



PART

2

Selected issues in the forest sector

THERE IS INCREASING EVIDENCE that forests will be profoundly affected by climate change. The recent outbreak of the mountain pine beetle in British Columbia, for example, appears to be related to historically high temperatures and may become the worst forest catastrophe in Canadian history.

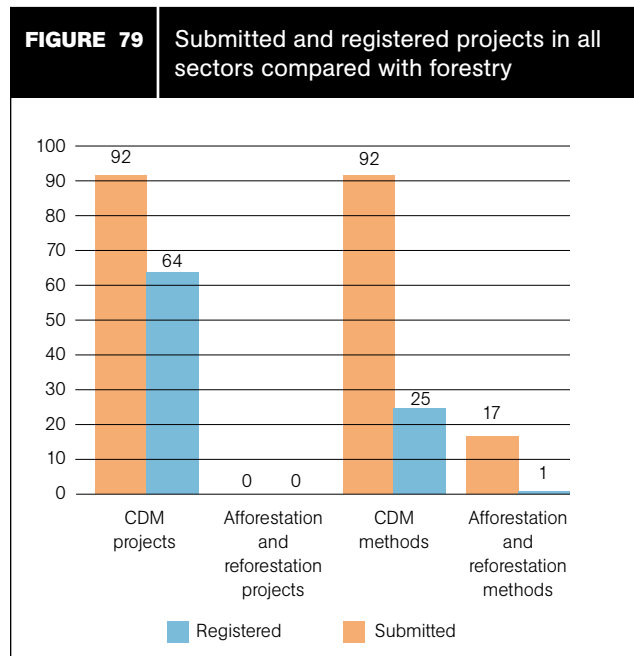
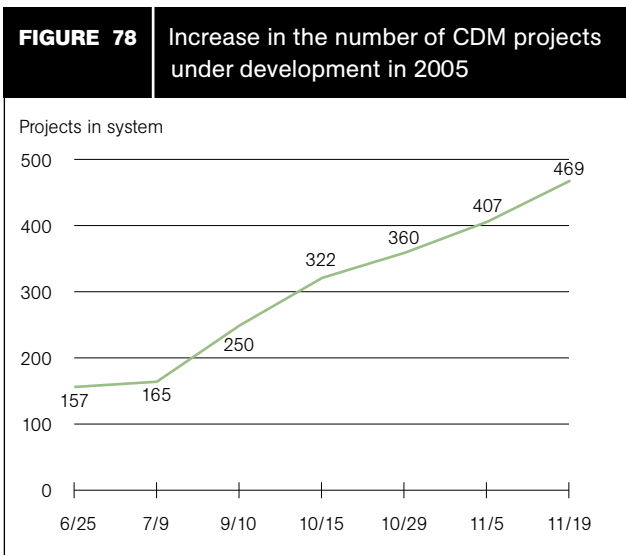
On the other hand, forests can play a key role in mitigating climate change. However, the world is struggling with political and bureaucratic hurdles that are limiting the use of the Kyoto Protocol (United Nations, 1998) as an instrument to help stop tropical deforestation.

After its entry into force in February 2005, implementation of the Protocol and its mechanisms is slowly gaining momentum, but there has been little impact in the forest sector. As of 2006, 25 methodologies for setting baselines and monitoring Clean Development Mechanism (CDM) projects (in all categories) had won approval, and 64 projects employing one of the approved methodologies had been registered. Many more projects are in the pipeline (Figure 78).

Forestry projects lag behind those of other sectors (Figure 79). Among the hurdles is the decision by the European Commission not to admit carbon credits from forestry projects in its internal emission trading scheme. However, individual European Union governments are free to purchase such credits, and a review of the Commission's decision was expected in late 2006.

CDM rules have been modified to allow the bundling of small- or large-scale projects. This opens up the possibility of relatively risk-free, small-scale afforestation and reforestation projects, and will facilitate the involvement of low-income individuals and communities.

Climate change negotiations have tended to focus on greenhouse gas emissions in industrialized countries. But attention now also encompasses developing countries, whose emissions are substantial and increasing. Attention focuses in particular on the role played by deforestation – which causes 35 percent of emissions in developing countries and fully 65 percent in the least developed countries. Unusually high participation in the United Nations Framework Convention on Climate Change (UNFCCC) Workshop on Reducing Emissions from Deforestation in Developing Countries, held in Rome, Italy, from 30 August to 1 September 2006, was a clear sign that developing countries are ready to begin reducing their emissions from land-use changes and that the climate-change regime is furthering its role in the global effort to reduce deforestation. Financing is a key hurdle. The workshop proposed several new mechanisms for transfer of payments from developed to developing countries. Negotiations will continue at a second workshop to be held in 2007.



THE YEAR 2006 was the International Year of Deserts and Desertification (IYDD), declared by the United Nations General Assembly to raise public awareness of this crucial issue. Observation of IYDD was led by an interagency committee of partners active in the implementation of the United Nations Convention to Combat Desertification (UNCCD), including the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and FAO. Countries and civil society groups organized international events and special initiatives such as tree-planting ceremonies to spread the message that desertification is a global problem, thus helping to strengthen the place of dryland issues on the international environment agenda.

Desertification constitutes one of the world's most alarming processes of environmental degradation. It affects about two-thirds of the countries of the world, more than one-third of the earth's surface (more than 4 billion hectares) and more than one billion people, with potentially devastating consequences on livelihoods and food security.

Desertification refers to the degradation of land resulting from various forces, including climatic variability and unsustainable human activities such as overcultivation, overgrazing, deforestation and wildland fire. It reduces the biological and economic productivity of land and has negative effects on rivers, lakes, aquifers and infrastructure. Desertification reduces food security and can lead to social unrest and conflict. By the year 2020, an estimated 135 million people risk being driven from their lands because of continuing desertification, including 60 million in sub-Saharan Africa alone.

With the world's highest rate of desertification, sub-Saharan Africa is facing losses in the productivity of cropping land approaching 1 percent annually and has had a productivity loss of at least 20 percent over the last 40 years (World Meteorological Organization,

personal communication, 2006). Other affected areas of the world include one-quarter of Latin America and the Caribbean and one-fifth of Spain. In China, sand drifts and expanding deserts have taken a toll since the 1950s of nearly 700 000 ha of cultivated land, 2.35 million hectares of rangeland and 6.4 million hectares of forests, woodlands and shrublands. Worldwide, some 70 percent of the 5.2 billion hectares of dry lands used for agriculture are already degraded and threatened by desertification.

In spite of the social and environmental impacts of desertification, there is no updated information on the progression of this process. The World Bank has been using the same estimate of annual losses resulting from desertification (US\$42 billion) since 1990 (World Bank, 2006a). The Millennium Assessment is based on a model developed in the early 1980s. Updated information is a key factor for more effective action. UNEP estimates that an effective 20-year global effort to combat desertification would cost in the range of US\$10 to 22 billion per year.

Natural vegetation plays a fundamental role in fighting soil degradation, and perennial vegetation guarantees effective and long-lasting soil protection. Deforestation increases the vulnerability of land to desertification. Afforestation and reforestation, within an appropriate landscape approach, are among the most effective ways to counteract it.

The financing of efforts to halt desertification is perhaps the most problematic issue facing countries with low forest cover. Many of the countries are poor and are already facing difficulties in repaying loans to international financial institutions. The World Bank, regional development banks and UN organizations and agencies have a role, as well as the Global Mechanism for UNCCD. Since land degradation was adopted as one of its focal areas, the Global Environment Facility is a potential source of funds, as well.



Green belt outside Nouakchott, Mauritania, protects the city from moving sand dunes: left, mechanical sand dune fixation precedes tree planting; right, established protection stands (2005)

FOREST LANDSCAPE RESTORATION brings people together to identify, negotiate and implement practices that restore an optimal balance among the ecological, social, cultural and economic benefits of forests and trees, within the broader pattern of land uses. It involves practical approaches that do not try to re-establish the pristine forests of the past. Rather, the goal is to adopt holistic approaches that restore the functions of forests and trees and enhance their contribution to sustainable livelihoods and land uses.

The Global Partnership on Forest Landscape Restoration (see www.unep-wcmc.org/forest/restoration/globalpartnership) is a worldwide network of more than 25 governments and organizations working to strengthen forest landscape restoration efforts globally (Box 5). Partners share their expertise with other practitioners, governments, communities and businesses. Several members of the Collaborative Partnership on Forests (CPF) are also active in this partnership.

Phase I (2003–2005) of the global partnership focused on raising the profile and understanding of forest landscape restoration, establishing national working groups, securing funds and providing technical support to its advocates. An International Forest Landscape Restoration Implementation Workshop was held 4–8 April 2005 in Petropolis, Brazil.

Phase II (2005–2009) aims to: increase the partnership; extend the network of learning sites to improve understanding and practices in forest landscape restoration; encourage broader, multistakeholder participation; strengthen the legal, policy, regulatory and institutional frameworks for forest landscape restoration; provide critical information and tools for sound development; and host a second international workshop.

Forest landscape restoration can be a vehicle to deliver on commitments regarding forests, biodiversity, climate change and desertification, as well as contributing towards achieving the Millennium Development Goals. It involves a multidisciplinary approach that integrates policies, plans and practices across sectors in national development processes, including eradicating hunger, reducing poverty and managing natural resources on a sustainable basis. Consequently, it also involves the integration of national forest programmes, policies and plans into national development programmes.

Experience has shown that successful forest landscape restoration starts from the ground up, with people who live in the landscape and stakeholders affected by its management. There is no single blueprint for success, as each situation depends upon unique local circumstances and processes. Examples of forest landscape restoration in the pattern of land uses interspersed in the landscape may include:

- management of natural forests for protective functions (e.g. watershed management or conservation of biodiversity);
- management of natural forests for productive functions (e.g. wood, fibre and NWFPs);
- soundly planned and managed planted forests created through afforestation and reforestation;
- riparian buffer zones along watercourses for flood and erosion protection;
- retention of forested corridors between remnant forest areas;
- rehabilitation of secondary forests;
- management of natural forests for tourism and recreation;
- agroforestry, combining trees, agricultural crops and livestock;
- community-based forest and tree development in phase with people's needs;
- urban and peri-urban forestry.



