



Policy brief

Making forests work for people and nature

– Responding to global drivers of change

This policy brief is based on the book *Forests and Society – Responding to Global Drivers of Change*, IUFRO World Series Volume 25.

The information on forest area and changes in forest area has been updated with data from the FAO Forest Resources Assessment 2010 (*Global Forest Resources Assessment 2010. Main Report*. FAO Forestry Paper 163). Information on the economic value of biodiversity loss was derived from *the Economics of Ecosystems and Biodiversity* (TEEB) study (<http://www.teebweb.org>).

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Desing and lay out Seppo Oja

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Summary of key messages

1. Drivers of change that affect forests and people interact in complex ways and across different levels. Global and regional processes can directly affect ecosystems and sociocultural systems at the local level, while cumulative land-use decisions at local levels can either contribute to problems at the global level or help to mitigate them.
2. Increasing demand for forest products and services creates new production and employment opportunities. Capturing these opportunities requires intersectoral coordination and landscape-scale planning and development approaches that simultaneously focus on different economic activities and social and environmental values.
3. Addressing the complex challenges related to forests and forestry requires a focus on institutional and policy intersections and cooperation at and between different levels (global, national, local). It is important to advance compatibility among the objectives of sectoral policies and increase cooperation among central authorities, local governments, educational and capacity-building institutions.
4. Stakeholder participation is key to developing appropriate institutions and policies. Awareness raising, capacity building and empowerment of local people are paramount for increasing participation. Partnerships, collaborative platforms and networks at different levels can also foster stakeholder participation and participatory policy making and can promote consensus on common objectives and strategies.
5. Incremental, adaptive, unidirectional policy changes may better respond to “real world” challenges and yield results more effectively than do drastic policy changes by creating opportunities for continuous learning from policy outcomes and building on success.
6. Government institutions must strive to create an enabling environment that facilitates sustainable forest management (SFM) and livelihoods by establishing secure rights to forest goods and ecosystem services and a favourable regulatory environment and by controlling illegal activities. Mechanisms to compensate those who provide ecosystem services must be further developed and implemented to make SFM and forest conservation a more attractive land-use option.
7. Implementation of SFM needs to be strengthened, with more attention devoted to decision-making processes, benefit-sharing, risk management and environmental issues, involving a wide range of stakeholders that include actors outside the forest sector. Measures to promote adaptation of forests and forest-dependent people to climate change should be promoted and incorporated into the SFM framework.
8. Adaptive management approaches that integrate research and monitoring of outcomes to improve the effectiveness of management interventions provide a flexible and responsive way to deal with uncertainty and change. Monitoring of forest cover, ecological changes in forest landscapes and the environmental and socioeconomic effects of different policies and management practices is crucial for adaptive management and adaptive policy development.
9. Capacity building is essential for ensuring that those involved in forest management possess the necessary skills and knowledge to foster SFM and take advantage of the opportunities it provides.
10. Professionals must be educated to have a broader, multidisciplinary understanding of the forestry sector and its role in meeting the needs for ecosystem services, in fostering rural development and in ameliorating the impacts of climate change. They need to take part in and provide leadership in interdisciplinary efforts to promote and consolidate SFM.



In addition to ecosystem services and wood, forests and trees outside forests provide numerous non-wood forest products such as food, fibre, resins, oils and plant and animal products used for medicinal, cosmetic or cultural purposes. Non-wood forest products are especially important for the livelihoods of the poor. Photos: above left Anders Malmer, above right Gerardo Mery and bottom left Bruno Locatelli.

I Forests are crucial for human well-being

The world's forest area covers more than 4 billion hectares, accounting for 31% of total land area. While deforestation, mainly due to conversion of forests to agricultural land, has shown signs of abating in several countries, it still continues at an alarming rate in others. Overall, approximately 13 million hectares of forest have been converted to other uses or lost through natural causes every year during the past 10 years. Simultaneously, forest area has increased through afforestation* and natural expansion of forests in temperate and boreal areas and in some emerging economies such as China, India and Viet Nam. The global net loss of forests from 2000 to 2010 has been estimated at 5.2 million hectares per year. Most forest loss takes place in the tropics.

Forests provide a wide range of products and services that are crucial to human well-being, and they contribute to the livelihoods of an estimated 1.6 billion people worldwide. Forests also play important roles in carbon sequestration, regulation of climate and water flows, air filtration, erosion control and the provision of habitat for 80% of the world's terrestrial biodiversity. While forests provide habitat for biodiversity, the ecosystem services forests provide are dependent on that biodiversity. A recent assessment estimated that the annual economic impact of global biodiversity loss is between EUR 1.35 and 3.1 trillion (USD 2.0–4.5 trillion), equivalent to 7.5% of global gross domestic product. Forests

have cultural and spiritual values and are important for recreation, tourism, and landscape beauty; they also contribute to emotional well-being, for example through relief of stress. Deforestation, forest degradation and fragmentation of forested landscapes result in the loss of critical products and services.

