Management, conservation and sustainable development of forests

Sustainable forest management can mean different things to different people. Criteria and indicators to monitor, measure and assess forest trends and conditions have significantly improved understanding of the concept, yet putting it into practice remains a challenge. Practitioners and policy-makers within and outside the forest sector have come to realize that managing forests in a sustainable manner involves the participation of a range of partners to balance trade-offs and resolve conflicts. This chapter examines the similarities and differences between sustainable forest management, as outlined by the "Forest Principles" adopted by UNCED, and the ecosystem approach, as defined by the Convention on Biological Diversity (CBD) and as applied to forests; describes successful forest landscape restoration practices; notes expanding opportunities for forest-based ecotourism in developing countries; identifies issues related to biosecurity, with a focus on invasive species; highlights developments in biotechnology in forestry; and examines international aspects of wildfire management, underscoring the importance of collaborative agreements to assist in cases of fire emergencies.

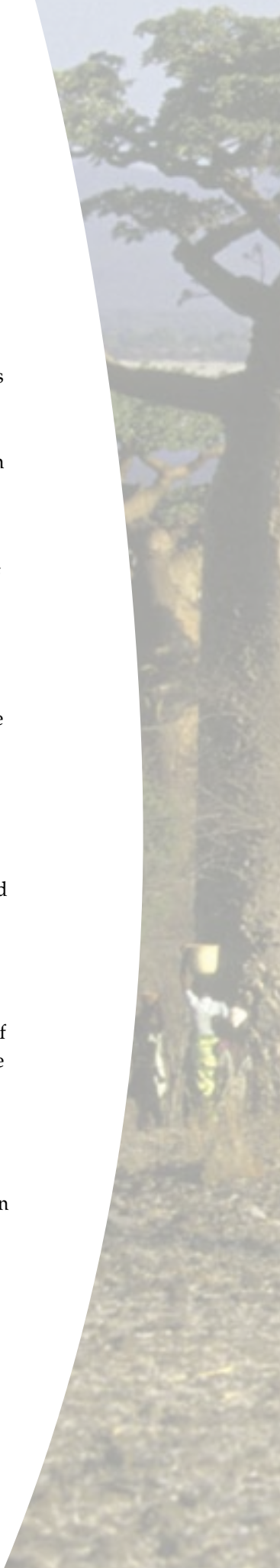
SUSTAINABLE FOREST MANAGEMENT AND THE ECOSYSTEM APPROACH

"Sustainable forest management", "ecologically sustainable forest management", "forest ecosystem management", the "ecosystem approach" to forest management and "systemic forest management" are among the many terms used to describe concepts and practices that incorporate the three pillars of sustainable forest management – economic, environmental and socio-cultural aspects – to varying degrees.

Recent discussions in the international forest dialogue have focused on the extent to which sustainable forest management and the ecosystem approach as applied to forests are similar, where they differ and how they could be integrated. The UNCED Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests (the "Forest Principles") (United Nations, 1992) outlines the former concept, while CBD defines the latter.

The results of these discussions may have implications both for forest managers and for national planning, monitoring, assessment and reporting. Which approach should forest managers apply – and how? Can countries use the same indicators for monitoring and reporting on progress towards sustainable forest management and towards application of the ecosystem approach to forests?

At the national and international level, clarification and potential integration of the two concepts might enable a better coordination and correlation between the expanded Programme of Work on Forest Biological Diversity of CBD and the Proposals for Action of the Ad Hoc Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) and thus avoid duplication and reduce the reporting burden on countries. It might also help to clarify the linkages and synergies between National Biodiversity Strategy and Action Plans and national forest programmes.



The concept of sustainable forest management

Sound forest management, taking into account social, cultural, economic and environmental values now and for the future, was widely practised in a number of countries before UNCED and the adoption of the Forest Principles. The concept of sustained yield was applied in forestry for more than a century and, together with watershed management, other soil and water conservation measures and forest protection, has helped maintain the vitality and productivity of production forests. The system of protected areas, which has led to the establishment of a large network of conserved forest ecosystems that now amounts to about 12 percent of the total forest area in the world (FAO, 2001), also long preceded UNCED. International agreement on the Forest Principles provided a basis on which to build a common understanding of sustainable forest management and measure progress.

The Forest Principles state that "forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations", that "these needs are for forest products and services, such as wood and wood products, water, food, fodder, medicine, fuel, shelter, employment, recreation, habitats for wildlife, landscape diversity, carbon sinks and reservoirs, and for other forest products" and that "appropriate measures should be taken to protect forests against harmful effects of pollution, including airborne pollution, fires, pests and diseases, in order to maintain their full multiple value".

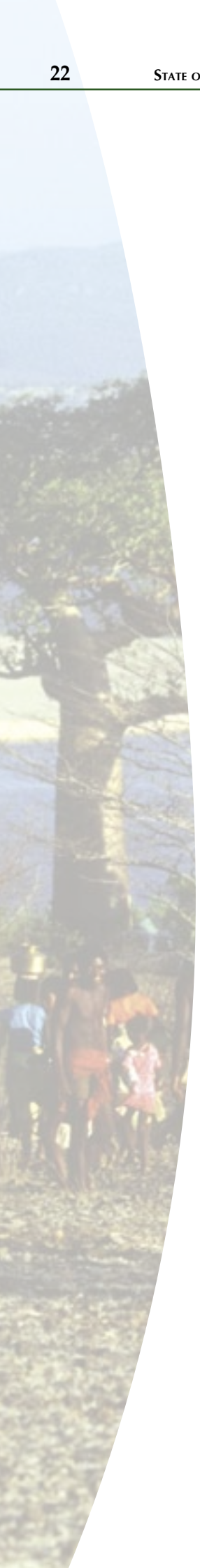
The concept of sustainable forest management has influenced many new initiatives, prompted revisions to forest policies and practices and been widely accepted around the world by forestry organizations at all levels. It continues to evolve through implementation of criteria and indicators processes at the national, regional and ecoregional levels. Extensive collaboration among these processes has resulted in the identification of seven common thematic elements covering the main aspects of sustainable forest management (see Box on page 3). Through the development and application of indicators for monitoring change, the concept is made operational at the national, as well as local, level.

The ecosystem approach and its application to forests

A key outcome of UNCED was CBD, which has three main goals: the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits from the use of genetic resources. At the second meeting of the Conference of the Parties to CBD (COP-2), delegates agreed that "…the ecosystem approach should be the primary framework of action to be taken under the Convention" (CBD, 1995). The ecosystem approach is based on 12 principles as contained in Decision V/6 of COP-5 to CBD (CBD, 2000).

CBD describes the ecosystem approach as "… a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way" (CBD, 2000). It also notes that "an ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems".

The term ecosystem "can refer to any functioning unit at any scale. Indeed, the scale of analysis and action should be determined by the problem being addressed. It could, for example, be a grain of soil, a pond, a forest, a biome or the entire biosphere". The concept builds on similar approaches such as the one applied to the management of natural resources by the Man and Biosphere (MAB) Programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in the 1970s; the ecosystem management approach, developed in the United States forest sector in the 1980s, and comparable developments in Canada and other countries; and work by the IUCN Commission on Ecosystem Management, the World Wide Fund for Nature (WWF) and other



environmental non-governmental organizations (NGOs).

Comparison of the concepts

A comparison of the two concepts and their underlying principles reveals few differences other than that sustainable forest management deals largely with only one kind of ecosystem – forests – whereas the ecosystem approach addresses a range of ecosystems (Wilkie, Holmgren and Castañeda, 2003). The main points arising from the comparison are as follows.

- Management, conservation and sustainable use of renewable natural resources are the stated goals of both concepts, providing a good example of how two independent processes have developed what is essentially the same vision.
- Both concepts are guided by a set of principles that, although similar, differ slightly in scope. The ecosystem approach principles are, for example, less concerned with the enabling conditions and prerequisites at the national and international levels than the Forest Principles. Some aspects included in the Forest Principles are, understandably, specific to forests and not applicable to other ecosystems and sectors.
- Principles and concepts common to both sustainable forest management and the ecosystem approach include national sovereignty over resources; duty of care (the responsibility for taking care of the environment and preventing adverse environmental impact, even across borders); the "polluter pays" principle; participation; intergenerational equity; conservation of ecosystem structure and functioning; multiple and sustainable use of resources; the need for environmental impact assessments; and equitable benefit sharing.
- While the ecosystem approach appears to deal primarily with ecological and environmental aspects – one of the three pillars of sustainable forest management – the preamble and the rationale of the principles make it clear that social and economic dimensions are equally important. Recent discussions on sustainable use and benefit sharing within CBD confirm this thinking.
- The few conceptual variations between the two sets of principles stem from different starting points (production forests and forest management versus conservation ecology) but are minimal for all practical purposes. In terms of field application, the differences are likely to be overshadowed by divergent interpretations, local conditions and capacity for implementation.
- As the concept of sustainable forest management has evolved, emphasis has been on what precisely needs to be achieved (specified by criteria) and how outcomes can be measured, monitored and demonstrated (through the monitoring of indicators). The ecosystem approach, a more recent development, has been focusing on the content of the principles, although efforts are under way to provide additional, practical guidance for its implementation (CBD, 2003).