Forest landscape restoration – a mosaic of planted forests for wood production and secondary naturally regenerated forests for protection of valleys and waterways, Bahia State, Brazil

BOX 5 Members of the Global Partnership on Forest Landscape Restoration	
World Conservation Union (IUCN)	International Union of Forest Research Organizations (IUFRO)
World Wide Fund for Nature (WWF)	International Tropical Timber Organization (ITTO)
Alliance of Religions and Conservation (ARC)	Program on Forests (PROFOR)
CARE International	Secretariat of the United Nations Forum on Forests (UNFF)
Secretariat of the Convention on Biological Diversity (CBD)	UNEP World Conservation Monitoring Centre (UNEP-WCMC)
Centre for International Forestry Research (CIFOR)	Forestry Research Institute of Ghana (FORIG)
Food and Agriculture Organization of the United Nations (FAO)	Governments of El Salvador, Finland, Italy, Japan, Kenya, Lebanon, South Africa, Switzerland, the United Kingdom of Great Britain and Northern Ireland and the United States of America
Global Mechanism for the UN Convention to Combat Desertification	
World Agroforestry Centre (ICRAF)	

THE CROSS-SECTORAL and participatory nature of national forest programmes makes them ideal mechanisms for gathering and sharing information from a wide range of sources on country issues, priorities and initiatives both within and outside forestry. As such, they can be instrumental in addressing the marginalization and underfunding of the sector by building linkages to wider national agendas, including poverty reduction and similar development strategies. However, the literature suggests that ties are often weak or non-existent.

Interviews in 2005 with government authorities and NGOs in Namibia, the Niger, Nigeria, the Sudan, Tunisia, Uganda, the United Republic of Tanzania and Zambia explored the extent to which national forest programmes and other sectoral processes were linked to poverty reduction strategies or similar frameworks. Best practices and constraints on and opportunities for establishing effective linkages were identified, drawing on lessons from forestry and other sectors such as agriculture, energy, health and education. The following findings are indicative of trends.

- Poverty reduction as a national goal is sharpening the focus on cross-cutting issues.
- Governments are instituting sector-wide approaches to planning and resource allocation.
- Efforts to assess and report on poverty are increasingly involving stakeholders, but participatory processes are often time-consuming and costly.
- Decision-makers will continue to underestimate the importance of forestry to social and economic development as long as the sector fails to quantify the full extent of its contributions, including those from fuelwood, NWFPs and environmental services.
- Change in donor funding from sectoral to central support may weaken forestry capacity and hinder efforts to decentralize services to districts and

communities where interventions could have the greatest potential to alleviate poverty.

- Marketing forestry on the basis of its capacity to meet key objectives of other sectors will broaden understanding of the benefits and open up opportunities for collaboration.

In partnership with IUCN, the Overseas Development Institute, the Center for International Forestry Research (CIFOR) and Winrock International, the Program on Forests (PROFOR) is attempting to show how sustainable forest management can enhance rural livelihoods, conserve biological diversity and help achieve the Millennium Development Goals. Under this partnership, case studies were carried out in Guinea, Honduras, India, Indonesia, the Lao People's Democratic Republic, Mexico, Nepal and the United Republic of Tanzania. In addition, a poverty-forests linkages toolkit was developed to increase understanding of how forests contribute to livelihoods (see www.profor.info/content/livelihood_poverty.html). The material includes:

- methods for gathering information on economic and other contributions from forests to households, especially those of poor people;
- field-data analyses that determine how forests can reduce poverty and vulnerability;
- suggestions for a packaging of results that is relevant to local and national planners, governments, institutions and organizations;
- description of poverty reduction strategy processes, including potential entry points for forestry, and an indication of the skills required to influence outcomes;
- case studies that illustrate the contributions of forest resources to households and an analysis of the impact of forestry policies and programmes.



Development organizations are increasingly working to show how sustainable forest management can contribute to poverty reduction and to strengthen links between forestry programmes and poverty-reduction strategies

RECENT DECADES have witnessed rapid socio-economic changes affecting all aspects of life, including the society/forest relationship. Globalization, accelerated by the rapid expansion of information and communications technologies, has brought countries and people together, and the ease of movement of capital and technology has altered the economic landscape. At the same time, the unevenness of globalization has excluded a large number of people from realizing the potential benefits. Society is grappling with change-related environmental problems, including loss of biological diversity, land degradation and desertification, climate change and increasing costs of energy and water.

An understanding of how the society/forest relationship is likely to evolve is important in preparing the sector to address emerging challenges and opportunities. Strengthening country-level strategic planning requires a better understanding of the developments beyond national borders. It is in this context that FAO is implementing regional and global forestry sector outlook studies.

Regional forestry sector outlook studies are carried out on a rotating basis. Of the five studies, the one on Asia and the Pacific was completed first (in the late 1990s), followed by Africa, Europe, Latin America and the Caribbean and Western and Central Asia, and a new study is currently under way to extend the Asia and the Pacific outlook from 2010 to 2020.

Global studies build on regional studies and are available on specific themes, including: a global fibre supply model; global forest products consumption, production, trade and prices; and the global outlook for wood supply from forest plantations. Most of the current projections extend through 2010. By the end of 2007, these projections will have been extended through 2030.

Global and regional outlook studies synthesize information from a variety of sources to provide a coherent view of the overall direction of change (Box 6). The focus is on analysing driving forces and how they directly and indirectly have an impact on forests. "What happens to forests" will be largely determined by "what happens outside forests".

BOX 6

What does the future hold for forests and forestry?

Drawing upon FAO global and regional outlook studies, a number of trends have been observed:

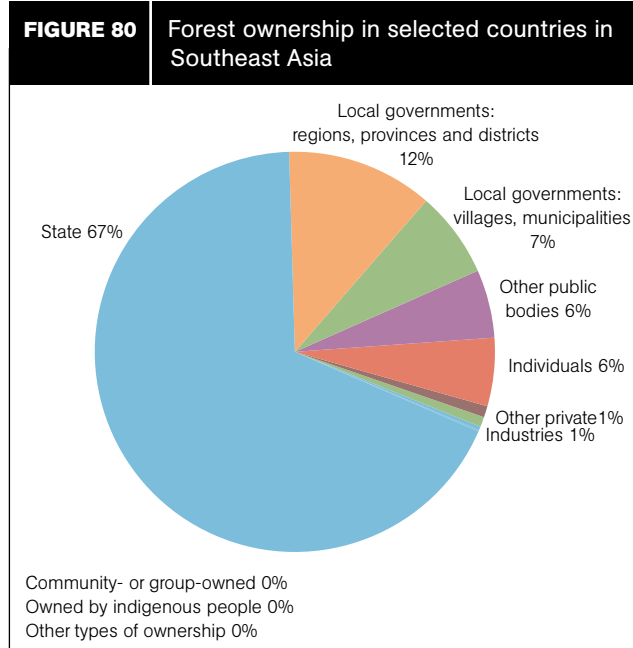
- Deforestation and forest degradation will continue in most developing regions; a reversal of the situation would depend on structural shifts in economies to reduce direct and indirect dependence on land. In most developing tropical countries, agricultural land used for both subsistence and commercial cultivation continues to expand. Consequently, loss of forests will continue.
- In contrast, deforestation has stopped in countries where the agricultural land base has shrunk. Continued expansion of forests is expected in parts of Asia and the Pacific, Europe and North America. A shift away from fossil fuels and towards biofuels will have divergent impacts, in some cases resulting in expansion of forests while, in others, continued degradation. However, the reduced economic viability of forestry may result in lower investments in forest management.
- The possible effects of climate change may increase the incidence and severity of forest fires and pest and disease infestation and may alter forest ecosystems. At the same time, concern about climate change will focus increased attention on the role of forests in carbon conservation and sequestration and in substitution of fossil fuels.
- Increasingly, forests will be valued for their environmental services. The protection of biodiversity and the arresting of desertification and land degradation will assume greater importance.
- Recreational use of forests is receiving more attention, especially in developed and rapidly developing countries, requiring changes in the approach to forest management.
- Technological changes, such as biotechnology and materials technology (especially engineered wood), will improve productivity and reduce raw material requirements.
- Geographical shifts in production and consumption are likely to intensify, especially as a result of rapid growth of emerging economies in Asia and the Pacific and Latin America and the Caribbean. This will be countered by slow growth of demand in many developed countries, owing to demographic changes and lower income growth rates.
- For many developing countries, wood will remain the most important source of energy. The rising price of oil and increasing concern for climate change will result in increased use of wood as fuel in both developed and developing countries. The development of improved fuel conversion technologies that enhance energy efficiency would particularly favour this shift.

THERE HAVE BEEN many projects, workshops, case studies and reports on participatory and community forestry over the past 30 years, but is there quantitative evidence of real change? One such measure would be the extent to which forest ownership and management rights have devolved to local communities or to individuals. This could take many forms:

- recognition of ownership or tenure of forest land by community groups;
- devolution of the management of selected state forest areas to local users' groups;
- joint management or co-management of state forest lands;
- leasing of state lands for forestry purposes;
- community concessions.

Public forest ownership remains by far the predominant category in all regions (FAO, 2006a). At the global level, 84 percent of forest lands and 90 percent of other wooded lands are publicly owned. The area of forests owned and administered by communities doubled from 1985 to 2000 – reaching 22 percent in developing countries – and is expected to increase further (White and Martin, 2002).

A 2005 study of forest tenure in 19 countries in Southeast Asia (FAO, 2006j) revealed that about 365 million hectares of forests (92 percent) are public, the majority of which (79 percent) are owned by central governments (Figure 80). The percentage owned by local communities and groups and indigenous peoples is insignificant. Most public forests (63 percent) are managed directly and solely by central or local governments. However, when considering forests owned or managed by local forest holders, this area increases to 18 percent of total forest area. Short-term agreements, with a limited



SOURCE: FAO, 2006j.

devolution of management rights and responsibilities, prevail over longer, more secure tenure agreements.

The transfer of forest management and user rights often is not accompanied by adequate security of tenure and the capacity to manage these resources. Improving local rights and access to forest resources are prerequisites to sustainable forest management. Much remains to be done to secure these rights and to remove policies and institutional frameworks that hamper the scaling-up of participatory forestry. Understanding the impact of forest tenure is essential if governments are to formulate effective policies and promote sustainable use and stakeholder participation.

LIKE ANY OTHER industrial activity, harvesting of wood and non-wood products has an impact on the natural and social environment. Reduced-impact logging methods such as low-intensity, selective harvesting cause minimal environmental damage and are economical if environmental impacts such as damage to residual stands are factored in (FAO, 2004b).

Yet inappropriate harvesting methods are still widely used throughout the tropics – to the detriment of the well-being of the workforce and local population, environmental sustainability and efficiency. Damaging practices may include:

- hyper-selective harvesting or skimming, which jeopardizes polycyclic harvesting systems and tempts foresters to re-enter harvested blocks;
- failure to implement a harvesting plan;
- inadequate road planning and construction;
- uncontrolled felling and wasteful topping and trimming;

- causing excessive crawler tractor skid trails on vegetation and soil, rather than working only on marked trails when carrying out skidding operations;
- wasteful conversion of timber owing to inappropriate topping and grading at the landing;
- lack of monitoring, control and impact assessment.