Global drivers of change that most affect forests and the products and services they provide include climate change, population growth and urbanisation and associated changes in values and consumption patterns, globalisation and changes in markets and investments, technological changes and innovations, and pressures that originate from other economic sectors such as agriculture, energy and mining.

Although many of the drivers of change affect forests, forestry and forest-dependent people worldwide, effects will be most severe in less-developed regions where people lack adaptive capacity due to poverty, political and institutional marginalisation and geographic isolation from centres of power.

While many drivers of change are not new, the pace of change has accelerated and the associated impacts have become more acute over time, undermining the ability of many forested landscapes to provide ecosystem services. Because developing new policies and modifying existing ones to address changes take time and policy implementation can take even longer, there is no time for delay. The need to act now is urgent in order to reduce the adverse effects of the drivers of change and to identify potential benefits and opportunities they may create.

* Establishment of forest on land that, until then, was not classified as forest. Implies a transformation from non-forest to forest.



FAO/ref. FO-6134/Robyn Dalzen



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Adaptation may also give rise to broader support for SFM because there is a growing recognition that forests play an important role in providing ecosystem services that are of utmost importance in reducing the vulnerability of society in general.

II Drivers of change interact to impact forests

Curbing deforestation and enhancing SFM are key to addressing climate change

Deforestation, forest degradation and land-use change are major sources of carbon emissions, resulting in about 15%–20% of current emissions. Forests play a crucial role in climate change mitigation and provide a unique opportunity for reducing emissions at a relatively low cost by curbing deforestation and forest degradation. However, tropical forests are disappearing at an alarming rate and this opportunity may be lost if effective action is not taken now.

Even if effective mitigation efforts are achieved in the short term, forests will be affected by climate change and associated disturbances such as floods, droughts, wildfires and pest outbreaks. As a result of climate change and subsequent changes in forest structure and forest cover, the positive effects of forests on human health and well-being may decrease. Warming temperatures may, for example, increase the occurrence of vector-borne diseases.

Adaptation of forests and people to climate change creates new challenges related to vulnerability assessment and the identification of adaptation measures and their implementation. Reducing emissions from deforestation and forest degradation and enhancing forest carbon stocks in developing countries (REDD+) represent for many developed countries an attractive opportunity to achieve a portion of their emission reduction targets through investments in tropical forests. For some developing countries, this mechanism may become an additional

source of funding to support SFM, development plans and poverty-reduction strategies.

Efforts to promote SFM have not been widely successful. Unless constraints to these prior efforts are not addressed, REDD+ funding mechanisms will not accomplish the objectives for which they have been developed. Therefore, addressing the causes of deforestation and enhancing SFM and its implementation are central to harness the potential of forests for mitigation of and adaptation to climate change.

Changing and increasing demands for forest products and services

By 2050 the world population is projected to exceed 9 billion and the proportion of urban dwellers is likely to be 70%. Rising food demand, changes in consumption patterns and dependence on biomass for energy will increase demand for agricultural land and drive deforestation and forest degradation. Increasing urbanisation and concomitant changes in land use on the urban fringe will further the fragmentation of forests. An increasingly urban population will more and more value forests for the ecosystem services they provide, especially for sustaining a healthy water cycle and carbon sequestration and storage and as an environment for recreation, landscape beauty and spiritual renewal. Conflicts and competition between the different land uses, land development and conservation will become increasingly acute.



Bruno Locatelli

Global changes in markets and investments

Global forest products markets and investments have profoundly changed in response to globalisation, information technology and the increasing role of plantation forests in Latin America and Asia. These changes are leading to increasing polarisation in forest product markets and investments between developing and developed countries. The recent global financial crisis has further strengthened these trends.



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Population growth and urbanisation lead to increasing and diversifying demands for forest products and services.

In many developed countries the demand for and production of traditional forest products are either growing slowly, stagnating or declining. In contrast, the markets and investments in the forest industry's production capacity are growing rapidly in emerging economies, such as China, India, Russia and Latin American countries. These changes provide new development and employment opportunities in forest sectors of emerging economies.

In countries, such as Canada, the United States, Sweden and Finland, with a long tradition in forest industry, forestry production has declined, but innovation and technological development for producing new goods from wood, including second-generation biofuels, are emerging. The European Union and some national governments' policies that encourage the use of renewable energy strongly support these innovative processes.



