting) on the same piece of land. The distribution of benefits (i.e. income, employment and tax revenues) amongst local and national authorities also often varies between different sectors. Institutions that try to control operations from the centre and where a large proportion of revenues go to the national government, often fail to successfully implement policies over widely dispersed areas and, unfortunately, forestry administrations often fall into this group.

Another institutional failure often arises because of the imbalance in money, skills and power between the different stakeholders. Forest managers and the processing industry typically have substantially more of all of these assets than government officials and local communities. This sometimes leads to corruption of government officials and local leaders and it often makes it difficult for other forest users to negotiate outcomes that take into consideration their concerns.



## 5 RESPONSES TO THE SITUATION

There are a number of responses to some of the problems identified above, which can be applied at the local, national and international level, by governments and the private-sector. Appropriate responses include:

- market reforms, which try to internalise some of the non-market costs and benefits of forestry;
- reform of policies and institutions, both within and outside the forestry administration; and
- direct intervention (e.g. specific development projects) that attempts to give value to some of the non-market goods and services in order to ensure that they are maintained.

There is already some experience with trying to implement several of these responses, but the majority of possible response options have not been attempted on a wide scale. The remainder of this section will describe how such responses might operate and present what little evidence there is of their implementation to date.

### 5.1 Market reform

Market reforms include a number of measures that either make existing markets work more effectively or create markets where these did not previously exist. In the context of attempts to encourage sustainable forest management, market reforms include measures to:

- provide better information about the source and environmental credentials of forest products;
- improve the legal framework to more clearly establish property rights and the rules governing the transfer of these rights between parties; and
- establish markets for one or more of a number of previously unmarketed forest outputs.

#### 5.1.1 *Improving market information*

A prime example of an attempt to reform markets is the development of forest certification. This initiative has been driven by environmental non-governmental organisations, most notably the Forest Stewardship Council, with industry support in some countries. Governments have reacted to the initiative in different ways; some have supported the initiative, a few have opposed it and a number have developed their own

#### Forest certification - some key facts and statistics

1. There are a number of national and internationally recognised forest certification schemes, the largest of which is the scheme operated by the Forest Stewardship Council, which has issued certificates for forests in 30 different countries.
2. Currently, about 17.3 million ha of forest (or 0.5% of world forest area) has been certified by FSC accredited certifiers.
3. Tropical forests account for 3.7 million ha (or 20%) of this total.
4. As of mid-1998, about 400 businesses and another 1,000 individuals and organisations were associated with the FSC's efforts to bring certified forest products to the marketplace in developed countries.

forest certification initiatives as an alternative to the Forest Stewardship Council certification systems. However, forest certification faces a number of challenges that will be difficult to overcome, including the following:

- forest certification will be most attractive (i.e. present the least additional costs) to forest owners and managers that already manage their forests reasonably well either due to strong national regulatory frameworks or because the owners already place high importance on environmental or multi-purpose management objectives;
- increasing globalisation in forest products markets means that end products often mix wood and fibre inputs from a number of sources that are increasingly difficult to verify, wood is also only a small part of the end product in some of its most important applications (e.g. in construction and furniture manufacturing) and the distance between the forest and end-user is becoming increasingly large;
- the benefits to the end-user from purchasing certified wood are poorly understood and difficult to market (in comparison to, say, dolphin-friendly tuna) and are mostly non-use benefits as opposed to use benefits (in comparison to some other environmentally friendly products such as energy efficient appliances and organically grown food);
- studies have shown that the markets for certified forest products in developed countries are relatively limited and the prospects for price premia are poor; and
- the majority (80 percent) of wood and wood products produced in developing countries is also consumed in developing countries, where willingness to pay for environmentally friendly forest products will be constrained by ability to pay.

In addition to the above challenges it is also worth noting that, by concentrating on how forests are managed for the production of marketed forest products, forest certification will do little to influence the management of the greater part of the global forest estate, which is used for other purposes.

In conclusion, the current structure of forest products markets and the poor prospects for price premia for certified forest products make it unlikely that the costs of increased silvicultural investments and longer rotations or cutting cycles can be passed on to forest products consumers. There may however, be some scope for producers to absorb some of these costs, particularly in cases where stumpage prices are artificially low (see below).