Why do these practices persist? The reason is a combination of unawareness and economics. Many companies or individuals in the harvesting business are unfamiliar with reduced-impact logging practices; they do not realize that such practices are as economically viable in the long run as traditional ones; contractors are not trained; more destructive logging and road-building practices are in place; some simply do not care. Unfortunately, many loggers think in short time frames and do not consider the environmental impacts. In many instances, companies have no legal or apparent financial incentive to improve their harvesting practices.

While intergovernmental processes have struggled to make progress at the policy level, considerable progress has been achieved at the field level regarding steps to be taken to manage forests sustainably. The *FAO model code of forest harvesting practice* was developed in 1996 (FAO, 1996). Regional codes were subsequently agreed in Asia and the Pacific in 1999 and in West and Central Africa in 2003 and 2005. National-level codes have been adopted or are under preparation in several countries in Southeast Asia. Parallel to the publication of the codes, implementation strategies were developed and training and activities increased in many countries, but progress in the field remains slow.

Two main hurdles threaten successful implementation of best practices in forest harvesting: illegal logging practices, which are undermining fair market conditions, and widespread lack of awareness of or concern for the economic, environmental and social benefits of good harvesting practices.

Forests and people suffer from destructive and wasteful harvesting practices. Technical, social and environmental guidelines are available, but are insufficiently implemented. More awareness-raising, training and research are needed to overcome these challenges.



FAO/H. Faïn

Environmentally friendly harvesting: skidding of Okume ties on a preplanned skid trail, without damage to soil or residual vegetation, Gabon

“INVASIVE SPECIES”, also known as “alien species” or “alien invasive species”, are species whose introduction, establishment and spread into new areas threaten ecosystems, habitats or other species and cause social, economic or environmental harm, or harm to human health. Invasive species can be found in all taxonomic groups, from bacteria to mammals, and are second only to habitat destruction as a threat to global biodiversity (Mooney and Hofgaard, 1999).

Many factors can support the introduction and spread of invasive species, including land-use changes, forest activities (harvesting of wood and NWFPs, forest road construction and conversion of natural forest to planted forests), tourism and trade.

Particularly challenging to forest managers are non-native tree species that have been intentionally introduced into an ecosystem to provide economic, environmental or social benefits (Figure 81). Many tree species used for agroforestry, commercial forestry and desertification control are not native to the area. It is vital to ensure that such species serve the purposes for which they were introduced and are managed so as not to cause negative effects on native ecosystems (see FAO, 2005b).

Estimates of the full costs of biological invasions are rare because of the difficulty in assessing the costs of impacts on biodiversity, ecosystem functions and human health, or other indirect costs such as the impact of control measures. The costs of invasive species to the forest sector have not been studied on a global scale. However, based on a study of six countries (Australia, Brazil, India, South Africa, the United Kingdom and the United States of America), it was estimated that as many as 480 000 alien species have been introduced in agriculture and forestry worldwide, with an annual cost of more than US\$1.4 trillion (Pimentel *et al.*, 2001).

Preventing and reducing the harmful effects of invasive species requires an approach that incorporates biological, ecological and social sciences, economics, policy analysis and engineering. National efforts should include early warning systems, eradication and control, as well as increased awareness and political leadership. Global, regional and bilateral efforts include standards and guidelines, monitoring and assessment, and information and action networks.

Numerous international and regional programmes and instruments, binding and non-binding, have been

developed to address the problem of invasive species, some with direct or indirect implications for forests and the forest sector.

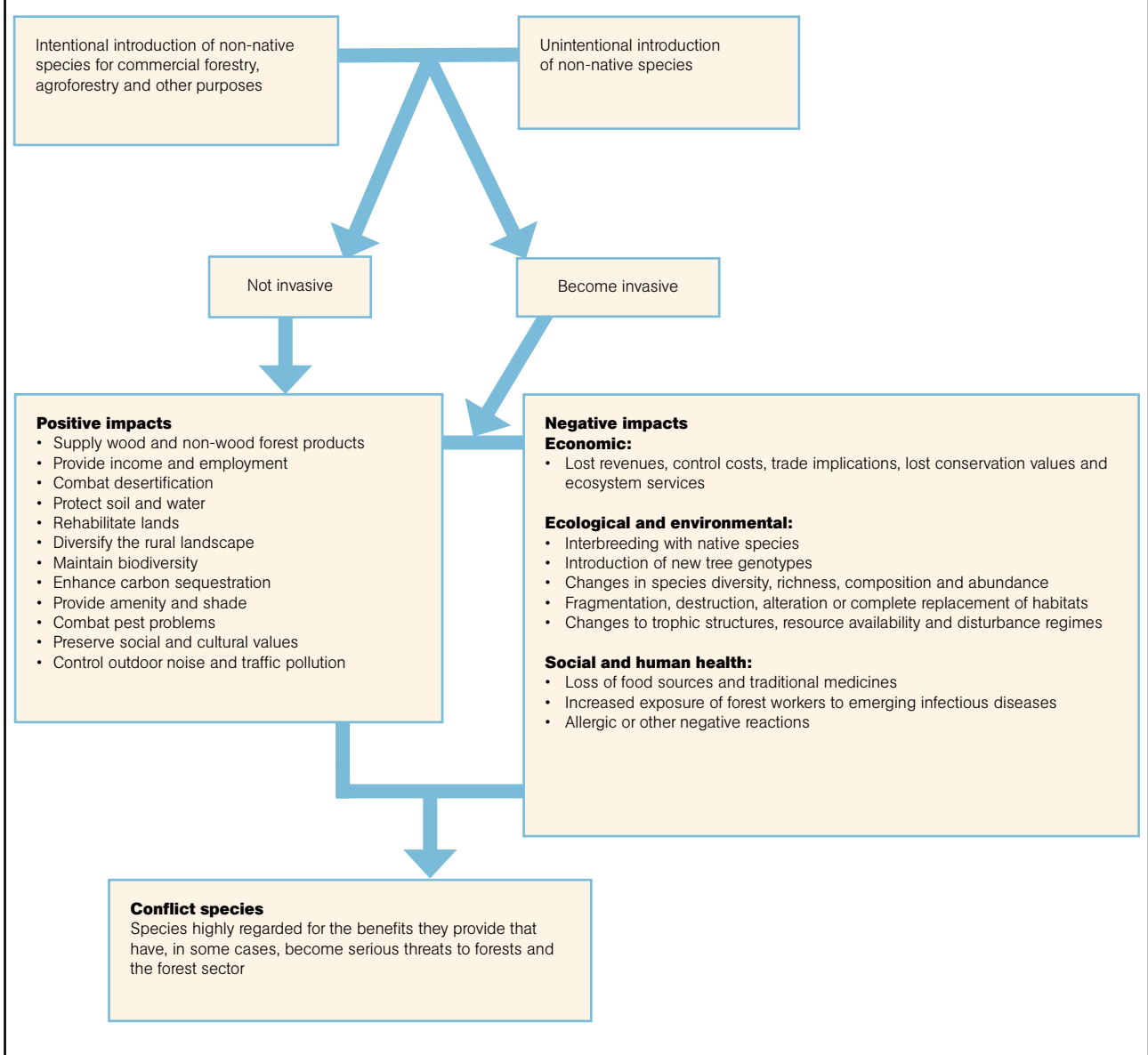
The Convention on Biological Diversity (CBD), for example, calls on its parties to “prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats, or species” (Article 8[h]). The parties have adopted a series of 15 guiding principles to lead governments and organizations in developing effective strategies for minimizing the spread and impact of invasive alien species. The eighth Conference of the Parties (COP-8) to CBD, held 20–31 March 2006 in Brazil, focused on gaps and inconsistencies in the international regulatory framework addressing invasive species. A process for the in-depth review of invasive species is scheduled for COP-9 in 2008.

The Global Invasive Species Programme (GISP) was established in 1997 to address global threats caused by invasive species and to provide support to the implementation of Article 8(h) of CBD. To increase awareness and provide policy advice, the Programme has prepared the *Global strategy on invasive alien species*, which outlines ten strategic responses to the invasive species problem (McNeely *et al.*, 2001). GISP initiated the Global Invasive Species Information Network (www.gisnetwork.org), a Web-based network of governmental, non-governmental, educational and other organizations working together to provide increased access to data and information on invasive species worldwide.

In addition, FAO and partner countries have recently created two regional networks: the Asia–Pacific Forest Invasive Species Network (APFISN) (www.fao.org/forestry/site/35067/en) and the Forest Invasive Species Network for Africa (FISNA) (www.fao.org/forestry/site/26062/en).

Because invasive species are addressed in different agreements and conventions (e.g. CITES, IPPC and the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures), many countries have difficulty in keeping up with the reporting requirements. In response, the UNEP World Conservation Monitoring Centre (UNEP-WCMC) has recently developed a set of issue-based modules summarizing country obligations under CBD and other conventions, which facilitates more streamlined and efficient delivery on reporting obligations (see svs-uneplibmdb.net/?q=node/14).

FIGURE 81 Introduction and spread of non-native woody species



THE IMPORTANCE OF monitoring, assessment and reporting on forests has gained widespread attention in the international forestry community. In recent years, progress has been made in several key areas.

MEASURING PROGRESS TOWARDS SUSTAINABLE FOREST MANAGEMENT

Many regional processes, FAO and ITTO have made contributions to monitoring, assessment and reporting for sustainable forest management. Fifteen years of work on criteria and indicators regionally and nationally have contributed to a common understanding of this concept. One result is that the Global Forest Resources Assessments continue to improve in terms of the scope of coverage, data quality and country participation (Box 7).

CAPACITY-BUILDING TO IMPROVE THE NATIONAL INFORMATION BASE

Steady progress is being made in strengthening the capability of countries to carry out monitoring, assessment and reporting, but it is hindered by a shortage of resources. The estimated cost of carrying out a one-time national forest assessment, based on relatively low-intensity, systematic field sampling, is from US\$500 000 to US\$1 million, depending on the country. In the past five years, FAO has supported the preparation of national forest assessments in 14 countries; in addition, three regional projects are planned or under way. This is a good start, but another 100 countries require assistance. The projects aim to strengthen national capabilities to monitor, assess and report on forest resources, products and institutions. ITTO supports training in the use of its criteria and indicators and related reporting format.