COP-7 to CBD noted that sustainable forest management, as contained in the Forest Principles, can be considered as a means of applying the ecosystem approach to forests. Tools developed in the context of sustainable forest management, including criteria and indicators, national forest programmes, model forests and certification schemes, could potentially help to implement the ecosystem approach. COP-7 also concluded that substantial opportunity existed for those implementing the two concepts to learn from each other (CBD, 2004).

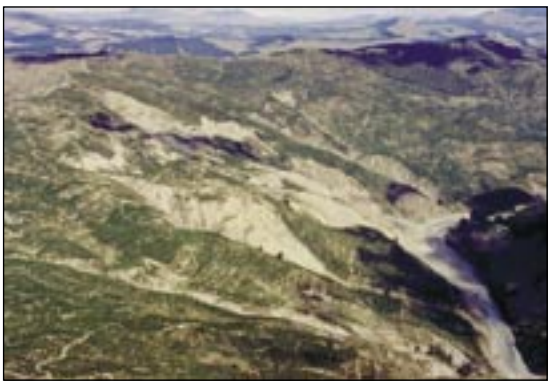
In addition, COP-7 requested that the Executive Secretary of CBD collaborate with the Coordinator and Head of the United Nations Forum on Forests (UNFF) Secretariat and members of the Collaborative Partnership on Forests (CPF) to integrate the two concepts further. In this regard, the ecosystem approach could consider the lessons learned from sustainable forest management, particularly in the application of criteria and indicators. On the other hand, in sustainable forest

management greater emphasis could be placed on collaboration within and among sectors; the interactions between forests and other biome/habitat types within a landscape; and biodiversity conservation, in particular through continued development of criteria and indicators and certification schemes.

Integrating the concept of sustainable forest management and the ecosystem approach should lead to using the same indicators to monitor and report progress, thereby reducing the reporting burden on countries. It is also expected to lead to synergies in policy and planning processes at the international and national levels.

Enhanced sharing of information and experiences among practitioners, countries, CBD, UNFF and other members of CPF can improve forest practices at the field level. Moreover, many tools to apply sustainable forest management may be useful in other ecosystems, and focusing on conservation of biological diversity and intersectoral collaboration within the ecosystem approach can help to refine sustainable forest management. Sustainable forest management, particularly in developing countries, can generate socio-economic and financial returns, reduce poverty, increase food security and bring about social equity and sustainable livelihoods. Thus, it represents a viable option among competing land uses.

Planted forests and trees are used to restore an erosion-prone landscape heavily degraded by unsustainable farming practices in New Zealand



D. RHODES

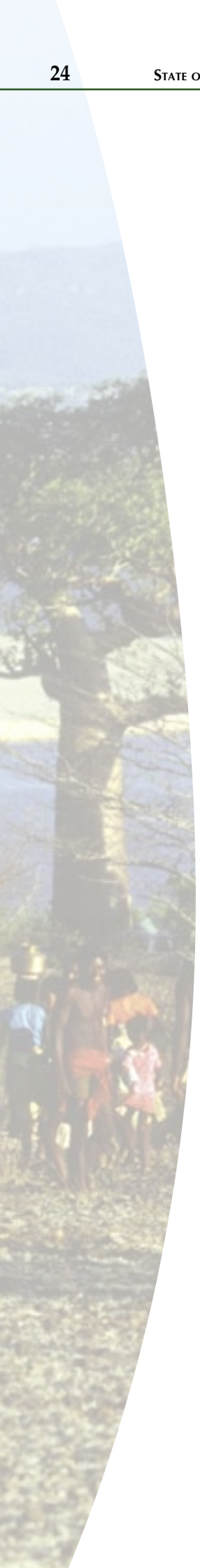
Rather than continue the debate on differences and similarities between the two concepts, efforts should now focus on their implementation, building upon best practices and tools and monitoring progress on the ground to improve national, regional, ecoregional and international policy processes.

FOREST LANDSCAPE RESTORATION

Conventional approaches to the sustainable management and conservation of forests seek to minimize loss of both the extent and quality of the resource. To this end, many national strategies have established networks of forest protected areas and introduced best practices in management of production forests. Many would argue that securing existing forest resources has taken priority over restoring degraded lands at the landscape or holding level where forests and trees have already been lost. Consequently, until recently, restoring forest resources has focused on establishing planted forests for the production of industrial roundwood, revegetating heavily impacted sites such as mines, quarries and landfills and restoring ecologies to enhance connectivity between sites of high biodiversity importance.

Notwithstanding the importance of ensuring that countries protect and manage their forests in a sustainable manner, there is a growing realization that such a strategy alone may be insufficient to guarantee a healthy, productive and biologically rich forest estate for the longer term. In some regions, so much forest has been lost or degraded that the supply of goods and services on which local, and sometimes national, economies depend is threatened. It is also now well established that fragmentation can exacerbate the vulnerability of many forest types to threats such as wildfires and invasive species. Finally, the impact that climate change will have on both intact and fragmented forest stands presents a serious challenge to optimizing the resilience and resistance of forest resources to global warming.

Forest landscape restoration aims to regain ecological integrity and enhance human well-being in deforested or degraded forest



landscapes (Maginnis and Jackson, 2002). The process brings stakeholders together from different sectors to put in place a variety of land-use practices that will help to restore the social, environmental and economic functions of forests and trees across the landscape. Since the launch of the Global Partnership on Forest Landscape Restoration (see Box below) at the sixteenth session of the FAO Committee on Forestry (COFO) in March 2003, organizations and governments have been exploring the concept as a possible complement to the management and protection of forest resources. Although it is not a new idea, its novelty lies in addressing and balancing trade-offs at the landscape level and its pragmatic rejection of the need to return modified forest landscapes to their original pristine state. Forest landscape restoration is carried out under the assumption that improving the flow of forest goods and services requires a balance between livelihoods and nature protection, and that this is best achieved within dynamic, multifunctional landscapes.

Global Partnership on Forest Landscape Restoration

The Global Partnership on Forest Landscape Restoration is a growing network of governments, international and non-governmental organizations and communities that are working to raise the profile of forest landscape restoration as a model of how the international forest community can link policy with practice. Under the partnership, more than a dozen national and regional workshops have been held, and several others are planned, to share experiences and to develop and implement practical next steps. An international expert meeting on forest landscape restoration will be convened in 2005 to review lessons learned and plan further coordinated action.

Further information on the global partnership is available at www.unep-wcmc.org/forest/restoration/globalpartnership.

Since a key objective of landscape restoration is to get the right blend of approaches at the right scale to enhance the supply of forest goods and services, efforts are not limited to, nor do they exclude, particular site-based technical interventions. Forest landscape restoration consists of a flexible package of these interventions, which include ecological restoration, natural forest management, regeneration of secondary forests, afforestation and reforestion of planted forests, woodland and rangeland management and planting of trees outside forests, including agroforestry and urban and peri-urban forests. The combined result should be a landscape mosaic of forests and trees that contribute to livelihoods and to sustainable land use and development.

Forest landscape restoration in practice

A restored landscape might consist of areas that are protected for watershed management and nature conservation, linked by regenerated native forests along rivers and streams. The landscape may also include well-managed natural or planted forests for production of wood and non-wood forest products for industrial purposes. Complementing these can be a diverse range of agroforestry plantings and trees outside forests, which provide valuable goods and services to smallholders. The restored landscape could also offer opportunities for recreation, amenity and tourism. Enhancing the multidisciplinary and intersectoral nature of landscape restoration depends as much on the needs and aspirations of local stakeholders, on institutional and land-tenure arrangements and on the prevailing land-use policy framework as it does on biotic factors such as residual soil fertility and remnant forest species diversity, abundance and distribution.