In view of all of these challenges, it seems likely that forest certification will make only a marginal contribution to the implementation of sustainable forest management, particularly in tropical countries. It remains, however, important as a force that has generated much publicity for sustainable forest management issues in national and international debate.

### ***5.1.2 Improving the legal framework***

Efforts to improve the legal framework supporting property rights have similarly been modest to date. However, in the few cases where attempts have been made to improve the legal framework surrounding forest tenure and the rights of local communities to use and manage their forests, the results have been quite positive. Examples include the Joint Forest

Management Initiative in India and recently issued leases to develop degraded forestlands in Nepal.

Initiatives such as these have shown that, where property rights are clarified and individuals are given greater security of tenure, they are prepared to invest in improved forest management and deforestation may be reduced or reversed. There is relatively little experience to suggest what might happen if such changes were also applied to the commercial forestry sector, but it would seem likely that they may also respond positively to such measures. Certainly, the presence of an expanding and relatively well managed private forest estate in many developed countries (where property rights are well defined) would seem to indicate that a strong legal framework is a necessary, but not sufficient, condition for improving forest management.

### *5.1.3 Creating new markets*

Another solution to market failure that is often proposed is to create new markets for some of the unmarketed goods and services that forests produce. There is some experience with developing commercial markets for: non-wood forest products; water; wildlife and amenity; biodiversity; and carbon sequestration. Experience with each of these different goods and services has shown how they may contribute to efforts to support sustainable forest management.

There are a number of non-wood forest products that have, over the years, been developed from commodities collected mainly for own use to commercial products. Drugs, such as aspirin and quinine, were originally discovered in forests, as were several other products (e.g. rubber, bamboo, and rattan). Experience with the development of these products shows that:

- the probability of finding products of major commercial value is low; and
- when discovered, such products are often either grown in intensively managed natural forest areas or plantations, or are quickly replaced by synthetically manufactured substitutes.

Even if the above were not true, it would still be likely that, in most circumstances, the benefits from harvesting non-wood forest products would be lower than the benefits from clearing forest land for agriculture. This would suggest that the importance of non-wood forest products is likely to remain as a source of local food and raw materials and that their commercial development is unlikely to support sustainable forest management on a large scale.

Two non-market services of forests that have become increasingly important in recent years are:

- the amenity benefits from scenic values and forest wildlife; and
- the option benefits of potential drug discovery (in areas of high biodiversity).

The benefits from these services have become increasingly commercialised and captured through the development of ecotourism (in the case of the former) and bioprospecting agreements (in the case of the latter).

Again, the areas where these services could potentially be important are fairly small and localised. For example, potential ecotourism sites will tend to be found in only the most accessible part of the forest. In the case of bioprospecting, it would only be necessary to collect samples from a few hectares of forest within a much larger area because the additional biodiversity and, therefore, the probability of discovering new chemical compounds, diminishes rapidly after the first few hectares.

To summarise, the value of these services is potentially high in a few areas, but practically nil elsewhere. Consequently, where such services are potentially important and can be commercialised, development of markets for these services would tend to favour exclusive use for these purposes and the curtailment of any roundwood harvesting activities. They are, therefore, unlikely to contribute to sustainable forest management efforts at the broad scale in forests used for wood production.

The last example of a new market potential is the possibility of selling tradable instruments for the sequestration of carbon, as part of global initiatives to reduce net carbon dioxide emissions. The value of such instruments is potentially high per hectare and could result in significant financial flows into the forestry sector. In addition, in contrast to the above examples, the market for such instruments could be used to finance forestry almost anywhere and on a large scale. However, there remain a number of issues that still have to be clarified, including:

- an exact method for creating, trading and accounting for these instruments;
- a method for calculating carbon sequestration in forests; and
- a relative position of forestry investment on the cost abatement curve.

In addition to this, there is also still some political uncertainty regarding how successful this initiative will be.

There are a few examples of forests where financial flows have been generated to support carbon storage in forests (e.g. in Costa Rica), but these are very limited to date. If carbon trading does become feasible on a larger scale, it could contribute to certain aspects of sustainable forest management, but there remain considerable uncertainties about how attractive forestry would be compared to other measures such as energy efficiency initiatives and higher energy taxes.

## **5.2 Reform of policies and institutions**

Government policies can be defined as: "any activities by the state that seek to modify the actions of individuals and firms with the intention of producing an outcome that would otherwise not occur". Policies can attempt to influence costs, prices and output levels through subsidies and taxes or by more direct measures such as price controls and other types of

regulation. Institutions, for the purpose of this discussion, can be limited to government institutions (primarily forestry administrations) that implement these policies.