Status of national forest assessments

Assessment completed: Cameroon, Costa Rica, Guatemala, Lebanon, Philippines

Assessment in progress: Bangladesh, Congo, Honduras, Zambia

Assessment formulated: Cuba, Kenya, Kyrgyzstan, Nigeria

Assessment under formulation: Viet Nam, regional project in West Africa (9 countries), regional project in the Near East (7 countries), regional project in Southern Africa (SADC countries)

Project in progress: Regional project on monitoring, assessment and reporting in Asia (FAO/Japan)

INTERNATIONAL COMMITMENT

The World Resources Institute is working in selected countries to develop a forest mapping tool, based on satellite imagery, to help enforce laws and monitor illegal operations. In its work to streamline forest-related reporting to international processes, CPF is developing a common information framework that will improve information management and reduce the reporting burden on countries. It has provided easy access to national reports submitted to CBD, FAO, ITTO, UNFCCC, UNFF and other forest-related reporting processes and is working towards more-coordinated, unified information requests (www.fao.org/forestry/cpf-mar).

Progress has been made in harmonizing forest-related definitions through a series of expert meetings. A common understanding has been reached on the definitions of: forest, forest degradation, rehabilitation, restoration, fragmentation, natural forest, planted forest, forest plantation, forest management and managed forests. Despite this progress, some forest terminology remains inconsistent, and new definitions arising during international processes make it difficult to monitor trends in variables.

FUTURE CHALLENGES

- Forest data are weak in many countries. Information gaps make it difficult for countries to arrive at sound policy decisions and to implement sustainable forest management, including effective law enforcement.
- New technologies may improve the availability and reduce the cost of high-resolution satellite images for the monitoring of deforestation, forest degradation, shifting cultivation, biomass, growth and yield, and other useful variables. However, few countries have the resources to use these capabilities.
- Quality information requires a long-term investment.
- International organizations need to focus on acquiring information that is truly useful to member countries. Too many long questionnaires are circulated by too many organizations.
- CPF organizations need to expand their efforts to streamline reporting, to eliminate duplication and to present information in a consistent manner.
- Knowledge that is shared is powerful and cost-effective. Countries and organizations need to explore new partnership approaches.

BOX 7

Kotka V Expert Consultation on Global Forest Resources Assessment: Towards FRA 2010

The Global Forest Resources Assessment programme has received technical guidance from international specialists through expert consultations organized by FAO and UNECE at regular intervals over the last 20 years. The first consultation was held in 1987, and subsequent ones took place in 1993, 1996 and 2002. The most recent consultation, the fifth, was held 12–16 June 2006.

All consultations have been hosted by the Finnish Forest Research Institute (Metla) and have been held in the city of Kotka, Finland. Thus the most recent consultation is referred to as Kotka V.

Kotka V had two main objectives:

- to provide guidance for FRA 2010 based on an in-depth evaluation of FRA 2005; and
- to enhance collaboration with other forest-related reporting processes and organizations, with a view to pooling resources and streamlining reporting.

A total of 87 specialists from 45 countries and 17 international and regional organizations participated in this consultation.

The participants recognized that FRA 2005 is the most comprehensive assessment to date in terms of scope and the number of countries included. More than 800 specialists were involved over a period of four years – including 172 officially nominated national correspondents and their teams.

The experts noted that the increased country involvement and the network of national correspondents were key factors in the success of FRA 2005 and acknowledged the very substantial work by the national correspondents, who prepared the country reports. National correspondents underscored that the FRA reporting process offered an incentive to gather and analyse information on the forestry sector. They highlighted the importance of the country reports in assessing and monitoring forests at the national level and as input to the policy-making process.

The experts made a series of recommendations for the next Global Forest Resources Assessment, scheduled to take place in 2010:

- The topics covered by FRA 2005 were important and should be retained, with suggested changes to some of the existing tables.

- The use of sustainable forest management thematic elements as the reporting framework for FRA 2005 increased the relevance of the process and should be maintained for FRA 2010, with the addition of the seventh thematic element on the legal, policy and institutional framework.
- FRA 2010 should provide the forest-related information needed for the assessment of progress towards the 2010 biodiversity target of CBD.
- Country reporting should form the basis for FRA 2010, supplemented by special studies on specific issues and a remote sensing component providing complementary information on the spatial distribution of forests and on forest cover and land-use change dynamics at regional and global levels.
- The network of national correspondents should be maintained and strengthened, and regional networks should be supported by the countries and FAO.

The organizations participating in Kotka V (the Amazon Cooperation Treaty Organization, CBD, International Network for Bamboo and Rattan, ITTO, IUFRO, MCPFE, UNEP, UNEP-WCMC, UNFCCC, UNFF, World Agroforestry Centre [ICRAF] and World Bank) stressed the benefits they had received from FRA 2005. They confirmed their willingness to contribute information to future FRA work and to indicate their specific needs in order to promote streamlining of reporting. The meeting recommended that collaboration with forest-related organizations should be maintained and enhanced, with a view to pooling resources and expertise and reducing the reporting burden on countries.

It was further recommended that a longer-term strategy for FRA be developed. This should include: an analysis of the role and advantages of regional networks and regional reporting; the future reporting schedule and modality; and options for the further streamlining of reporting on forests at the international level. The next session of the FAO Committee on Forestry (COFO 2007) is expected to provide further guidance to FRA.

MOUNTAINS COVER one-quarter of the earth's land surface and are home to more than 700 million people – most of them poor, isolated and marginalized. In the 15 years since UNCED, when mountains were recognized for the first time as being of global importance, mountain issues have gained increasing attention. Action in the field to improve the plight of mountain people and protect mountain environments is now widespread. The International Year of Mountains in 2002 provided a unique opportunity to devote attention to mountain issues and has led to increased support at many levels.



Since the International Year of Mountains – 2002, efforts to improve the plight of remote mountain people and to protect mountain environments have become more widespread (Nepal)

Developments since the International Year of Mountains include the following.

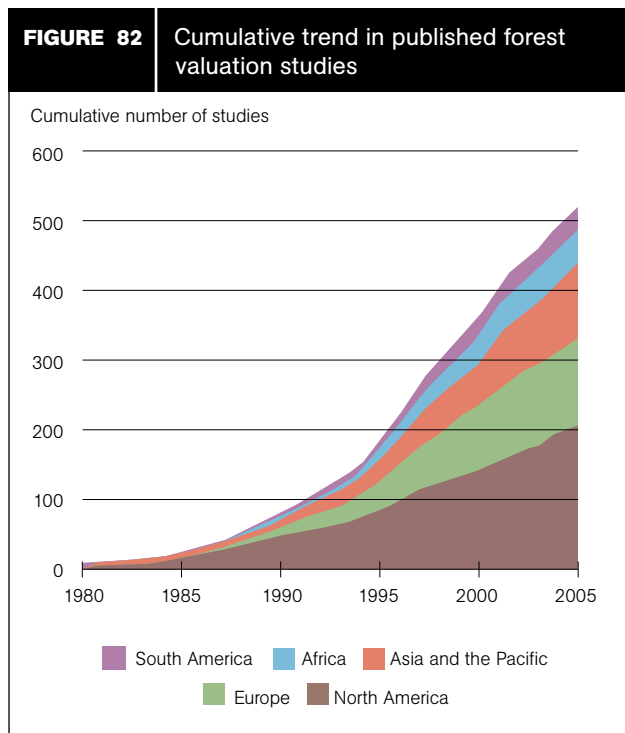
- A new mountain convention came into force in the Carpathian region.
- Processes to enhance collaboration based on the Carpathian model are under way in the Balkans and Caucasus mountain ranges.
- Countries in the Hindu Kush Himalaya and the Andes have expressed interest in exploring mechanisms for transboundary cooperation.
- The CBD has developed a work programme on mountain biological diversity.
- The Mountain Partnership, launched at the 2002 World Summit on Sustainable Development, has expanded to include 130 members, including governments, international organizations, civil society groups, and private-sector members. The partnership facilitates networking, communications, livelihood improvements and sustainable rural development in mountain regions.
- Global efforts, including the Millennium Ecosystem Assessment and the Mountain Research Initiative, are creating greater awareness of mountain issues.

Overcoming poverty remains the greatest challenge. Mountain people are still among the world's poorest, and remoteness is often a barrier to development and to participation in the benefits of the global economy. Rapid advances in communications and information technology are helping to overcome the physical barriers faced by mountain communities.

IT IS WELL KNOWN that forests can produce a wide range of non-market benefits. Wider recognition of these benefits among policy-makers has been promoted in international and national policy debates on the management and use of forests.

Techniques for valuing non-market benefits have existed for several decades and have been refined to the point where they are now accepted in some (mostly developed) countries in public-sector project and policy appraisals. A more recent trend has been the development of mechanisms to reward forest owners for the production of non-market benefits, often called payments for environmental services.

There is increasing interest in this topic, as evidenced by the growing number of published studies (Figure 82).



SOURCE: Derived from Envalue (www.environment.nsw.gov.au/envalue), EVRI (www.evri.ec.gc.ca) and FAO (www.fao.org/forestry/finance) databases on valuation of non-market benefits.

Most have been produced in developed countries: Australia and New Zealand (which account for a significant proportion of the Asia and the Pacific studies) and countries in Europe and North America. Many of these studies have examined recreation, amenity and environmental benefits (including the value of hunting, which has been a popular subject in North America). In developing countries, in contrast, most studies have examined the value of the subsistence use of forest products, rather than the broader social and environmental benefits.

Payments for environmental services include user fees (such as entry fees for recreation areas or permit fees for hunting) and artificial markets for other services from forests (e.g. payments for watershed protection activities). The latter have been a relatively recent innovation and, in many cases, these markets have been created and developed by governments.

Although only partial information is available, it is likely that payments for biodiversity services (especially user fees) are currently much larger than payments for carbon and watershed protection activities, as markets for the latter are much newer, and that formal arrangements for payments have been developed in only a few countries. A significant proportion of the market involves ad hoc payments or voluntary arrangements (e.g. investments in forestry for carbon sequestration external to the Kyoto Protocol).

Although interest in forest valuation and payment for environmental services remains high, many developing countries are unable to use these techniques owing to the high costs of data collection, analysis and the establishment of markets for such payments. In addition, many developing countries have difficulty collecting all the forest charges and taxes owed by producers of forest products. This suggests that addressing the latter problem should be a greater priority for immediate action than the developing of more sophisticated mechanisms such as these payments.

PLANTED FORESTS CONTINUE to expand, and their contribution to global wood production is approaching 50 percent of the total.

FAO gathered new information on planted forests in 2005 (FAO, 2006i), taking into account for the first time the planted component of semi-natural forests, which are neither strictly natural forests with minimal management nor forest plantations of introduced species with intensive management (Box 8). Semi-natural forests may be reforested by enrichment planting and/or seeding or through assisted natural regeneration and silvicultural treatments that enhance growth and yield.

The survey covered 38 selected countries representing 83 percent of the semi-natural forest area and 86 percent of the global forest plantation area.¹

Asia leads the world in planted forests, followed by Europe (Figure 83). The areas of forests planted for productive purposes and of those planted for protective purposes are both steadily increasing (Figure 84). The trends are similar in all regions except Africa.