Support from local stakeholders is fundamental to the success of any restoration activity. Public and private investors, as well as smallholder landowners, need to be allowed to invest in natural and planted forests and trees and be confident that they will receive benefits. When restoration helps meet the broader demands of society by providing such

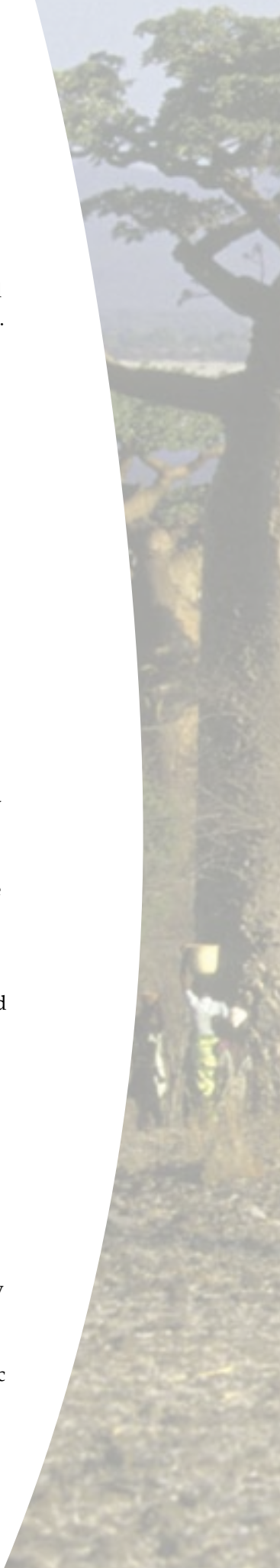
services as biodiversity conservation, carbon sequestration and watershed protection, incentives or new market mechanisms may be required to compensate local people. In addition, governance issues must be addressed, including the need for consistent and enabling policy and for legal and regulatory frameworks that contain clear commitments on land rights and on forest ownership and use. Traditional practices and institutions can also have a significant role.

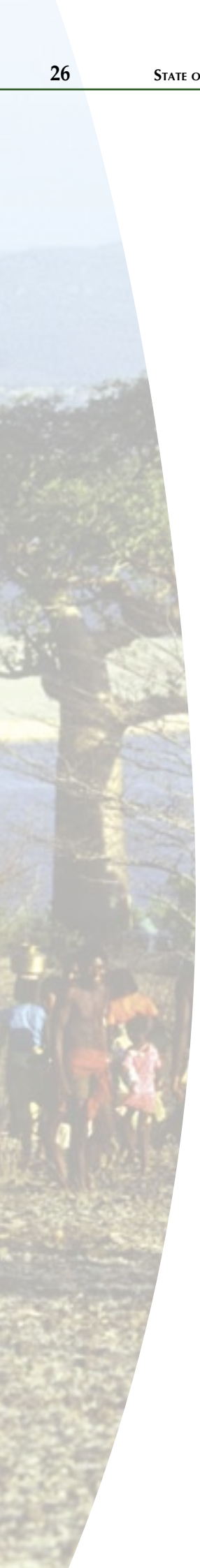
In restoring forest landscapes it must also be recognized that objectives may shift over time. While long-term aims may be to increase the resilience, diversity and productivity of land-use practices and to conserve biodiversity, short-term interventions may be required to meet immediate needs, for example for production-based benefits. The following examples illustrate the results of restoration initiatives.

In the United Republic of Tanzania, the Sukuma people in Shinyanga had a strong pastoralist tradition and relied on *Acacia* woodland enclosures, or *ngitili*, to provide dry-season fodder and a range of other essential goods and services. However, as a result of tsetse fly eradication schemes, the conversion of land for cash crops and state-sponsored collective farming, by 1985 only about 1 000 ha of *ngitili* remained, and land degradation had become a serious issue. A government-sponsored soil conservation project set out to work with traditional land-use systems and to build on institutional structures. These efforts coincided with a relaxation in the rules governing collective farming. By 2000, the area of *ngitili* had increased to more than 250 000 ha. Although restored patches range between 10 and 200 ha, their cumulative effect has dramatically transformed the Shinyanga landscape (Barrow *et al*., 2002). The recovery of landscape-level forest functionality, in this instance, had little to do with formal planning processes or tree planting. Rather, it was the lifting of land-use constraints and empowerment of local traditional institutions that allowed *ngitili* to flourish.

In 1970, the 50 000 ha of even-aged Sitka spruce (*Picea sitchensis*) plantations in Kielder Forest supplied 5 percent of the United Kingdom's softwood requirements (Global Partnership on Forest Landscape Restoration, 2004). Although the forest was successful in terms of timber production, the lack of public access and the perceived deterioration of the environmental and wildlife habitat value of this publicly owned estate were an increasing cause of dissatisfaction. The Forestry Commission modified the forest while maintaining its productive capacity, increasing the proportion of native broad-leaved species to 8 percent, up from 1 percent in 1980, ostensibly for aesthetic and habitat purposes. Moreover, it altered restocking practices in 20 percent of the harvested compartments to improve biodiversity conservation. In this way, the Forestry Commission enhanced social and environmental attributes at the landscape level while delivering 1 400 tonnes of roundwood per day on a sustainable basis. Greater efforts were made to include people in the restructuring and management of Kielder Forest so that, although the workforce fell from 2 000 to 260 employees over 50 years, the number of visitors rose to half a million per year, revitalizing the local economy through tourism and related services.

From the mid-1970s onwards, a combination of poor harvesting methods, shifting agriculture and fire degraded large tracts of forests in Asia and the Pacific to the point where there was little potential for wood crops or ecological services such as carbon sequestration, watershed protection and biodiversity conservation. Without remedial action, these degraded forest lands were likely to be converted to other uses. In the late 1990s, the Forestry Research Support Programme for Asia and the Pacific (FORSPA) established a forest rehabilitation network, which launched pilot sites in Cambodia, the Lao People's Democratic Republic, Papua New Guinea, Sri Lanka and Viet Nam. Management protocols have been developed between forestry specialists and local communities, taking into account the unique social, environmental and economic conditions and incorporating scientific and traditional knowledge in restoration initiatives. The network is raising interest in forest landscape restoration in the region and





Searching for excellence in forest management

The Asia-Pacific Forestry Commission (APFC) has recently finalized an initiative entitled "In search of excellence: exemplary forest management", launched in November 2001. Individuals from across Asia and the Pacific were invited to nominate forests that they perceived to be well managed and to elaborate on management aspects they considered exemplary.

"In search of excellence" identifies:

- examples of good forest management across a broad range of forest ecotypes in the region, covering a variety of objectives, ownership structures and sizes of forest area;
- practices that show promise for the future and for other areas;
- perceptions of what constitutes good forest management.

The invitation to nominate forests was extended via Web sites, newsletters and brochures over several months. Workshops were also convened in nine countries, providing opportunities for participants to debate the elements of good forest management.

More than 170 nominations of both planted and natural forests were received from 20 countries. They ranged in area from less than 20 to nearly 2.5 million hectares and included forests managed for watershed protection, biodiversity conservation, timber or non-wood forest products, recreation, agroforesty, tourism and rehabilitation. Submissions covered state-owned, private and community forests as well as joint ventures.

Ten technical experts selected 30 forests for in-depth case studies. These were examples that stood out for specific management aspects and demonstrated innovation in the face of challenge. Emphasis was placed on identifying a variety of management experiences that characterized a range of objectives across several countries.

The case studies were published in April 2004, together with an analysis of commonalities and differences in management among nominated forests. The findings revealed that there is no "right" way to manage forests and that approaches vary according to cultures, local conditions and management objectives. However, common elements were evident in the management of most forests in the sample.

Excellence tended to be defined in terms of outstanding forest practices based on scientific principles as well as on participatory and transparent management. It was often identified in the context of impressive biophysical changes (e.g. rehabilitation of degraded areas, reduced soil erosion, enhanced water quality and yield) or positive socio-economic changes (e.g. increased incomes for local people, improved availability of forest products, enhanced understanding and appreciation of forest health protection). The involvement of stakeholders in decision-making and the management of forests for multiple benefits were also recognized as important elements.

FAO recently carried out a similar exercise in Central Africa, in collaboration with the Interafrican Forest Industries Association (IFIA), the World Wide Fund for Nature (WWF), the African Timber Organization (ATO), the International Model Forest Network Secretariat (IMFNS), the International Tropical Timber Organization (ITTO) and the World Conservation Union (IUCN). Case studies of this initiative were published in FAO Forestry Paper No. 143 (FAO, 2003a).

is facilitating the exchange of information, experiences, technology and expertise.

Ideas for the way forward

Case studies and regional workshops evaluating the role of forests and trees in urban and rural landscapes consistently and clearly point to the need for:

- decentralized, participatory and multidisciplinary approaches to policy, planning, management and monitoring;
- maintenance of forests and trees as integral components of the landscape;
- supportive institutional frameworks and greater intersectoral collaboration;
- integrated approaches to balance short-term needs for food and livelihoods with long-term needs for environmental services, including biodiversity conservation;
- dissemination of knowledge and technology concerning the role of forests and trees in restoring wider landscapes, through national and international networks;
- sound extension and technical support systems and demonstrations of forest landscape restoration at work;
- interventions that reflect the unique physical, cultural, social, political, environmental, economic and institutional conditions of each landscape.