As the above analysis has shown, markets will do little to support the implementation of sustainable forest management. Consequently, it is likely that well designed and effectively implemented forestry policies will be required to improve forest management. In the context of this analysis, some of the more important areas of policy and institutions that might be examined with a view to reform include:

- pricing policies in situations where the prices of forest products (usually stumpage values or land rents for the use of forest resources) are determined administratively by the government;
- the distribution of benefits from forest operations at national and local levels;
- subsidies to forestry and other activities that have an impact on forests;
- regulations governing land-use planning, forest management and trade; and
- the skills and motivation of forestry administration staff.

By their very nature, many of the policy and institutional reforms that are likely to be needed to support sustainable forest management involve some major political decisions. To date, many governments have been reluctant to make these choices.

### ***5.2.1 Pricing policies***

The reasons why higher forest levies might improve forest management were elaborated above. In short, they are that low levies discourage efficiency and investment in the resource and reduce public finances that can be spent on monitoring and control. These arguments are now generally accepted in most circles. However, raising forest levies remains a major challenge for forestry administrations in many countries. Many attempts to raise levies fail because of the vested interests of powerful forest industry stakeholders, which often stop the implementation of such measures. Therefore, any attempts to correct for this policy failure should concentrate on the question of how to pursue such goals as much as the question of what the correct level of levies should be.

#### **Forest levies and rent capture**

A number of recent studies have shown that low rent capture is a common feature of forest pricing policies across a wide range of countries in the tropics. Many forest levy systems capture only half of the economic rent from roundwood production and, in some cases, capture is as low as only a few percent. The problem of low rent capture is further compounded by ineffective collection, where forestry administrations fail to collect the levies on all roundwood production. In some major roundwood producing countries in the tropics, the amount of roundwood harvested in the informal or illegal logging sector may be as great as the officially recorded figures.

The first problem with many forest levy systems is that they are largely determined administratively rather than by the market. The levels at which forest levies are set are predominantly based on an analysis of estimated cost and revenue structures for the private-sector, that are poorly understood and easily hidden from public scrutiny. For ease of analysis, they also tend to be calculated and set on the basis of broad averages of costs and prices, which typically result in recommendations for levy increases that allow marginal operators to



survive while other, more efficient or more fortunate operators make high profits. Furthermore, the price is typically the same for the whole country, thus failing to recognize the important cost implications due to the geographical location. The trend in developed countries is for a move towards more competitive systems of awarding forest concessions, awarding cutting rights and selling roundwood. In contrast, in developing countries, competition for access to forest resources and the sale of roundwood is almost unheard of.

In situations where forest levies are set administratively, the analysis supporting proposed changes to levy systems is sometimes weak but, more often, it is political and institutional factors that stop such changes from being implemented rather than technical issues. Common problems include:

- a lack of openness and transparency in discussions between government and the private-sector over such issues;
- the presence of significant political power in the hands of a number of private-sector forest operators or their associations;
- a lack of accountability on the part of government to obtain the best value for the use of national natural resources; and
- the absence of competition for access to resources (often due to the presence of a large incumbent industrial structure).

In some cases it is also true that an unsustainably large industrial processing structure has developed on the availability of cheap and apparently abundant natural resources and that significant levy increases would result in reduced output. However, this argument would only apply to a few countries (e.g. Indonesia) and even in these cases, there may be scope to maintain output levels though greater efficiency (as has occurred, for example, in Malaysia).

Most proposals to increase forest levies tend to come from technical specialists within forestry administrations, which are then passed on to senior management and, eventually, Ministers. In many cases, these proposals are rejected by Ministers (and, in some cases, they do not even get this far) after discussions with the private-sector. Typically, the private-sector argues that such increases will force several of them out of business, harming income and employment in the sector and the national economy. In the few cases where modest levy increases have been pushed through in developing countries, there is no evidence of such increases having resulted in reduced output in the forest processing sector.