The top ten countries accounted for 81 percent of the 38 countries surveyed (Table 38). Of the planted forests in these countries, 73 percent were managed for productive purposes and 27 percent for protective purposes. However, it is obvious from the results that not all countries use the categories “productive” and “protective”, given that it is unlikely that the planted forests in any country would actually fall 100 percent in either category, as reported by Brazil, Japan, Sweden and the United States of America.

Conifers dominate the productive planted forest category, accounting for 54 percent of area reported in 2005 (Figure 85), while broadleaves account for 39 percent. In the protective forests category, coniferous species account for 47 percent and broad-leaved species 31 percent (Figure 86).

The global area of semi-natural forests increased marginally from 251 million hectares in 1990 to 256 in 2000 and 261 in 2005. For the surveyed countries, semi-natural forests in 2005 comprised 53 percent planted and 47 percent assisted natural regeneration. These proportions are representative of semi-natural forests globally; however, proportions varied markedly among regions, subregions and selected countries.

The proportion of semi-natural forests managed through assisted natural regeneration decreased over the period 1990–2005, particularly in Europe and South and Southeast Asia (Figure 87). An exception was North America, where the proportion of assisted natural regeneration increased.

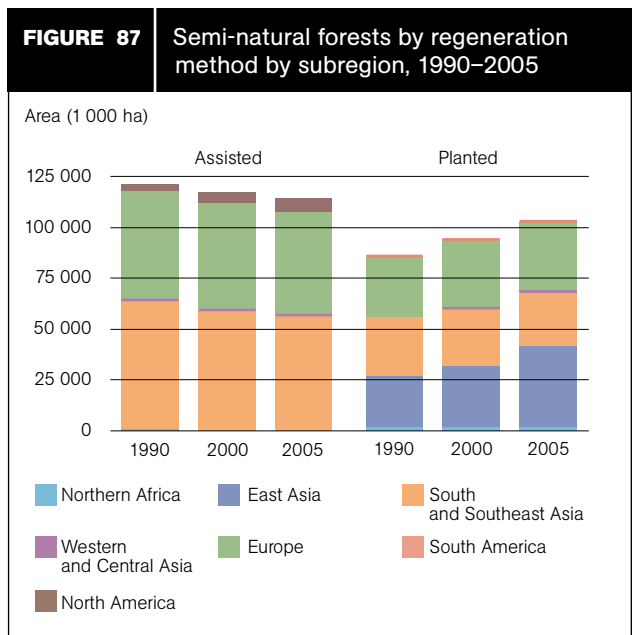
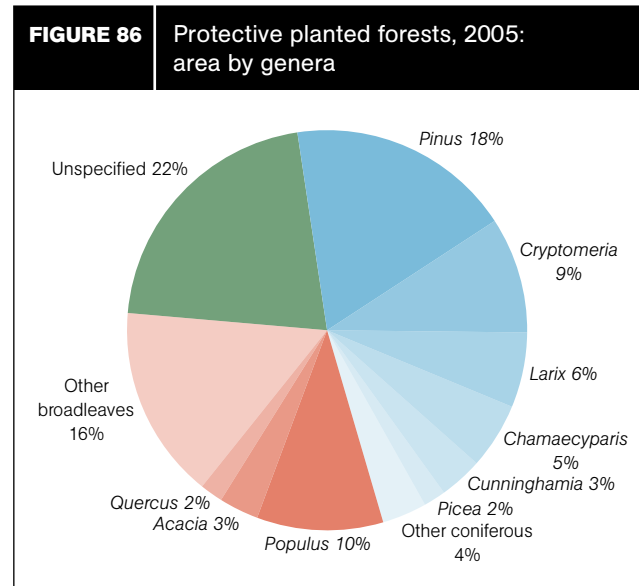
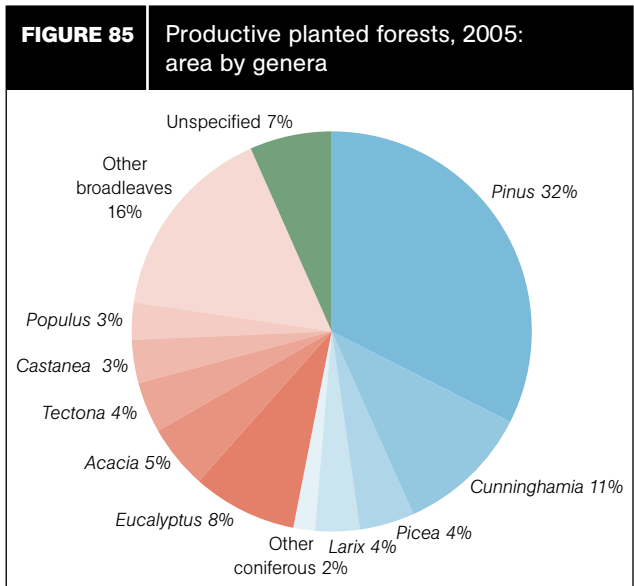
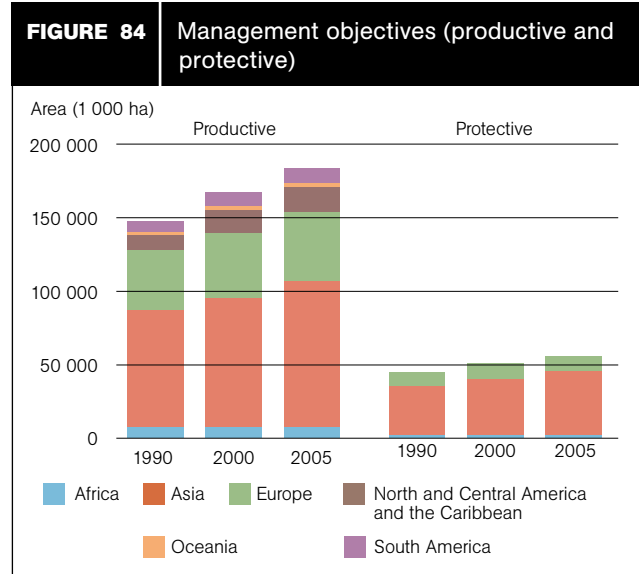
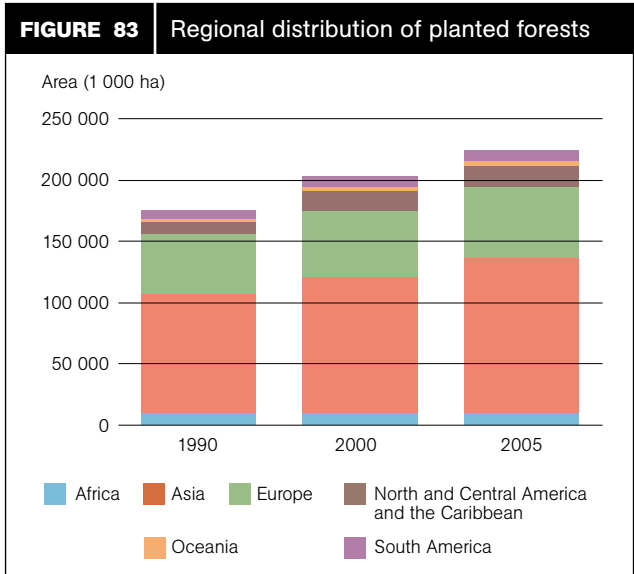
Globally, the proportion of semi-natural forests established through planting or seeding increased, especially in East Asia. A marginal decrease was registered in Africa.

TABLE 38
Ten countries with largest area of planted forests, 2005 (1 000 ha)

Country	Total	Productive	Protective
China	71 326	54 102	17 224
India	30 028	17 134	12 894
United States of America	17 061	17 061	0
Russian Federation	16 963	11 888	5 075
Japan	10 321	0	10 321
Sweden	9 964	9 964	0
Poland	8 757	5 616	3 141
Sudan	6 619	5 677	943
Brazil	5 384	5 384	0
Finland	5 270	5 270	0
Total	181 693	132 095	49 597

BOX 8 Planted forests in the continuum of forest characteristics						
Naturally regenerated forests		Planted forests				Trees outside forests
Primary	Modified natural	Semi-natural		Plantations		
		Assisted natural regeneration	Planted component	Productive	Protective	
Forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed	Forest of naturally regenerated native species where there are clearly visible indications of human activities	Silvicultural practices by intensive management: <ul style="list-style-type: none"> • Weeding • Fertilizing • Thinning • Selective logging 	Forest of native species, established through planting or seeding, intensively managed	Forest of introduced and/or native species established through planting or seeding mainly for production of wood or non-wood goods	Forest of introduced and/or native species, established through planting or seeding mainly for provision of services	Stands smaller than 0.5 ha; tree cover in agricultural land (agroforestry systems, home gardens, orchards); trees in urban environments; and scattered along roads and in landscapes

¹ Figures for many other countries were obtained too late to be included in the present analysis.



NOTE: East and Southern Africa, West and Central Africa and Oceania reported 0.

PRODUCTION OF INDUSTRIAL roundwood was 1.6 billion cubic metres in 2004, and about 7 percent of this was exported (about 120 million cubic metres). Thus 93 percent of industrial roundwood was processed domestically for domestic consumption or export.

Forest products trade reached a total value of US\$327 billion in 2004 (Figure 88). This represents 3.7 percent of global trade value in all commodity products. Primary wood products accounted for 21 percent and primary paper products for 34 percent of the value of forest products trade. Secondary products (such as furniture or books) accounted for the remainder. The recent sharp increase in values is largely a result of the high appreciation of the euro to the United States dollar.

TRENDS IN REGIONS AND PRODUCTS

On a global scale, the greater part of the forest products trade has taken place within Europe, within North America, and among Asia and the Pacific, Europe and North America. Europe is the largest exporting and importing region in the world. It imported a value of US\$158 billion and exported US\$184 billion of forest products in 2004, accounting for, respectively, 47 and 56 percent of global import and export value. These large shares are a result primarily of the high proportions of paper products and secondary processed products traded (Figure 89).

A recent conspicuous change is the emergence of the Russian Federation as the largest exporter of industrial roundwood. The Russian Federation exported 42 million cubic metres of industrial roundwood in 2004, accounting for 35 percent of global trade. East Asia and Europe are major importers of Russian timber.

Another interesting feature is that, from 2001, North America as a whole became a net importer of forest products (in terms of value). Moreover, this gap in net trade is widening every year because of rapidly growing imports to the United States of America from Asia, Europe and South America.

Wood-processing industries have developed in the past decade, especially in China, Eastern Europe and several developing countries. For example, in 2004 China became the largest importer of industrial roundwood, a major exporter and importer of wood-based panels, the second largest importer of paper and paperboard and the largest exporter of secondary processed wood products such as wooden furniture. Eastern European countries have become major exporters of sawnwood, wood-based panels and secondary processed wood products. Southeast Asia and Brazil have also developed their secondary wood-processing industries.