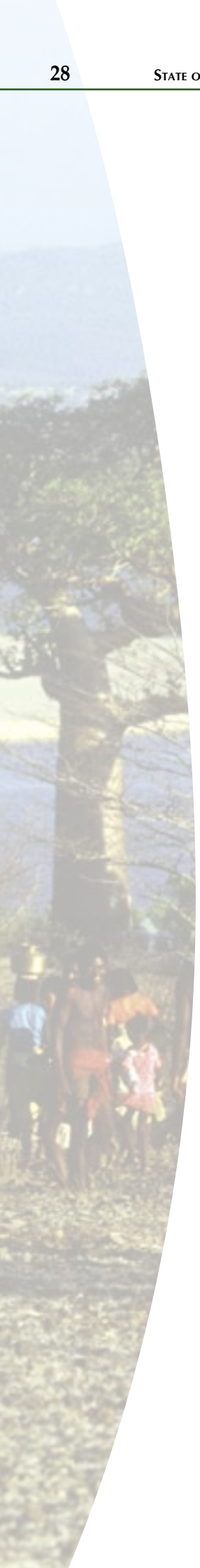
FORESTRY AND ECOTOURISM: EXPANDING OPPORTUNITIES IN DEVELOPING COUNTRIES

The recent boom in nature tourism and ecotourism provides emerging challenges and opportunities for forest management. As the world's largest employer, the tourism industry directly or indirectly generates more than 200 million jobs, or 8.1 percent of total employment, globally. The value of travel and tourism exceeds US$4.2 trillion annually, or more than 10 percent of global gross domestic product (GDP) (WTTC, 2004).

Nature tourism, of which ecotourism is a segment, accounts for a sizeable, if somewhat uncertain, share of this large industry. While there is no accepted definition of "nature tourism", it is generally considered to encompass activities that relate to or depend on natural attractions, including outdoor sports, hunting, fishing, canoeing and backpacking. The International Ecotourism Society defines ecotourism as "responsible travel to natural areas that conserves the environment and sustains the well-being of local people". Although widely accepted, the definition is not functional for gathering statistics, making it impossible to determine accurately ecotourism's share of total tourism (measured in terms of tourists, expenditures, employment or contribution to GDP). However, ecotourism is already a profitable business, and most analysts agree that it is the fastest-growing segment of the industry.

Some claim that as many as 40 to 60 percent of all international tourists are nature tourists (Fillion, Foley and Jacquemot, 1992), while most estimate the percentage of ecotourists at between 10 and 20 percent because the term is defined more narrowly (Pleumarom, 1994; Ananthaswamy, 2004). Much of nature tourism and ecotourism focuses on forests. From bird-watching to canopy walks, forest treks and wildlife viewing, growth in the sector means it will increasingly influence how forests are used around the world.

Environmental advocates and development experts are tapping the huge potential of tourism to advance both conservation and rural development, especially in areas where logging is restricted or undesirable. Many people perceive ecotourism as capable of delivering substantial environmental, social, cultural and economic benefits at the local and national levels. It provides a means by which people can use forests and wildlife to generate income without extracting resources or degrading the environment, and it presents a strong incentive to protect the resource. If managed properly, ecotourism can generate income and employment for rural communities faced with few alternative livelihood opportunities. Examples of ecotourism and its potential can be found in every region of the world (see Box on page 28).



Potential of ecotourism: some examples

- The Kenya Wildlife Service estimates that 80 percent of Kenya's tourists are drawn by the country's wildlife and that the tourism industry generates one-third of the country's foreign exchange earnings (Kenya Wildlife Service, 1995).
- Domestic and international travellers make more than 275 million visits a year to the 388 recreation areas administered by the United States National Park Service (United States Department of the Interior, 2004), generating direct and indirect economic benefits for local communities of more than US$14 billion annually and supporting almost 300 000 tourist-related jobs (Tourism Works for America Council, 1997).
- Prior to the civil war in Rwanda, tourists visiting the country's mountain gorillas provided more than US$1 million in annual revenues, enabling the government to fund anti-poaching patrols and employ local residents (Gossling, 1999). Tourism is once again on the upswing, with hundreds of foreign visitors a month handing over US$250 each to see the gorillas.
- More than half of all international visitors to Nepal include a trip to at least one national park. Before civil strife reduced numbers, more than 80 000 tourists visited Royal Chitwan National Park, and 50 000 trekkers visited Annapurna Conservation Area each year (Yonzon, 1997).
- The more than 60 000 visitors a year to the Galapagos Islands contribute in excess of US$100 million to Ecuador's economy (Charles Darwin Research Station, 2001).

Ecotourists are seeking nature in its pristine state, which is often found only in remote destinations. Under the UNESCO Nam Ha Ecotourism Project in the Lao People's Democratic Republic, trekkers are brought to specific tribal villages, which receive US$0.50 per tourist and then use the money to buy medicine, pay for schooling and improve community welfare. Locally recruited guides earn US$5 per day – an exceptional wage by Lao standards – leading tourists and sharing their insight and knowledge of the forest and its wildlife. Revenues have reduced illegal logging and hunting and have improved health conditions for local people (Gray, 2004).

Often, however, mass tourism in natural areas can have a devastating impact. Without measures to ensure otherwise, activities destroy the environment, disrupt social structures and leave few economic benefits for local people. Recent studies indicate that some ecotourism previously thought to be benign stresses wildlife, disrupts breeding patterns and changes the behaviour of wild animals (Ananthaswamy, 2004).

Environmental considerations

Care must be taken to ensure that the very features that provide the basis for attracting tourists are not damaged or destroyed in accommodating visitors' physical needs and comforts. Disturbances to the local ecology – rubbish and waste disposal, cutting of trees for fuelwood, lodges, access routes and communication facilities, for example – are obvious at many sites, including major parks and protected areas.

The overuse of popular ecotourism sites often results in erosion of trails and riverbanks, water pollution, destruction of vegetation and loss of species. Problems can usually be attributed to lack of planning, failure to develop and implement management plans, inadequate monitoring and control mechanisms, low participation of residents living in or near sites and divergent priorities of government agencies, the tourism industry and local populations.

J. LEJEUNE

Growth in the ecotourism sector will increasingly influence how forests are used around the world

As part of sound management planning, all potential effects of tourism on the ecosystem should be assessed, not only those likely to affect the species that attract visitors to the site. Solid baseline data are also essential to monitor changes that may occur as the industry develops. The concept of carrying capacity, with its physical, social and ecological components, should be taken into account as well.

Significant progress has been made in recent years in the design, construction and management of eco-friendly tourist lodges. Such facilities emphasize the use of local construction materials, careful waste and rubbish disposal, water conservation, and solar power and water heaters. Guides also play a crucial role in protecting the environment by ensuring that tourists do not encroach on sensitive areas, collect threatened or endangered plants or disturb wildlife. Successful ecotourism therefore requires the recruitment and training of guides who manage and influence the behaviour of tourists.

Socio-cultural considerations

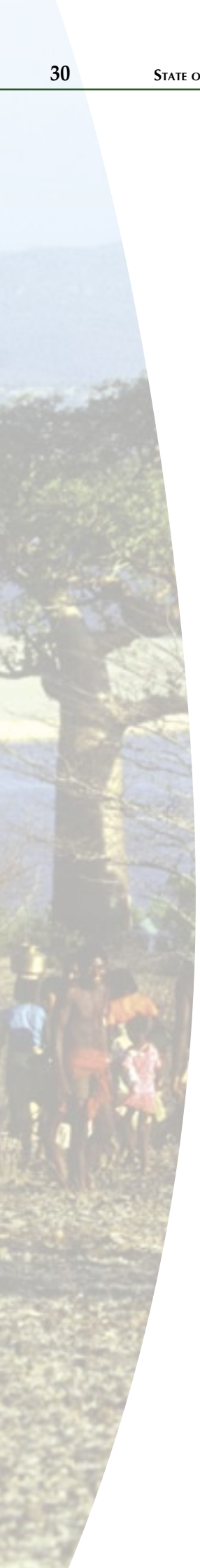
Tourism of all types, including ecotourism, offers opportunities for people of diverse backgrounds and cultures to exchange views, develop friendships and gain a better understanding of others. On the other hand, tourism can highlight differences, fuel animosities and lead to clashes of cultures, especially when wealthy tourists visit isolated or less-developed regions.

Ecotourism, if not controlled, can rapidly stretch the social fabric of remote forest villages and cultures. Inflation of local prices, loss of ancestral lands, behavioural and value changes, prostitution, drug abuse and diseases are real threats. Many indigenous people in developing countries have only recently begun to experience the impact of a market economy. As some members of the community are quicker than others to earn money from tourism, they may rival traditional leaders and elders in terms of prestige. Their income may be many times higher than what a villager can earn by conventional means, perhaps leading to jealousy and violence. Other negative results include begging and hostility towards tourists.