By concentrating on technical analysis of what the level of forestry levies should be rather than on how such measures might be adopted and implemented, technical assistance has largely failed to support such measures in the past. In the future, greater attention might be given to:

- developing competitive mechanisms for the awarding of forest concessions and cutting rights, setting production and export levies and selling standing roundwood;
- developing broad-based support for any changes to forest levy systems amongst other government agencies, politicians and civil society rather than treating this as a purely internal technical issue;

- increasing transparency and accountability in the awarding of forest concessions and setting forest levies by publishing and openly discussing the results of any analyses supporting important decisions in these areas; and
- instituting regular revisions of administratively set forest levy rates either through index linking or periodic revaluation of levy structures.

### ***5.2.2 The distribution of forest revenues***

A problem associated with low forest levies and poor enforcement is that the benefits from such levies are often not distributed in a way that encourages institutions to increase levies and work harder to ensure that they are collected.

An uneven distribution of benefits often occurs both between different government agencies and between national and local government structures. For example, it is generally the case that all forest levies are deposited in the national accounts. This sometimes occurs while, at the same time, the forestry administration has insufficient funds to implement even the most basic of duties. Indeed, it is not uncommon in some developing countries, for forest levies to be paid on an almost voluntary basis, with practically no monitoring or control at the forest processing plant or in the field.

A more general problem is that the benefits from forest management are often not shared with local communities who consequently see the forest as of little benefit to them and are therefore, inclined to convert it to other land uses.

Again, most technical assistance in the past has concentrated on what the levels of forest levies should be rather than how the money collected from such levies should be distributed amongst various agencies. Possible measures to attempt to rectify this situation might include:

- improved financing of forest revenue collection services, including performance indicators related to collection activities and performance bonuses either for the agency or staff;
- a stronger legal framework to support revenue collection and penalise evasion;
- greater devolution and decentralisation of collection activities (particularly in countries with very large forest areas) including the provision of adequate funding to support such changes; and
- the development of transparent benefit sharing mechanisms with local communities

### ***5.2.3 Subsidies***

There is a substantial amount of evidence to show how subsidies have been successful at encouraging afforestation in both developed and developing countries. However, there are few examples of subsidies being successfully applied to support sustainable forest management. (Indeed some of the forest plantations established with the support of subsidies

are probably unsustainable in the wider sense of the word.) The only major subsidy that has been applied to forest management in the natural forest on a wide scale has been the subsidy implicit in low stumpage prices and, as already discussed, this has been shown to have generally negative rather than positive impacts on forest management.

Outside the forest sector, subsidies to other land-uses including agriculture, mining and infrastructure development have also been shown to be detrimental to forests in certain respects, for example in the case of deforestation. Indeed, in the specific case of deforestation, subsidies in these sectors are probably a bigger barrier to the implementation of sustainable forest management than subsidies within the forestry sector itself.

To some extent, the responsibility for the detrimental effects of subsidy regimes and support to infrastructure development lies with developed countries. Widespread subsidies to agriculture in developed countries keep prices low in international markets and encourage developing countries to respond by subsidising their own agricultural sectors. There are also numerous examples of infrastructure development projects, supported by overseas development assistance, which have resulted in environmental degradation.

The broad conclusions about the use of subsidies and their impact on sustainable forest management can be summarised as follows:

- greater attention should be given to the environmental impacts of subsidies in the forestry and related sectors in both developed and developing countries;
- in general, subsidies to forestry are unlikely to be an effective mechanism to support sustainable forest management, except in situations where tree planting is desirable; and
- greater attention should be given to the environmental impacts of infrastructure development projects, where these are likely to result in significant land use changes.

#### ***5.2.4 Government regulation***

Regulation is a direct measure by which governments seek to alter the actions of the private-sector by specifying either output or quality standards that they must meet, or by instructing them to perform certain actions or forbidding them to do others. Because of the direct nature of government regulations, they are often a preferred choice for governments that want to implement a particular policy. Given the limited success of some of the other measures that have been attempted to encourage the implementation of sustainable forest management, it seems likely that better designed and more strictly enforced regulation will form a major part of any strategy to encourage sustainable forest management.

While regulation works well in some countries, it is ineffective in others. Common failures of current government regulations in the forestry sector include:

- incompatibility of regulations issued by different agencies with a responsibility for land-use sectors;
- weak enforcement;

- regulations that are too complex.

In spite of the care that must be taken in formulating workable forest related regulations, they will remain a vital tool available to forestry policy makers to support the implementation of sustainable forest management. However, this should not be seen as a green light for the introduction of many new regulations. Rather, in many cases, the existing complex web of regulations should be replaced by simpler output-orientated measures that can be clearly quantified and enforced.