Foreign investment has played a critical role in the development of processing industries in rapidly growing

regions, particularly in technology transfer, infrastructure development and improved access to global markets. Factors that have promoted foreign investment include low labour and production costs, government support to education and research, incentive policies for foreign investment and a growing domestic economy. Proximity to forest resources and major markets used to be a fundamental factor. However, as has been noted in China's exports, low production costs offset the higher transportation costs in reaching forest resources and global markets. The gap is widening between developing countries that are able to produce competitive products using foreign investment and those that are not able to do so.

Recent expansion of processing capacity in developing regions has shifted production bases on a global scale. A consequence is intensified competition, reflected in the downward trends in trade prices for major wood products. Faced with the rapidly increasing imports of wood products from China, the United States of America and the European Union have imposed anti-dumping duty on some Chinese products.

DEVELOPMENT OF TRADE POLICIES TO PROMOTE SUSTAINABLE FOREST MANAGEMENT

Public procurement policy

Several countries (including Belgium, Denmark, France, Germany, Japan, the Netherlands, New Zealand, Sweden and the United Kingdom) have developed or are developing public procurement policies to promote the use of legally or sustainably produced products, as have several local governments in Europe and the United States of America. Verification of legality is a basic requirement in these schemes, although differences are seen with regard to criteria, sources and coverage of products, and methods of verification.

Private-sector initiatives

"Green building" initiatives in a number of countries promote construction practices that use sustainably produced products. Examples include the Leadership in Energy and Environmental Design Green Building Rating System by the United States Green Building Council, which gives points for the use of certified wood. Similar initiatives have started in Canada and Europe.

Recently, some large European paper companies have begun incorporating chain-of-custody verification and certification of forest management into their investment projects in developing countries. At their second global meeting in June 2006 in Rome, Italy, the chief executive officers of 54 international forest industry companies signed a Commitment to Global Sustainability.

Phytosanitary measures

In an effort to control the spread of invasive pests, in 2002 the Interim Commission on Phytosanitary Measures of the IPPC adopted International Standard for Phytosanitary Measures No. 15 (ISPM 15) for treating wood packaging material in international trade. As of January 2006,

the European Union and more than 20 countries have implemented or are developing national standards in accordance with ISPM 15, including major exporters and importers of industrial commodities that use wood packaging material.

FIGURE 88 Regional trends in forest products trade

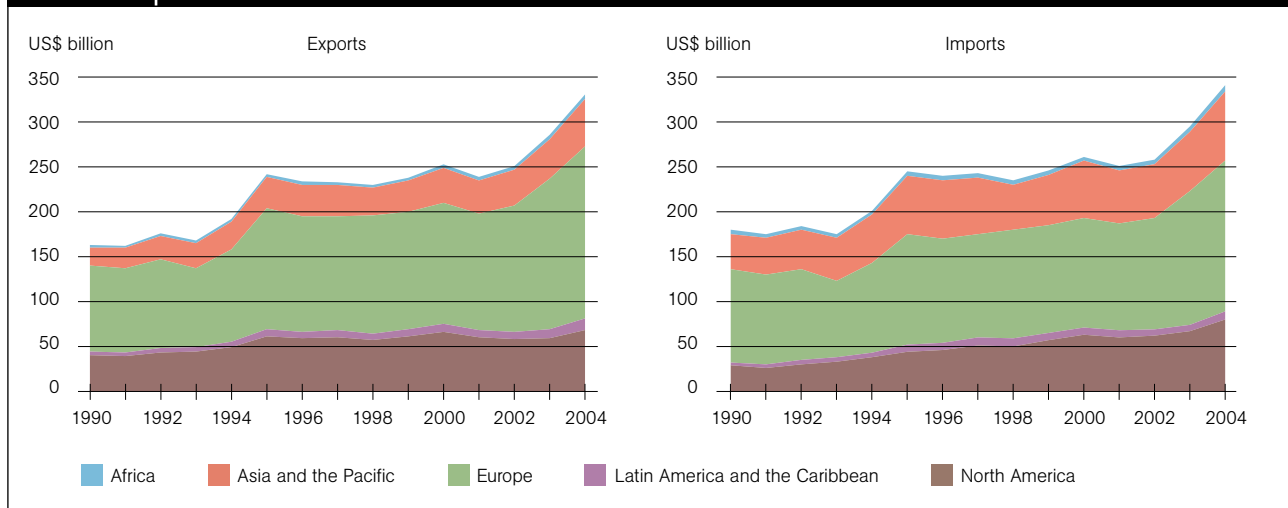
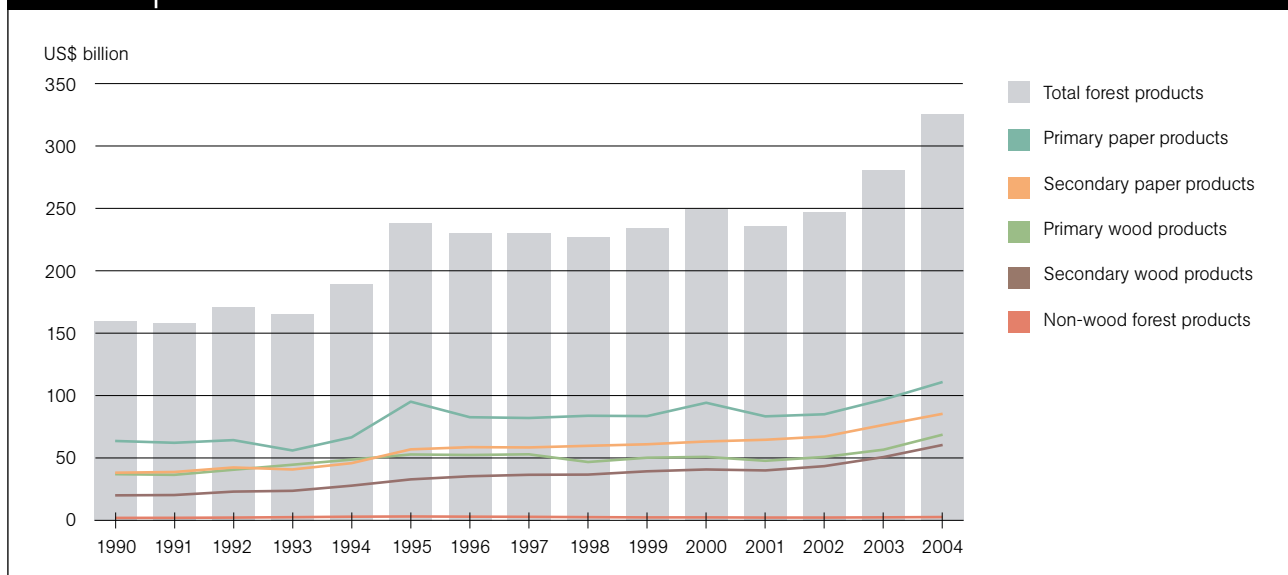


FIGURE 89 Global exports of forest products, 1990–2004



NOTE: Primary wood products include roundwood, sawnwood, wood-based panels and wood chips. Secondary wood products include wooden furniture, builders' joinery and carpentry. Primary paper products include pulp, paper and paperboard. Secondary paper products include packaging cartons, boxes and printed articles, including books and newspapers.

SOURCES: FAO, 2006b; United Nations, 2006.

THE URBANIZATION of society continues to increase, presenting challenges and opportunities for forestry. As urban areas expand, nearby trees and forest resources are usually lost or degraded. At the same time, there is a growing awareness across the globe of the importance of urban green spaces to the quality of the urban environment and urban life.

Cities in developing countries face specific problems in the supply of essential products to city dwellers, including food, wood-based energy and clean water. Urban residents fight pollution and search for the recreational and leisure functions provided by green areas. The development of human settlements is often spontaneous and uncontrolled, particularly in situations of conflict or natural disaster.

Urbanization has a heavy impact on the natural resource base, including the use of forests and trees for

basic wood products and fuelwood. This can result in watershed degradation and soil erosion in the rural areas surrounding cities. On the other hand, the rural poor can benefit from the income generated by the production of wood, fuelwood, NWFPs and foodstuffs if there are rights to tree and forest resources and equitable access.

The challenge of urban forestry has been increasingly addressed in international venues, for example the IUFRO World Congress 2005; the eighth and ninth sessions of the European Forum on Urban Forestry in 2005 and 2006; and the second and third sessions of the Urban World Forum in 2004 and 2006. Much of the participation in these events, however, has been from developed countries. A challenge is to make it possible for the cities of the developing world to benefit from the lessons learned in the developed world.

The Asia–Europe Meeting (ASEM) is an informal process of dialogue and cooperation that brings together the member countries of the European Union with 13 Asian countries. This process has sponsored two symposia on urban forestry. The first, held in China in 2004, resulted in a set of goals, priorities and follow-up actions for cooperation in urban forestry among member countries. The second, held in Denmark in June 2006, focused on urban forestry for human health and well-being.

In April 2006, FAO brought together representatives from five countries in Central and Western Asia to consider ways in which urban and peri-urban forestry could help alleviate poverty. Cities in these countries have similar problems: water quality, degradation of forest-based resources, and poverty. Examples were presented of good practices in the planning, management and use of urban greening in the region that have successfully contributed to urban livelihoods and quality of life. Workshop participants recommended that the social, cultural, economic and environmental benefits of urban greening need to be assessed and marketed and raised on the agenda of municipal and governmental policy-makers.



A.G. Ghuriani

Urban greening in Central and Western Asia: a community tree-planting day in Kabul, Afghanistan (2006)

MANY NATIONAL forest policies and international commitments stress that sustainable management of forests can be promoted through voluntary tools such as management guidelines, codes of best practices, criteria and indicators and standards for certification (Table 39). At the international level, such tools are developed through partners working together towards a common goal and defining shared principles and mechanisms. These voluntary instruments enhance knowledge-sharing and provide the means to conceptualize sustainable forest management, implement it and evaluate progress towards achieving it.

NATIONAL AND LOCAL GOVERNMENTAL TOOLS

Sustainable forest management requires a solid legal and policy foundation at the national level – or at the subnational level in countries where the responsibility for managing forests has been devolved to this level.

In the 15 years since UNCED, a majority of the world's countries have established or updated their national forestry laws and policies and are moving towards integrated approaches that balance environmental, economic and social aspects of forest management. In many countries, significant steps have been taken to devolve forest management to local levels and to involve local people in decision-making.

Some of the most innovative national and local policies are originating in tropical countries, where the battle to slow deforestation is fought on a daily basis. A vivid example is Costa Rica, the only country in Latin America that has succeeded in reversing the downward trend in forest area. Costa Rica is implementing many different tools to promote sustainable forest management, including tax incentives and payment for environmental services.