Economic considerations

The extent to which ecotourism is able to conserve forests and develop rural areas is largely contingent on capturing revenues to manage parks and other forest land and discourage destructive practices. Too often, however, the money that ecotourism generates goes to other countries, providing little incentive to protect the resource. This type of leakage occurs in the form of payments to tour operators, airfare, foreign-owned accommodation and non-local supplies and food. The World Bank estimates that only 45 percent of tourism's revenue worldwide stays in the host country, and a study of the popular Annapurna region of Nepal found that only 10 percent of tourism expenditures benefited the local economy (Martinoli and Fiore, 1999).

Increasingly, governments are demanding that parks and protected areas generate sufficient revenue to cover the cost of their management through such means as entrance and user fees and concession licences. Thailand, for example, expanded its infrastructure, upgraded facilities, intensified marketing efforts and increased entrance fees. Such approaches are not without controversy, however. Park managers, trained in resource protection, are often apprehensive about problems that rising numbers of tourists bring. Tourists, on the other hand, sometimes resent paying high fees, especially under



Assisted natural regeneration: a simple technique for forest restoration

The term "assisted natural regeneration" was first coined in the Philippines, where the approach has been used to restore forest cover to *Imperata cylindrica* grasslands by working with and building on the principles of natural plant succession.

Known locally as *cogon* in the Philippines and *alang-alang* in Indonesia, *Imperata cylindrica* is an aggressive grass that covers more than 50 million hectares of land in Asia and the Pacific – land that was mostly covered by forests originally (Garrity *et al.*, 1997). *Imperata cylindrica* is highly flammable, and frequent fires prevent further succession and the natural return of forest cover. However, if *Imperata* grassland does not burn, it will naturally and gradually return to forest as pioneer trees and shrubs eventually grow above *I. cylindrica* and outcompete it for light and water.

There are a variety of techniques for assisted natural regeneration, depending on reforestation objectives, site characteristics and resources available. In general, however, it involves:

- protecting against fire and grazing;
- suppressing *I. cylindrica* and other fire-prone grasses;
- weeding, mulching and applying fertilizer, if needed, to rootstock and young tree seedlings that sprout from seeds carried by natural dispersal agents.

While fire prevention is a key element in rehabilitating *Imperata* grasslands, effective techniques for suppressing this and other weeds have been discovered more recently. In the Philippines, wood planks or bamboo poles are used to press *I. cylindrica* to the ground to slow its growth and reduce its regenerative capacity. Covered grasses in the lower layers quickly die, allowing tree seedlings and saplings to grow and shade the grasses. This simple process also reduces flammability, as air does not circulate well in the compacted grass (Friday, Drilling and Garrity, 1999).

Advantages of assisted natural regeneration relative to conventional reforestation include:

- regeneration of indigenous species;
- restoration of biological diversity and ecological processes;
- lower costs because of the elimination or reduction of seedling production, transport, planting and replanting activities;

two-tiered pricing schemes that charge local residents considerably less.

Expanding tourism in parks and protected areas is doubly taxing if revenues revert to the national treasury. Ecotourism income should help to improve the management of forest areas on which tourism is based but is often not available to the agencies concerned. In Costa Rica, for example, only about one-quarter of the park service's budget comes from fees – not enough to manage and protect its numerous sites. The remainder must come from donors and government allocations.

Challenges

While ecotourism offers good reason to conserve forests and stimulate rural economies, it is not a panacea. Experience has revealed that it succeeds only under certain conditions, and resource managers and development officials would do well to avoid unrealistic expectations.

Ecotourism requires sites that have attractive natural features, such as wildlife in sufficient abundance for tourists to spot, unique plants, waterfalls, mountains and beautiful scenery. Comfortable accommodation, safe hiking trails, good information and visitor-friendly facilities are also important. While a few ecotourists are willing to endure harsh conditions, most prefer a mix of adventure and luxury. Balancing the two requires knowledge of tourist preferences and substantial investment capital.

While ardent ecotourists relish the idea of travelling to remote destinations, most

- easy implementation, requiring no costly tools or skilled labour;
- minimal soil disturbance;
- natural selection and succession of trees appropriate to prevailing conditions.

Experience in Indonesia and the Philippines indicates that successful application of assisted natural regeneration requires the participation of local people and mechanisms to promote the equitable sharing of benefits. While excellent potential exists to apply assisted natural regeneration more widely, constraints include:

- a lack of knowledge of ecosystem dynamics, including the requirements for natural regeneration of species;
- lack of experience in implementing approaches and techniques;
- weak policy and incentive systems with regard to land tenure and equitable distribution of benefits derived from restoring forest diversity (Sajise, 2003).

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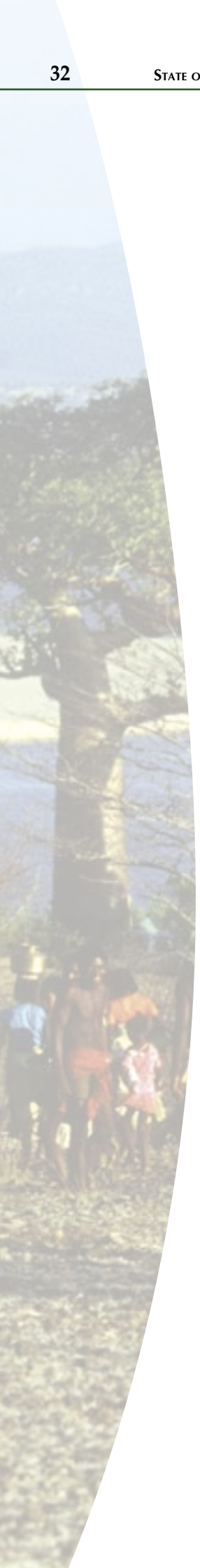
In the Philippines, wood planks are used to press **Imperata cylindrica** *to the ground to reduce its regenerative capacity, allowing tree seedlings and saplings to grow and shade the grasses*

do not have the time, desire or money to do so. Sites, therefore, should be accessible – but not too accessible. Moreover, as with other forms of tourism, ecotourism is highly sensitive to perceived risk and physical danger, especially those associated with civil strife, war and terrorism. As experiences in Nepal and Rwanda have shown, thriving businesses can fail rapidly when tourists feel threatened.

Tourism is also influenced by world economics. Middle and upper-middle classes in developed countries are the most sought-after clients because of their purchasing power. In addition, currency exchange rates, political considerations and cultural perceptions influence the decision to travel.

As a highly competitive business, ecotourism requires effective management and marketing skills – skills that are often lacking in rural communities. While projects, donors and NGOs can provide short-term support, local capacity must be built if the industry is to benefit local people. Residents and affected communities also need to be involved in efforts to develop ecotourism, to understand the implications of such development, to benefit from activities and to negotiate with outsiders as equals. Some countries have policies that provide for partial reimbursement to residents for the costs of establishing protected areas.

Ecotourism planners also promote the sale of local handicrafts, the use of local accommodation and training programmes to enable residents to



fill positions as tour guides, lodge managers and park employees (Vanasselt, 2001).

To conserve the natural resources on which ecotourism is based, small-scale tourism is often recommended although it generally brings only small-scale benefits, including seasonal and low-paying jobs. Thus, a major challenge is to identify a scale of ecotourism that will provide profits to local communities without jeopardizing forests and other natural resources.

The recent proliferation of ventures claimed to be ecotourism – many of which harm the environment and fail to provide local benefits – has led to calls for certification of the industry. As with forest certification, the plethora of schemes for certifying ecotourism businesses is resulting in consumer confusion, little recognition of labels and lack of understanding of certification processes. Some businesses claim that certification improves performance, but a difference in the market is not yet apparent. Efforts are ongoing to harmonize processes and raise tourist awareness of certification (Chafe and Honey, 2004).

In conclusion, ecotourism is a highly competitive business that requires considerable capacity to succeed. Most countries are not realizing the full potential of this segment of the industry, are not making effective use of the revenues it generates and are not providing adequate support to develop the sector. With a few exceptions, the forestry profession does not look upon ecotourism as a forest management strategy, so benefits from its successful development tend to accrue to other sectors. Much more could be done to sensitize foresters to the need to include ecotourism within management regimes.

Further information on ecotourism can be found at www.ecotourism.org.

BIOSECURITY AND INVASIVE FOREST TREE SPECIES

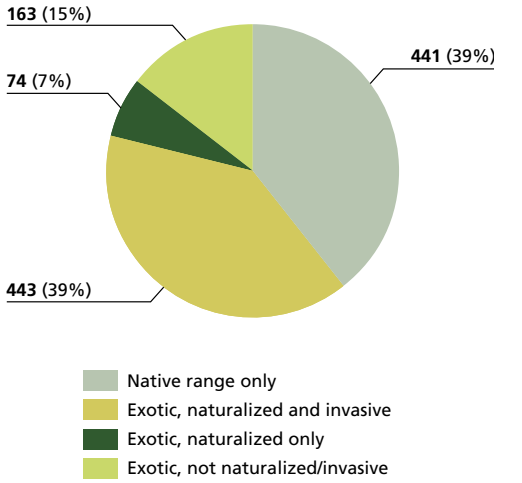
Concern over the potential negative impact of the introduction of new species, breeding and the use of genetic modification (GM) has led to increased attention paid to the need to develop regulatory frameworks and policies to manage environmental and biological risks. The management of such risks, generally referred to as biosecurity or bioprotection, is of direct relevance to the sustainability of agriculture, food safety and the health of the environment, including the conservation of biological diversity. In forestry, a recent focus has been on invasive forest tree species (see Cock, 2003; FAO, 2003c).