### ***5.2.5 Forestry administration staff***

The above recommendations for market, policy and institutional reform of the forestry sector all have tremendous implications for forestry administration staff. In the future, they will need to develop a broader range of skills and be able to apply them fairly across a broad range of stakeholders. Currently, there is a major problem with the motivation of forestry staff in a number of countries who, in many cases, seem unable or unwilling to undertake even the simplest of tasks assigned to them.

Ultimately, these problems occur for a number of reasons, including:

- lack of training;
- low pay (sometimes combined with widespread corruption);
- weak personnel management;
- poor career prospects; and
- the effect of donor financed projects which tend to absorb the best staff at high salaries at the expense of staff for regulatory functions.

Again, good governance and greater competition is the solution to this problem. Increased salaries for forestry administration staff might help, but salaries tied to performance would probably be even better. Open competition for promotion and well-designed career planning arrangements might also help to motivate staff. On the other hand, greater penalties for corruption and incompetence would also have to be introduced. In some countries, such improvements to public administration could be politically difficult to implement, so again, broad support for such changes should be developed at the grass-roots level.

## **5.3 Development projects**

The above discussion has very much stressed the need for reforms to existing market, policy and institutional structures to implement sustainable forest management, rather than the need for significant investment in particular projects. However, there are a couple of aspects of sustainable forest management where a project-based approach might be appropriate and these are briefly discussed below.

### ***5.3.1 Conservation area management***

The recommendations made above have mostly concentrated on tackling the problems of deforestation and the sustainable production of forest products. A third aspect of sustainable forest management is the protection and management of legally protected forest areas. Such areas require financing to protect and maintain them and, with the exception of sites where ecotourism may be feasible, are unlikely to produce any financial returns.

The conservation of forest areas of particularly high environmental value is recognised by all countries as an important component of sustainable forest management. However, in the case of many developing countries, financing to support these areas is often negligible in the face of the many more urgent demands on government finances. Consequently, many governments designate legally protected areas but do not have the resources to protect or maintain them (the so-called "paper parks"). In view of the fact that the benefits of many of these areas are global in nature, there is some justification for a recurrent transfer of financing to support such areas from rich to poorer countries.

There have already been a number of developments in this area, such as the Global Environment Facility and various debt for nature swaps. Another recent development is the direct purchase or leasing of areas of high conservation value by non-governmental organisations. So far, the latter has occurred mostly within developed countries, although a few projects involving non-governmental transboundary funding of conservation areas have taken place.

Generally, funding for such initiatives has been extremely limited to date, considering the vast area of forests contained in legally protected areas. It seems that there may be a useful role for an international funding mechanism to support the management of forest conservation areas in developing countries.

### ***5.3.2 General support to the sector***

Financing of the forestry sector, either for normal investments or to support investments with public benefits, should be based on financial and economic sustainability, which implies that nationally generated financial resources should be the prime source of such financing. International financial resources should be used to bridge financial gaps in this process and to provide resources for activities that are providing specific global benefits.

### ***5.3.3 Staff training***

The other area where significant project investment might be justified is staff training. As already noted, the implementation of sustainable forest management will require a significant upgrading of skills in the forestry sector. Forest workers and forest managers will be expected to improve harvesting and management practices and forestry administration staff will be expected to play a wide number of roles that are currently unfamiliar. Several million people currently work in the forestry sector in developing countries and this is no small task.

The private-sector is unlikely to invest in such training, the benefits of which will be global in nature. Similarly, government administrations may see this as a low priority in the face of other demands for government services. Consequently, there is likely to be a need for international support in this area. Assistance could focus on several developments, including:

- technology transfer from rich to poor countries;
- the development of nationally recognised training curricula, set to meet international standards for forest management;
- the development of national training centres and regional centres of excellence

Such investment will be a necessary condition for the widespread implementation of sustainable forest management in most developing countries.



## 6 APPROACHES TO INTERNATIONAL CO-OPERATION

Based on the above analysis and more general discussions about some of the issues raised here, a set of general and specific strategies to promote more sustainable forest management through the use of international co-operation, have been derived. These are briefly outlined below.