INTERGOVERNMENTAL INITIATIVES

Non-legally binding instruments for all types of forests

To strengthen political commitment and action to implement sustainable management of all types of forests and to achieve the global objectives on forests, UNFF has agreed to adopt a non-legally binding instrument on all

types of forests by 2007 (ECOSOC, 2006). It remains to be seen whether this instrument will be more or less effective than the existing Forest Principles adopted at UNCED in 1992.

Criteria and indicators for sustainable forest management

Criteria and indicators are used to monitor, assess and report on progress towards sustainable forest management. Most of the member countries of ITTO, MCPFE and the Montreal Process produce periodic reports on status and trends in forestry using the C&I framework. It is also applied in national forest programmes, certification and in communicating progress to policy-makers and the public.

CPF members and many national governments continue to promote the implementation of C&I as a framework for reporting and as a tool to support improved forest management practices. In 2004, four Central Asian countries joined the C&I process. Member countries of the Lepaterique Process of Central America recently reaffirmed their commitment to continue using C&I for reporting on progress towards sustainable forest management. The eight Amazon countries of the Tarapoto Process, operating under the umbrella of the Organización del Tratado de Cooperación Amazónica, validated 15 priority indicators in 2006.

ITTO used the C&I reports of its producer member countries as a basis for the *Status of tropical forest management 2005*. IUFRO promotes the use of C&I through training and through involving scientific and academic societies in the C&I process. CIFOR supports countries in improving their C&I for community-based and participatory forest management.

Forest law enforcement and governance

In recent years, a number of countries have actively promoted improvements in forest law enforcement and governance as a key component of national and international efforts to achieve sustainable forest management. Most of the initiatives have been regional in nature, for example in Central Africa, East Asia and Europe. International organizations actively involved in supporting the initiative include FAO, ITTO and the World

TABLE 39
Examples of tools to promote sustainable forest management

	Voluntary tools	Legally binding instruments
National	National forest programmes	National laws and regulations
Regional	C&I processes	Regional conventions
Global/international	UNCED Forest Principles	International Tropical Timber Agreement

Bank. The Group of Eight (G8) countries have also played a catalytic role.

NON-GOVERNMENTAL INITIATIVES

Certification schemes are market-based tools for sustainable forest management. The logic of certification is simple: if consumers prefer products from forests that are certified as being managed on a sustainable basis, or if they are willing to pay a higher price for certified products, then forest producers will have an incentive to adopt sustainable forest management practices.

The area of certified forests has expanded rapidly in recent years. The total area of certified forests is approaching 20 percent of the world's production forests (as defined by FRA 2005), although this is only 7 percent of the world's forest area. The majority of certified forests continue to be found in developed countries, where forest area was already stable or increasing before certification arrived on the scene. The challenge for certification is the need to expand the process to tropical forests.

TOOLS DEVELOPED BY INTERNATIONAL AGENCIES, INCLUDING MULTISTAKEHOLDER INITIATIVES

The development of voluntary guidelines is a key part of many international agencies' work, including that of FAO and ITTO (Box 9). They vary in scope and

level – from detailed operational practices to broader policy guidelines, and from regional to global. The more successful of these initiatives have one thing in common: they were developed by a broad spectrum of stakeholders representing government, the private sector and civil society.

Voluntary guidelines on planted forests and fire management are currently being developed through a broad consultative process involving technical experts representing different sectors and regions, the regional forestry commissions and COFO.

Once the voluntary guidelines are established, regional training workshops will be conducted to strengthen countries' capacity to translate the principles into policies and practices. Following the example of the *FAO model code of forest harvesting practice* (FAO, 1996), regions and countries can adapt and apply the new guidelines to their local situations and conditions.

USE AND USEFULNESS OF VOLUNTARY TOOLS

Voluntary, non-legally binding instruments provide guiding principles on forest use. At their best, they build upon international agreements and commitments, most importantly the Rio Forest Principles, but also international labour and trade agreements, including the International Tropical Timber Agreement (ITTA).

BOX 9 Examples of forest-related voluntary guidelines

Since 1990 countries have worked to develop and implement criteria and indicators for sustainable forest management through regional and international processes, pioneered by ITTO, that now cover 155 countries.

ITTO developed *Guidelines on the conservation of biological diversity in tropical production forests* (ITTO, 1993) to optimize the contribution of timber-producing tropical forests to the conservation of biological diversity.

The *FAO model code of forest harvesting practice* (FAO, 1996) was compiled to highlight the wide range of environmentally sound harvesting practices available and enable policy-makers to develop national, regional or local codes of practice to serve particular needs.

Subsequently, regional codes were agreed in Asia and the Pacific in 1999 (FAO, 1999) and West and Central Africa (FAO, 2005c). National-level codes have been adopted or are under preparation in several countries in Southeast Asia.

Governance principles for concessions and contracts in public forests (FAO, 2001b) compiles critical factors

in balancing and safeguarding the public and private interest in forest management and identifies new approaches to contractual arrangements in the provision of goods and services from public forests.

ITTO, in collaboration with partners, developed *Guidelines for the restoration, management and rehabilitation of degraded and secondary tropical forests* (ITTO, 2002), which is part of ITTO's series of internationally agreed policy documents for achieving the conservation, sustainable management, use and trade of tropical forest resources.

The Confederation of European Paper Industries developed *Legal logging: code of conduct for the paper industry* (CEPI, 2005) to combat illegal logging.

Best practices for improving law compliance in the forest sector (FAO/ITTO, 2005) distils the available knowledge that decision-makers could follow in reducing illegal operations in the forest sector.

The implementation of voluntary tools varies among regions and countries. For example, the *Regional code of practice for reduced-impact forest harvesting in tropical moist forests of West and Central Africa* (FAO, 2005c) is not yet well integrated at the national level owing to a lack of resources for training, while the *Code of practice for forest harvesting in Asia–Pacific* (FAO, 1999) is being implemented through national codes, with support from the Asia–Pacific Forestry Commission and bilateral donors.

Tremendous progress has been made in the conceptual development of criteria and indicators. However, C&I implementation lags behind in most developing countries, owing to deficiencies in data collection, analysis and storage, and weak institutional capacity, which affect the proper use and implementation of C&I. Their implementation is much farther along in countries that have significant financial resources.

The best results in developing countries have been achieved by linking C&I with national forest assessments and inventories and national forest programmes.

The area of certified forest has increased in developed countries and is helping to improve management practices, yet the original objective of combating deforestation in the tropics has not been widely realized. The problems are fairly straightforward: most deforestation in the tropics is caused by conversion to other land uses rather than by logging; certification is not cheap; and its successful implementation requires a solid institutional and governance platform. Moreover, it is yet to be seen whether consumers are willing to pay more for certified products on a large scale.

International agencies organize national and regional workshops for training and exchange of experiences to boost the use of the tools discussed. The challenge is to provide adequate support to capacity-building so that countries can make the best use of voluntary instruments. An emerging challenge is to avoid overlaps between different instruments and to integrate them through national policy and monitoring frameworks.

RECENT STUDIES have emphasized the complexity of the relationship between forests and water, including the myths that more trees are always “good” and that deforestation is always “bad”.

Floods in Bangladesh: history, dynamics and rethinking the role of the Himalayas (Messerli and Hofer, 2006) concludes that there is no evidence for a direct and causative link between Himalayan deforestation and floods in Bangladesh. The impact of forest cover on flooding is a question of scale: the effects of forest clearing on flood flows and sediment transport are immediate and strong in small mountain watersheds, while in large river basins, natural processes dominate.

Forests and floods: drowning in fiction or thriving on facts? (FAO/CIFOR, 2005) concludes that “... direct links between deforestation and floods are far from certain” and that “All floods cannot and should not be completely prevented – flooding is important for maintaining biodiversity, fish stocks and fertility of floodplain soils”.

From the mountain to the tap: how land use and water management can work for the rural poor (DFID, 2005) drew several conclusions that startled some foresters, including the provocative statement that “Trees on the whole are not a good thing in dry areas if you want to manage water resources”. Many trees, especially fast-growing species such as pines and eucalyptus, suck more water from the ground than other crops. The water transpires from the leaves, and the trees contribute to drying out the land. The report identifies ten policy lessons, emphasizing the importance of policy instruments and market mechanisms that benefit the poor and give due attention to livelihood benefits, not just water allocation.

At the World Water Council’s fourth World Water Forum in Mexico City, Mexico, in March 2006, ministers and scientists debated a World Bank paper, *Water, growth and development* (World Bank, 2006b), which argued that investments in water infrastructure will automatically lead to development. Several participants argued that one single approach will not work throughout the developing world.

A review by FAO and international partners (FAO, 2006k) – including the European Observatory of Mountain Forests (EOMF), the International Centre for Integrated Mountain Development (ICIMOD), REDLACH and ICRAF – recommended new and innovative approaches to watershed management, including the following:

- a move from participatory to collaborative approaches to managing watersheds (Table 40);
- more attention to institutional aspects;
- flexible programme design;
- a long-term approach to planning and financing for watershed management.

A thematic study on forests and water carried out in the framework of FRA 2005 (FAO, 2006l) identifies categories of forest ecosystems that require special attention based on their hydrological relevance:

- mountain cloud forests;
- swamp forests;
- forests on saline-susceptible soils;
- forests on sites with landslip risk;
- riparian forests;
- municipal water-supply forests;
- avalanche protection forests.

TABLE 40

Participatory and collaborative watershed management compared

Participatory watershed management	Collaborative watershed management
Focusing on communities and people and targeting primarily grassroots social actors (households, small communities)	Focusing on civil society and targeting a variety of social and institutional actors, including local governments, line agencies, unions, enterprises and other civil society organizations, as well as technical experts and policy-makers
Assuming that sound natural resource management is a public interest shared by all social actors	Recognizing that stakeholders bear particular (and sometimes contrasting) interests in natural resources that need to be accommodated
Seeking (or claiming) to make decisions through a bottom-up process, by which grassroots aspirations are progressively refined and then turned into operational statements and action	Seeking decision-making that merges stakeholders’ aspirations and interests with technical experts’ recommendations and policy guidelines through a continued two-way (bottom-up and top-down) negotiation process
Centring on the watershed management programme, with local government expected to assist as a side supporter	Centring on the local governance process, with the watershed programme acting as facilitator and supporter
Aiming at general consensus, presuming that conflict can be solved through dialogue and participation	Aiming at managing natural resource conflicts from the awareness that often dialogue and participation can mitigate (partially and temporarily) conflicts, but not fix them structurally

AMONG THE MULTIPLE threats to wildlife, two of the most immediate and direct are unsustainable hunting and trading in wildlife and wildlife products, and human–wildlife conflict.