In addition to possible loss of native species resulting from the spread of introduced tree species, the introduction of new tree genotypes (non-local provenances or genetically improved planting stock) could have an adverse impact as a result of what is sometimes referred to as genetic pollution – the creation of hybrids and the loss of gene pools that may have acquired specific characteristics through local adaptation. To date, however, few studies and few recorded instances of such results are found in the forest sector. Information is also scarce on possible negative effects of the introduction of other species into forest ecosystems, including biological control organisms and mycorrhizae.

Introduced forest tree species can help sustain national and local economies and be of significant value to the environment and to society. However, when insufficient consideration is given prior to use and when on-site management is neglected, some species may invade adjacent areas, giving rise to a number of problems (Robbins, 2002). Moreover, with global trade increasing, greater movement of people and overstretched quarantine services, the number of accidental introductions of potentially invasive forest tree species is expected to rise.

Global information on forest tree and shrub species that have become invasive is inadequate and subject to interpretation because the contexts in which studies have been carried out vary, terminology is unclear and concepts may overlap as in the case of "invasive" (an introduced species that, when unmanaged, invades surrounding habitats) and "naturalized" (an introduced species that has adapted locally, is well established and forms an integral part of the flora of a country or region). Lack of agreement on terms such as "introduced",

FIGURE 2
Classification of 1 121 tree species according to geographical distribution and invasive behaviour



Source: Haysom and Murphy, 2003.

"alien" and "exotic" and the subjective values attached to them add to the confusion and increase difficulties in assessing the extent and impact of the undesirable spread of forest trees.

Of the more than 1 100 tree species included in a recent survey (Haysom and Murphy, 2003), those outside their native range were classified according to their reported degree of invasiveness (Figure 2). Among those categorized as invasive were 282 species used in forestry. A further 40 were reported as naturalized but not invasive. Both angiosperm and gymnosperm invasive species were identified. In decreasing order, most invasive forest tree species occurred in the families Leguminosae, Pinaceae, Myrtaceae, Rosaceae and Salicaceae.

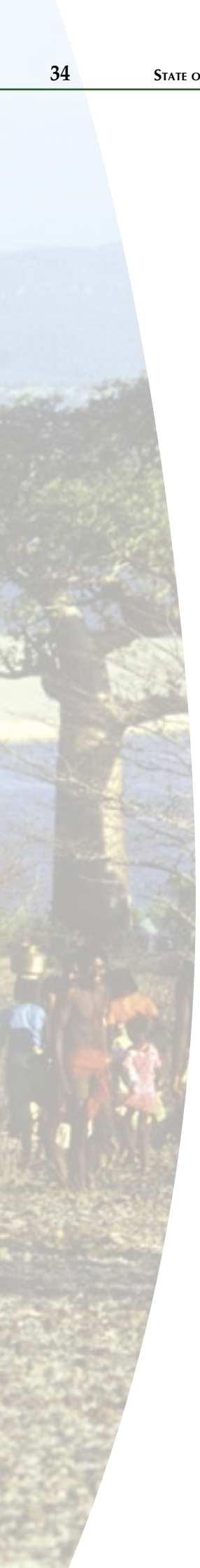
According to the study, invasive tree species were reported with various intensities in all regions reviewed: Africa, Asia and the Pacific, Australasia, Europe, North America and South America. The largest number occurred in Africa (87 species) and the lowest in Europe (12) and Asia (14). Most species were invasive in only one region, and even those most frequently considered invasive were not reported to have adverse impacts in all countries where they had been introduced. Most tree species reported to have become invasive in new habitats originated in Asia; the Pacific was the origin of the fewest. However, scant information was available on the history of the introductions or on the subsequent use and management of the trees.

Again according to the study, most invasive tree species were reported in countries and regions where investments to catalogue introductions and conduct research on their impact were high, for example, Canada, Puerto Rico, South Africa and the United States. On the other hand, gaps in information were evident in Africa, Asia and parts of South America.

Risks associated with invasive species, including plants, animals, fish, microbes, pests, insects and diseases, are addressed in the work programme on invasive alien species of CBD and in campaigns and projects of IUCN and other NGOs. However, in some circumstances invasiveness can be a desirable trait, for example, for combating desertification or rehabilitating degraded lands.

FAO convened a Technical Consultation on Biological Risk Management in Bangkok, Thailand, in January 2003, which addressed biosecurity related to food and agriculture (FAO, 2003b). An Asia-Pacific Forest Invasive Species Conference held in Kunming, China, in August 2003 laid the foundations for the establishment of an Asia-Pacific Forest Invasive Species Network under the auspices of the Asia-Pacific Forestry Commission (APFC). The network was formally launched in April 2004. It shares information on forest invasive species and facilitates access to expertise and resources such as education and training facilities and courses.

More decision-makers and professionals should be made aware of the need to evaluate the consequences of introducing new tree and shrub species, especially since tree species that provide useful products and services in one sector can be considered harmful in another. A multisectoral approach is therefore needed to assess impact from different perspectives and to identify management options that balance positive



Biosecurity issues addressed by UNFCCC

During COP-9 to UNFCCC in December 2003, several countries sought to eliminate the use of potentially invasive alien tree species and genetically modified organisms in afforestation and reforestation projects under the Clean Development Mechanism (CDM) of the Kyoto Protocol. The meeting ultimately agreed that the host country of any such project would decide on the use of such trees and the investor country could either accept or reject the resulting carbon credits (UNFCCC, 2003).

and negative aspects. On the positive side, the introduction of faster-growing tree species may enhance carbon sequestration, provide much needed woodfuel and other products, stabilize soils and protect agricultural lands. On the other hand, trees that become invasive create problems in the management of grassland pastures and, in some instances, of agricultural lands and natural or planted forests. Of particular concern is their effect on ecologically fragile natural or semi-natural habitats, such as riparian and wetland systems. A study conducted in the fynbos vegetation region of South Africa (Nyoka, 2003) revealed that introduced invasive trees caused substantial losses in native biodiversity and greatly diminished runoff in water catchments, allegedly affecting South Africa's water supply and requiring expensive controls.

At the local level, the longer the invasiveness of a species remains undetected, the less chance there is for successful intervention. Fewer options will exist for containment through management or for control through eradication, and the costs of interventions will rise over time.

Although it is difficult to predict which species might cause serious damage if introduced, those that are known to have caused problems when brought into other parts of the world provide the best guide for evaluating risks. Thus, access to reliable information and better knowledge of economic and environmental impact are critically important. Clarification of concepts, terms and definitions at the international level is also a priority, as is reaching agreement on assessment methodologies and on data to be collected at national and local levels to help evaluate and manage risks.

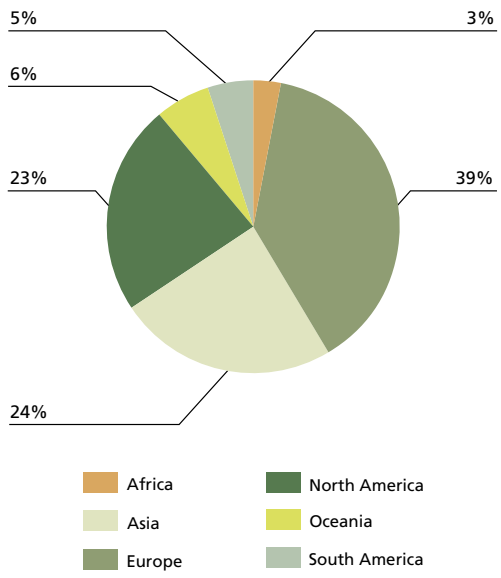
As mandated by member countries, FAO is compiling a glossary of terms and definitions related to biosecurity in food and agriculture, forestry and fisheries. In addition, the Organization is developing databases on introduced, naturalized and invasive species. They can be accessed through the FAO portal on food safety, animal and plant health at www.fao.org/biosecurity.