- It may be unrealistic to expect to reach agreement on what sustainable forest management really means, particularly when the concept includes a wide variety of the goods and services that forests produce. Even the immensely simpler concept of sustainable wood production is open to various interpretations. Therefore, it is probably more pragmatic to focus on the process of improving forest management, particularly by reducing or eliminating clearly unsustainable practices and by promoting an incremental progress towards more sustainable forest practices.
- Sustainable forest management for wood production is feasible in many ecological, economic and political situations. However, the number and complexity of factors that affect the feasibility of implementing sustainable forest management is such that it is not possible to design clear and certain paths towards improved forest management. There are no obvious recipes of universal validity to promote more sustainable practices in different political, economic and social environments. The forces that influence the management of forests, including: technological processes; environmental and economic conditions; political and social factors; are all likely to be present in most situations. Nevertheless, they are likely to be mixed in many different ways, requiring a combination of measures specifically crafted to respond to local conditions in order to foster improved forest management in any particular case.
- The promotion of sustainable forest practices requires sound institutions, policies and political support for reform. Institutional strength is perhaps the most essential ingredient required to implement improved forest management through clear rules of the game, effective control over forest resources and the elimination of negative policies and corrupt activities. In countries where these conditions are not present, a productive role of international co-operation and finance is probably that of introducing new ideas, promoting public awareness about the consequences of continuing business as usual and developing institutions. However, because these reforms depend heavily on political factors, it is not easy for international institutions to influence them. Mobilisation of political forces supporting reform in these cases may take a long time. However, abundant experience indicates that the alternative of throwing money at the problem simply does not work when policies and institutions are not adequate. Experiences also show that lasting policy reforms can not be “bought” by international institutions or effectively imposed through conditionalities (Spears, 1994). On the other hand, in countries where sound policies and institutions exist or where governments are willing to introduce reforms, financial resources can produce an impact.
- It should be noted that the promotion of improved forest management does not always require large amounts of money. In fact, frequently the opposite may be true: some of the actions to foster better forest management, such as the elimination of subsidies, may save government's money or increase their revenues. Thus, the role of development finance is likely to be less important in terms of providing additional money than in terms of supporting improved governance.



- Many, perhaps most, of the actions to promote improved forest management will have to aim at sectors other than the forest sector. In addition, many of these actions may not be politically palatable. Ensuring more sustainable development may require changes in sectors such as: transportation; mining; and oil exploration. Policy reforms need to be based on a careful assessment of how developments in these sectors will affect different stakeholders because benefits and costs are likely to be distributed unevenly. The initial role of international support should be that of analysing and disseminating the consequences of inaction, education of the public and strengthening institutions. Financing may be needed to compensate those that lose as consequence of policy reforms.
- Frequently it is not necessary to design new models or policy approaches to improve forest management. A more productive approach is likely to be to target policy and institutional failures that are known to exacerbate the proliferation of unsustainable practices.
- In general, it is important to reduce the uncontrolled use of public forest resources. Access may be needed, particularly for the rural poor, but under more controlled circumstances. Development finance should support the attainment of a firmer grip on public property rights, land demarcation, land titling and land ownership enforcement. No investments in improved forest management will be sufficiently attractive until the option of unsustainably harvesting valuable wood acquired at nominal prices in public forests is effectively brought to an end.
- Enhanced forest management plans, policies and projects are only as good as the knowledge upon which they are based. International institutions should support applied research in developing country institutions that will provide essential knowledge about the economic, political, social and technological forces that shape the incentives to improve forest management.
- Improving data and the dissemination of information is a priority area for investment. Countries can only improve their forest management when they have adequate knowledge and information on which to base their decisions. The World Bank and other international agencies should work towards strengthening countries' capacity to collect and analyse forest sector information and make wise land management decisions based on such information.