In many parts of Africa, commercial trade in bushmeat for consumption is probably the single most important cause of the decline of wildlife populations, ranging from insects, birds and turtles to primates, antelopes, elephants and hippopotamuses. It was estimated that in the Congo Basin, alone, the annual offtake of bushmeat is about 5 million tonnes (Fa, Peres and Meeuwig, 2002), but a recent, detailed study of bushmeat offtake in the moist forests of Cameroon and Nigeria (Fa *et al.*, 2006), which documented an average offtake of 346 kilograms per square kilometre, suggests a much lower offtake of up to 1 million tonnes for the Congo Basin. However, this lower estimate gives little cause for comfort, because it is still far in excess of a sustainable level, given the inherently low production of animal biomass in tropical forests.

Meat from wild animals is not an African issue only (Table 41). The meat from freshwater turtles is consumed in huge volumes in East Asia, despite the fact that three-quarters of the 90 species found in Asia are considered threatened, and 18 of those critically endangered (IUCN, 2005).

There are success stories of the revival of overexploited wild animal populations. In 1969, all 23 species of crocodylians were threatened or had declining populations. Today, one-third of crocodylians can sustain a regulated commercial harvest, and only four species are critically endangered. In many cases, well-managed, CITES-approved ranching programmes produce sustainably harvested hides for the international market, garnering the support of industry and governments, while helping supplant illicit trade. Similar programmes in regulating the trade in wool products from South America's vicuna have resulted in similar successes. By the 1960s, vicuna populations had been reduced to 5 000 animals, less than 1 percent of historical populations, but conservation and management have restored their numbers to 160 000. Today, the illegal global trade in wildlife is second only to narcotics and is valued at almost US\$5 billion (Wildlife First, 2006).

Because of human population growth, the accompanying growth of human settlements and the

consequent reduction of wildlife habitat, conflicts between humans and wildlife are occurring more and more frequently around the world. In Africa, where many people depend directly on natural resources for their livelihoods, wildlife species such as crocodiles, elephants, hippopotamuses and lions raid crops, injure or kill livestock, invade human settlements and cause damage to personal belongings, and can even injure and kill people. As a result, local people are increasingly hostile to wildlife, and local communities do not cooperate with conservation authorities. The result is increased instances of poaching and other illegal activities.

The causes of human–wildlife conflicts will not be eliminated in the near future, and it can be expected that conflict will only increase in frequency and intensity. There is, therefore, an urgent need to find ways to manage human–wildlife conflict. A range of approaches are being tried, including natural and artificial barriers, such as suspending chilli-pepper-impregnated cloths on ropes surrounding agricultural fields, a technique used successfully in an FAO project in Ghana to deter elephants from raiding crops. At present, the most reasonable approach to managing human–wildlife conflict is to implement short-term mitigation strategies jointly with long-term preventive measures.

A poignant indicator that something is wrong in the human–wildlife relationship is the phenomenon described as “elephant breakdown” (Bradshaw *et al.*, 2005): “Elephant society in Africa has been decimated by mass deaths and social breakdown from poaching, culls and habitat loss.... Wild elephants are displaying symptoms associated with human post-traumatic stress disorder (PTSD): abnormal startle response, depression, unpredictable, asocial behaviour and hyperaggression.” This phenomenon has recently been given as an explanation for the killing of rhinoceroses by hyperaggressive, young male African elephants. New conservation strategies are required to preserve elephant social systems and promote normal social patterns.

A challenge for policy-makers is to balance conservation of wildlife resources with the livelihood requirements of local populations, in all regions.

TABLE 41

Decline of selected animal populations

Species	Initial population	Year	Current population	Decline (%)
Bonobo (pygmy chimpanzee)	100 000	1984	5 000	95.0
Asian elephant	200 000	1900	40 000	80.0
African elephant	10 000 000	1900	500 000	95.0
Tibetan antelope	1 000 000	1900	75 000	92.5

WOOD

WOOD IS INCREASINGLY used for energy.

High fossil fuel prices together with new energy and environmental policies are making woodfuel an essential ingredient of energy policy in both developed and developing countries. In developed countries, it is likely that the use of wood for energy will continue to increase if fossil fuel prices continue to rise. More generally, the use of biofuels, including those based on wood and on agricultural products, will likely continue to increase, including their use for motor vehicles. In developing countries, wood is already the primary source of energy for heating and cooking: in Africa, almost 90 percent of all wood removals are used for energy. With ever higher fuel prices, there will be even more pressure on forests and trees outside forests to provide energy in the poorest countries.

Traditionally, the main sources of wood for fuel are woody residues and wastes derived from timber industries (sawmills, particle board and pulp mills). In poor rural areas of developing countries, fuelwood is usually obtained directly by felling trees or collecting fallen wood. Recently, recovered woody biomass and residues from logging operations have also become important supply sources.

In 2003, renewable energy accounted for 13.3 percent of the world's total primary energy supply (Figure 90). Biofuels amounted to almost 80 percent of total renewable energy. They supply more energy than nuclear sources, and about four times as much as hydropower, wind, solar and geothermal energy combined. About 75 percent of biofuels are derived from fuelwood, charcoal and black liquor (a by-product of pulp and paper-making).

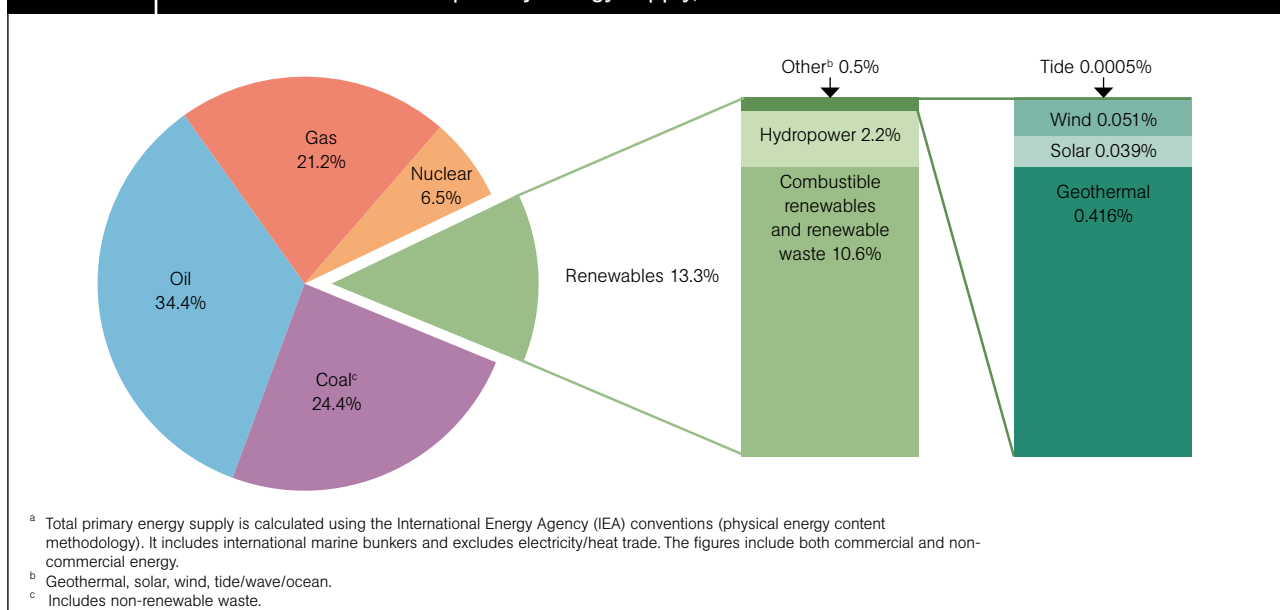
Most biofuels are used for residential cooking and heating, mainly in Africa, Asia and Latin America. For example, almost 90 percent of the wood removals in Africa are used for fuel. In Organisation for Economic Co-operation and Development (OECD) countries such as Austria, Finland, Germany and Sweden, biofuels are increasingly used for the production of electricity, attracting huge investments in wood-energy industries. There is a growing market for forest by-products as raw materials for energy. Sawmills and pulp and paper industries benefit by becoming energy producers.

Outlook studies by the International Energy Agency indicate that renewable energy sources will continue to increase their market shares in the energy mix (IEA, 2005). While heating and cooking will remain the principal uses for fuelwood and charcoal in developing countries, the use of solid biofuels for the production of electricity is expected to triple by 2030 (Figure 91).

Although most current woodfuels are derived from by-products (residues and wastes), in the future more will be derived directly from forests and tree plantations. The positive and negative implications of increased use of wood as fuel will depend on the rationality of future energy, environmental, forestry and industrial policies, including the role of incentives and taxes for the promotion of wood as fuel.

International trade in woodfuels is expected to increase in some regions, including Central and South America. Woodfuel production and export could become key ingredients for the development and expansion of forest

FIGURE 90 Fuel shares of world total primary energy supply,^a 2003

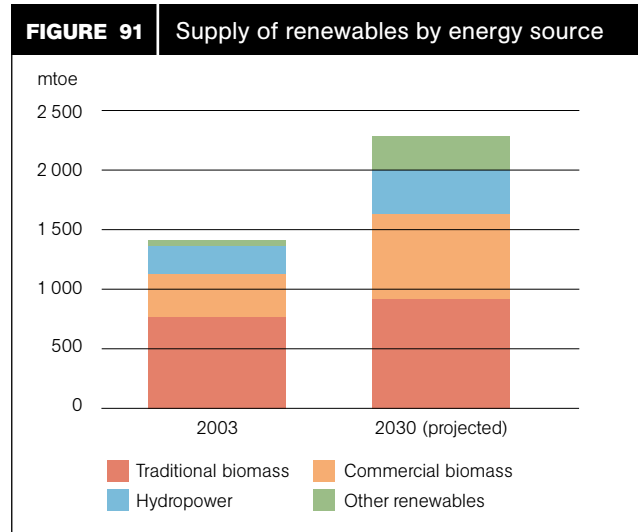


SOURCE: IEA Energy Statistics (available at www.iea.org/textbase/stats/).

activities, although it is not likely that this trend will have a direct impact on poverty. However, these activities may contribute to deforestation and forest degradation if policies are not implemented to avoid negative impacts.

As the demand for woody biomass for energy increases, structural changes in the energy sector will have positive and negative implications for wood industries. Wood energy could become a motor for the development and expansion of forestry activities. Progressive policies are required to ensure that these changes help alleviate poverty in developing countries.

Much of the research in this area has been undertaken by energy and forestry organizations in isolation from each other. This is clearly a field in need of more effective sharing of knowledge across traditional sectors.



NOTE: Mtoe = million tonnes of oil equivalent.

SOURCE: IEA Energy Statistics (available at www.iea.org/textbase/stats/).