BIOTECHNOLOGY IN FORESTRY

The term biotechnology refers to developing or using living organisms to produce, alter or improve a product or a living organism for a specified purpose. It encompasses conventional breeding, including plant and animal domestication from prehistoric times, and modern innovations that focus on a portion of a biological system (Yanchuk, 2001). Most public research involving forest biotechnology relates not to GM, but to tools for studying and characterizing the biology and diversity of forest tree species, populations and individuals, or for propagating forest trees. More than two-thirds of non-GM biotechnology research in forestry uses only four genera – *Pinus*, *Eucalyptus*, *Picea* and *Populus*. Research is carried out in all regions of the world, with significant differences among regions and objectives (Figure 3). More than two-thirds of activities on genetic diversity and marker-assisted selection are carried out in Europe and North America, while 38 percent of research programmes using advanced propagation technology are in Asia.

Genetic modification – the transformation of organisms by the insertion of one or more isolated genes – has been subject to passionate debates, most recently over the commercialization of new genotypes (Cock, 2003). Some scientists and some members of the public are worried about risks associated with gene transfer to native populations

FIGURE 3
Forest biotechnology research by region, excluding genetic modification



Source: FAO, 2004.

(genetic pollution) and about environmental impacts. Although genetic pollution or displacement of native species may also occur with conventionally bred varieties or exotic species, there is uncertainty about the effects of releasing organisms that were obtained by breaking natural barriers that have prevailed in conventional breeding to date. Other concerns include consumer health (although these concerns are less apparent than for agricultural crops) and the equitable sharing of costs and benefits.

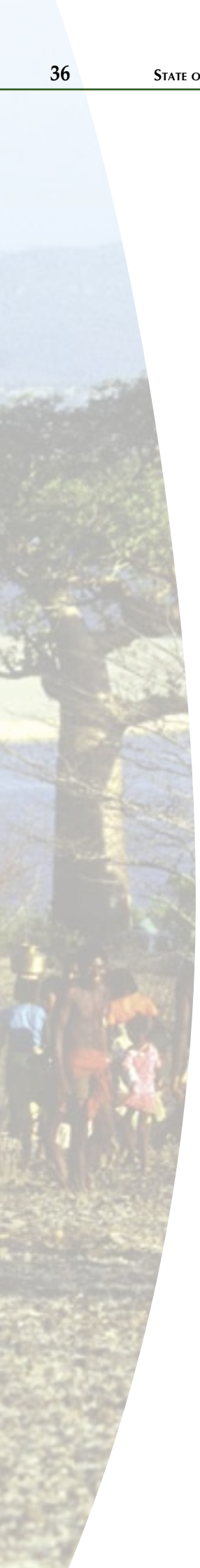
While the tools for genetic modification in forestry are mostly the same as those used in the agriculture sector, the potential applications, benefits, impacts and public perceptions differ significantly where forest trees are concerned (El-Lakany, 2004). These differences stem from the social, cultural and environmental aspects of forests. They also stem from the fact that forest trees have only recently been domesticated, in contrast to most agricultural crop species. Many forest trees are still in their wild (unimproved) state or are removed only one or two generations from their ancestors through breeding programmes.

To improve the amount of reliable information on biotechnology in forestry, FAO is now carrying out the first global review, including developments and applications of genetic modification technology (FAO, 2004). Preliminary findings suggest that, as of 2002, only one country (China) was growing genetically modified forest trees (poplar clones) on an area of less than 500 ha. *Populus* is the genus of forest tree in which genetic modification has been studied most widely, although some research has been reported for 19 genera of woody plants.

Almost half of all research on genetic modification in forest trees takes place in the United States of America, with most of the remainder in other developed countries. However, the technology is growing rapidly, and some of the more advanced developing countries are quick to adopt it.

Most first-generation traits under examination (e.g. pest resistance and herbicide tolerance), with the exception of wood quality traits, derive from research in agricultural crops and are of interest mainly for potential commercial wood production. However, developing, testing and approving genetically modified forest trees for wider use may entail high costs and significant time frames because of the difficulties associated with assessing risks in such long-term crops. Other applications of GM could be found in forest conservation activities, including the recovery of valuable ornamental and urban shade tree species that have succumbed to insects and disease. Another use of GM technology, often overlooked but perhaps the most important, is in basic research on tree biology for better understanding of gene functioning and the characters that genes control.

In many countries, the private sector is undecided and reluctant to communicate its intentions with regard to the deployment of genetically modified trees. While companies may fear that failing to engage in genetically modified organism (GMO) research could mean lost opportunities, they recognize the power of



public opinion and are aware that widespread opposition to genetically modified forest trees poses a commercial risk in a number of countries.

The economic rationale for employing GMOs in forestry has not yet been clearly demonstrated because the monetary value of forest products in global trade is far less than that of agricultural products. Many planted forests grow in countries where improved genetic material and appropriate silvicultural procedures are not used. The success of tree improvement programmes over the past 50 years suggests that there is scope for enhancing productivity and yields on a sustainable basis using conventional forest tree breeding. This is the situation at present, however, and does not imply that the application of GM technology to forest trees will not be advantageous.

As a relatively new tool in forestry, GM technology has potential benefits and drawbacks but is not intrinsically good or bad. Since its usage is technically possible, it should be studied and regulated on a case-by-case basis. Genetic modification in forestry is more than a technical issue. Socio-cultural values and the multiple uses of forests need to be taken into account, and public acceptance is necessary, if genetically modified forest trees are to be deployed.

Keeping an eye on developments

Whether it is government or the private sector that stimulates advances in biotechnology, forest planners need to become more aware of its potential and drawbacks and to consider these aspects when developing future forest management strategies.

The distinctive nature of forest trees and their importance in ecosystems make risk assessment a critical issue in the deployment of many biotechnologies. Thus, national and international agencies need to address the management of such risks from an intersectoral perspective.

Developed and developing countries have different priorities, capacities and applications for biotechnology. However, developing countries could make rapid technological gains and improve their capacity as long as economic opportunities were available and regulatory frameworks were in place.

Given the high cost of genetic biotechnology and the expected growth in demand for quality industrial wood over the next 30 years, industry will likely focus on intensification and on high-yield plantations. The forest sector needs to monitor developments in GMOs in agriculture because regulations for crops are likely to be adapted for forest trees.

GM and other biotechnologies may have a role to play in plantation forestry in some countries. However, because some 95 percent of the world's forest area is natural or semi-natural, the area planted with genetically modified forest trees is likely to remain small.

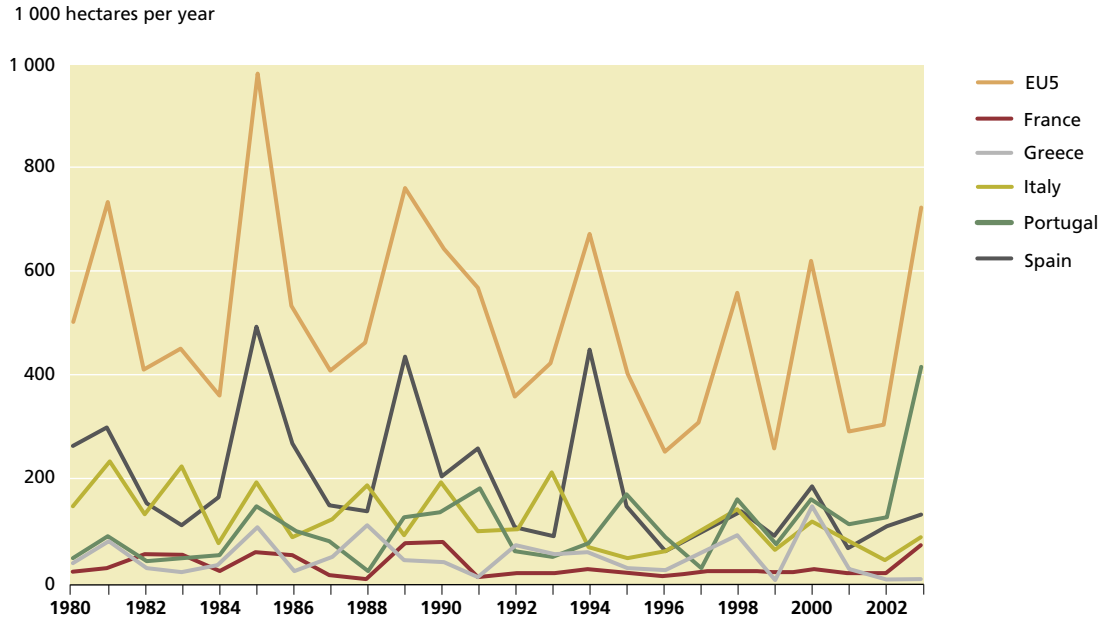
FAO intends to continue monitoring biotechnology, including GM, in forestry at the global level as well as to make objective, updated and reliable information available.

WILDLAND FIRES

Much public and media attention is given to uncontrolled fires in forests, other wooded lands and other lands – generally referred to as wildland fires. Since many incidents are not monitored or documented, the absence of reliable assessments of damage and impact hinders decision-making. For this reason the Global Fire Monitoring Center (GFMC) and the Global Observation of Forest Cover Fire Implementation Team have called for international joint efforts to launch an operational space-borne fire monitoring system that will allow real-time and complete coverage of wildland fire events and fire impact around the world (Ahern, Goldammer and Justice, 2001).