## REFERENCES

- Barros, A, and Uhl, C, 1995, Logging along the Amazon River and estuary: patterns, problems and potential, *Forest Ecology and Management*, Vol 77, pp 87-105.
- Brown, C, 1999, The outlook for future wood supply from forest plantations, *Global Forest Products Outlook Study Working Paper GFPOS/WP/03*, FAO, Rome.
- Contreras-Hermosilla, A, 1999, Towards sustainable forest management: an examination of the technical, economic and institutional feasibility of improving management of the global forest estate, *FAO/FPIRS/01*.
- Dupuy, B, Maître, H -F, and Amsallem, I, 1999, Tropical forest management techniques: a review of the sustainability of forest management practices in tropical countries, *FAO/FPIRS/04*. (Also available in French).
- Hagner, S, 1999, Forest management in temperate and boreal forests: current practices and the scope for implementing sustainable forest management, *FAO/FPIRS/03*.
- Southgate, D, 1998, *Tropical forest conservation: an economic assessment of the alternatives in Latin America*, Oxford University Press, New York.
- Spears, J S, 1994, Conditional lending experience in World Bank financed projects, Report No 13820, Operations Evaluation Department, World Bank, Washington DC.
- Whiteman, A, Brown, C, and Bull, G, 1999, Forest product market developments: the outlook for forest product markets to 2010 and the implications for improving management of the global forest estate, *FAO/FPIRS/02*.
- Whiteman, A, (editor), in prep, The potential for technological change to influence future wood supply and demand, *Global Forest Products Outlook Study Working Paper GFPOS/WP/04*, FAO, Rome.



## ANNEX 1: THE FOREST SECTOR AT A GLANCE IN WORLD BANK CLIENT COUNTRIES

	Non-OECD countries		OECD
	Tropical	Temperate and boreal	Temperate and boreal
<b>Forest resources</b>			
Forest area (in million ha)	1,805	1,005	645
<i>Forest cover (in percent)</i>	32.8	22.5	21.2
<i>Forest area (in ha per capita)</i>	0.57	0.66	0.60
Forest area change (in million ha per year)	-12.6	+0.1	+1.2
<i>Forest area change (in percent per year)</i>	-0.70	+0.01	+0.18
Forest area available for wood supply (in million ha)	680	770	350
<i>Forest area available for wood supply (in percent)</i>	37.7	76.6	54.3
Legally protected forest area (in million ha)	150	90	50
<i>Legally protected forest area (in percent)</i>	8.3	9.0	7.8
Other unavailable forest areas (in million ha)	975	145	245
<i>Other unavailable forest areas (in percent)</i>	54.0	14.4	38.0
<b>Forest products production and consumption</b>			
Industrial roundwood production (in million m <sup>3</sup> )	345	220	925
<i>Industrial roundwood production (in m<sup>3</sup> per ha)</i>	0.19	0.22	1.43
<i>Industrial roundwood production (in m<sup>3</sup> per ha available)</i>	0.51	0.29	2.64
Industrial roundwood exports (in million m <sup>3</sup> )	35	30	60
<i>Industrial roundwood exports (percentage of production)</i>	9.5	12.5	6.5
Wood product production (in million m <sup>3</sup> )	320	205	965
<i>Wood product production (in m<sup>3</sup> per capita)</i>	0.10	0.13	0.89
Wood product exports (in million m <sup>3</sup> )	70	45	245
<i>Wood product exports (percentage of production)</i>	20.8	20.8	25.5
Wood product consumption (in million m <sup>3</sup> )	305	195	990
<i>Wood product consumption (in m<sup>3</sup> per capita)</i>	0.10	0.19	0.92
Wood product imports (in million m <sup>3</sup> )	55	35	270
<i>Wood product imports (percentage of consumption)</i>	18.0	17.9	27.3
Fuelwood consumption (in million m <sup>3</sup> )	1,370	295	140
<i>Fuelwood consumption (in m<sup>3</sup> per capita)</i>	0.43	0.19	0.13



## **PAPERS PRODUCED BY FAO FOR THE WORLD BANK FOREST POLICY IMPLEMENTATION REVIEW AND STRATEGY**

Contreras-Hermosilla, A, 1999, Towards sustainable forest management: an examination of the technical, economic and institutional feasibility of improving management of the global forest estate, FAO/FPIRS/01.

Whiteman, A, Brown, C, and Bull, G, 1999, Forest product market developments: the outlook for forest product markets to 2010 and the implications for improving management of the global forest estate, FAO/FPIRS/02.

Hagner, S, 1999, Forest management in temperate and boreal forests: current practices and the scope for implementing sustainable forest management, FAO/FPIRS/03.

Dupuy, B, Maître, H -F, and Amsallem, I, 1999, Tropical forest management techniques: a review of the sustainability of forest management practices in tropical countries, FAO/FPIRS/04.

Dupuy, B, Maître, H -F, and Amsallem, I, 1999, Techniques de gestion des écosystèmes forestiers tropicaux: état de l'art, FAO/FPIRS/05.