The total global area burned in 2002 and 2003 – of which about half was in Africa – appears to be comparable to long-term averages, in the annual range of 300 to 400 million hectares per year. According to GFMC daily updates, wildland fires continued to claim lives, destroy valuable private and public property and emit compounds that affect the composition and functioning of the atmosphere. Wildland fires and land-use fires consume an estimated

FIGURE 4
Area burned in five southern European countries, 1980–2003



Source: UNECE/EC, 2004.
Note: Detailed statistics are only available for some regions, underscoring the need to improve coverage of satellite remote sensing systems.

average of more than 9 billion tonnes of vegetative biomass globally each year.

During 2002–2003, unprecedented high temperatures and drought in several regions broke records dating back 150 years. Extreme conditions resulted in severe fires in Australia (around Canberra), Canada (British Columbia), Italy, Portugal and the United States (California), causing the loss of more than 100 lives. Although fires in the United States in 2003 forced entire communities to be evacuated, the area burned (1.65 million hectares) was less than the average of the past eight years (2 million hectares) (NICC, 2003).

The number of fires and area burned fluctuate annually in the Mediterranean region. The total area burned in 2002–2003 did not exceed the area burned during extreme years of the 1980s and 1990s. In Portugal, fire area quadrupled compared with average years, and in France the area more than doubled the average (Figure 4). However, without the assistance of Italy and Spain, the figures would likely have been even higher. While additional funding and improved suppression technology will have an impact on the size of a fire, more public education and awareness campaigns are needed to reduce the incidences.

In South Africa, large stores of industrial roundwood burned in 2003, while in the Russian Federation, 24 million hectares of coniferous forests and other lands were affected by wildfires in the same year, with devastating consequences for the ecology and national economy.

In tropical Asia and Latin America, land-use fires and associated smoke pollution continued to affect public health and safety, and the same problem appears to be surfacing in Central America. Through monitoring, GFMC has detected an increasing number of fire events in Central Africa, which indicates that in the equatorial forest region, fire is systematically being employed in land-use change, as in Asia and Latin America.

A number of wildfires throughout the world have led to secondary disasters of high humanitarian significance. Human casualties caused by mudslides occurring after fires or flash floods and public health affected by extreme wildland fire smoke pollution in many countries reveal that the consequences of

GFMC

In 2003, 24 million hectares of coniferous forests burned in the Russian Federation

excessive burning and high-severity wildfires go beyond economic and biodiversity losses. Forest health is also affected by wildfires, which are often associated with insect infestation, for example of Siberian moth (*Dendrolimus superans sibiricus*) in Mongolia and the Russian Federation (Goldammer, 2004) and Southern pine beetle (*Dendroctonus frontalis*) in most Central American countries (Billings *et al.*, 2004).

The principal cause of uncontrolled forest fires in 2002–2003 was human activities, particularly from burning agricultural stubble and waste. As a case in point, 91 percent of wildfires in Italy originated from such practices. In Canberra, Australia, on the other hand, lightning caused the raging fires that destroyed 500 homes. Arson is on the rise, having been reported in Australia (Sydney), France, Mongolia, Portugal, the Russian Federation and the United States. Calls are therefore being made to tighten national fire legislation and to strengthen law enforcement.

Fire prevention

Fire prevention through sound management remains, by far, more cost-efficient than suppression during emergencies. However, lack of resources, negligence and policies focusing narrowly on conservation have left several areas without fire management strategies and increased their vulnerability. Prescribed burning and programmes to reduce fuel buildup are now priorities in Australia, Canada, the United States and elsewhere. In the United States, the main agencies involved in fire management (the Forest Service of the United States Department of Agriculture and the National Park Service and Bureau of Land Management of the Department of the Interior and others) conducted prescribed burning on more than 1 million hectares for fuel load reduction and other objectives (biodiversity conservation) in 2003.

The use of fire in agricultural practices in many developing countries illustrates the complex nature of fire prevention policies and fire legislation and the linkages among sectors. Where fire is an indispensable tool in shifting cultivation, for example, its widespread use needs to be taken into account when laws are developed so that people are not forced to break them to meet basic needs. Community forestry and similar programmes that engage residents in the quest for solutions have proved effective in both preventing and controlling wildland fires.

Fire suppression

While fire prevention may be the desirable approach, most countries pay dearly to maintain emergency response capacity to avoid severe social, economic and environmental losses. International cooperation, notably through bilateral agreements, is proving to be effective in combating fire and in facilitating emergency aid across borders. The introduction of an Incident Command System (ICS) – which provides a common language for international fire fighting teams in order to avoid misunderstandings in terminology – made it possible for fire fighters from Australia, Canada, Mexico, New Zealand and the United States to work together during 2002–2003 in Australia and the United States. This standardized system increases the safety of crews on the ground and in the air and decreases the risk of lives being lost.

International cooperation in wildland fire management

The global fire community met in 2003 at an International Wildland Fire Summit in Sydney,

Australia, to propose and agree on pragmatic and sustainable solutions to protect human health and avoid the consequences of wildland fires. More than 80 participants from 34 countries and 10 international organizations reached agreement on:

- principles to adapt international wildland fire management projects and exchanges to local ecological and social conditions;
- a template for international agreements that agencies can use to cooperate or to arrange mutual aid with one or more countries;
- the establishment of an Incident Command System as an international communication standard for wildland incident management;
- a strategy for enhancing future international cooperation in wildland fire management;
- a request for the United Nations (UN) to assist in implementing proposed strategic goals.

The need for countries to enter into collaborative agreements to assist with fire emergencies is recognized and well articulated. Indeed, commitment to move in this direction is illustrated by the results of the fire summit, the UN-led Inter-Agency Task Force for Disaster Reduction, the Global Fire Partnership that IUCN, The Nature Conservancy and WWF launched in 2003 and the establishment of 12 Regional Wildland Fire Networks within the Global Wildland Fire Network. The agreement that GFMC, the International Strategy for Disaster Reduction, FAO and the Global Observation of Forest and Land Cover Dynamics reached in May 2004 on a framework for developing an international wildland fire accord is further proof of fruitful collaboration.

Although the responsibility for suppressing fires resides with countries and national fire authorities, the key to dealing more effectively with emergencies lies in putting agreements in place between and among countries. To enhance this type of collaboration, FAO and partners are working with countries to develop bilateral or multilateral instruments.

A Workshop on Multilateral Assistance against Forest Fires in the Mediterranean Basin was held in Zaragoza, Spain, from 10 to 11 June 2003 under the auspices of the African Forestry and Wildlife Commission/European Forestry Commission/Near East Forestry Commission (AFWC/EFC/NEFC) Committee on Mediterranean Forestry Questions *Silva Mediterranea*. Participants studied procedures to coordinate mutual agreements and examined common legal and logistical tools to facilitate the sharing of resources among countries to combat forest fires within the Mediterranean Basin, when needed. This workshop was a preliminary activity to prepare a future Mediterranean conference on multilateral assistance against forest fires.

In April 2004, fire brigades of several European Union (EU) countries (including France, Germany, Italy, Slovenia and Spain) jointly conducted a large fire suppression exercise in southern France involving aerial means and ground crews. In the same year, consultations on cooperation in wildland fire management were held for the Balkan countries, the eastern Mediterranean, the Near East and Central Asia; the Baltic countries; Central America and the Caribbean; Northeast Asia; South America; the Southern African Development Community (SADC) and sub-Saharan Africa; and the Western Hemisphere. ◆

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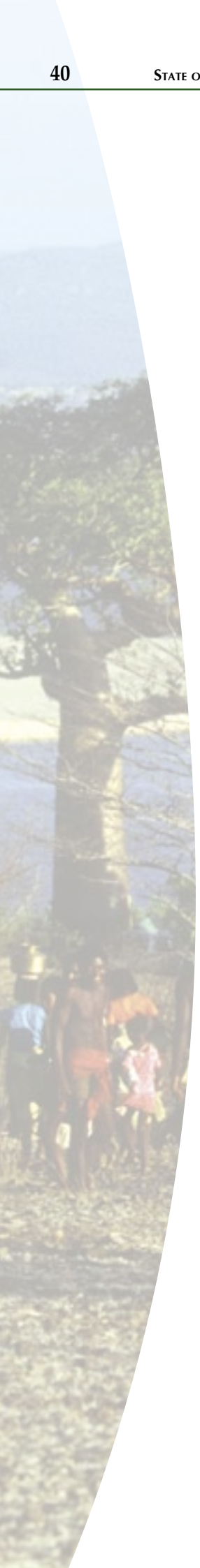

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