Innovations and technological development create new opportunities for forest industries and support the forestry sector's role in contributing to the bioeconomy – the use of renewable biological resources and bioprocesses for more sustainable and eco-efficient manufacturing of goods.
Photos: Metla/Erkki Oksanen

The international trade in forest biomass to supply energy is rapidly increasing. In a number of countries, wood-based bioenergy has the potential to become a growth industry and could provide employment in the production, harvesting and processing of biomass. Land availability for bioenergy production and the capacity of forests to sustain productivity under intensive production and harvesting regimes vary greatly between areas and countries. In many developing countries, the growing demand for biofuels can accentuate competition between different land uses and can lead to conflicts between local communities and companies establishing large-scale biofuel plantations.



FAO/ref. FO-6595/ Masakazu Kashio

Sustainable farming techniques, agroforestry and trees on agricultural land can contribute to biodiversity conservation. Trees on agricultural lands provide various ecosystem services and are an important source of wood and non-wood forest products.



FAO/ref.FO-5990/ Juntima Pongkraikitti

Need for integrated cross-sectoral policies and land-use planning

The strongest drivers of change affecting the forest sector often originate outside the sector. Increases in the prices for agricultural commodities and incentives for agricultural and livestock production, for instance, have given rise to deforestation because opening new forest areas for cultivation becomes attractive from an economic perspective. Identifying and quantifying the full economic costs of policies that encourage agricultural practices and other economic activities that are detrimental to forests continues to be important.

Forests and trees in agricultural lands have an essential role in landscapes with different land uses, providing ecosystem services and maintaining ecosystem connectivity as well as supporting local livelihoods. Comprehensive land-use planning and land management is important for creating functional landscapes where agriculture, sustainably managed forests, conservation areas and other land uses are integrated in a sustainable manner. To achieve this, integrated, cross-sectoral, landscape-scale planning and development approaches, which simultaneously focus on different economic activities and social and environmental values over broad areas, are needed.

Key challenges that limit the ability of forestry activities to contribute to local livelihoods include remoteness, poor rural infrastructure, paucity of basic human services and scant institutional presence. However, economically attractive activities have been reported when a favourable set of conditions combine to encourage sustained local participation in forest-based development initiatives. Mechanisms to compensate those who provide environmental services, especially ones directed to mitigation of



Anders Malmer



FAO/FO-5616/ Hiroshi Hiraoka

climate change, should be further developed and implemented to make sustainable management and conservation of forests more attractive land-use options.

Drivers of change interact in complex ways

Drivers of change interact in complex ways. For example, changes in climate augment pest infestations and wildfires, which cause forest degradation, and, in turn, increase carbon emissions into the atmosphere, further accentuating the problems of climate change. Increasing global demand for forest products have led to deforestation and forest degradation, especially when problems of illegality and poor institutional capacity have resulted in unsustainable practices. Drivers of change affect different regions at different speeds and intensities: in boreal forests, climate change is already having an impact on forest ecosystems and on forest-dependent communities, while in many tropical areas primary impacts continue to be from more immediate causes such as

Land-use changes can increase the demand for water while simultaneously affecting the hydrological cycle and water quality. Changes in rainfall patterns and temperature will directly affect water availability and alter the nature and distribution of forest and tree cover.

illegal logging, the heavy dependency of local communities on forest resources and conversion of forest land to agriculture and pastures.

Global changes shape local realities – local changes have global implications

Global drivers intersect with local socioeconomic, ecological and cultural realities and introduce new challenges that require innovative, locally adapted responses.

Global processes such as climate change can directly affect the health, resilience and sustainability of ecosystems and sociocultural systems at local and



Anders Malmer

regional levels. At the same time, adaptation of the wider society to climate change is based on adaptation measures at the local level. The very ability of forests to contribute to climate change mitigation and adaptation will be influenced by local and/or regional responses to climate change.

Growing global demand for forest products and services can create new opportunities for smallholders, community-based forest enterprises and other small or medium size enterprises. To benefit from

these opportunities, local actors should have secure, long-term rights to forest resources, capacities to carry out technical, managerial and administrative decisions and access to capital. A favourable political and institutional environment that does not stifle efforts to manage forests and natural resources in a sustainable manner is also fundamental.



Bruno Locatelli

Complex interacting drivers threaten Amazonian forests

Amazonian forests are a globally important storehouse of biodiversity, a depository of carbon and a source of greenhouse gas emissions through deforestation. They play an important role in the livelihoods of local people and as a source of resources for national economies. The Amazonian region is dynamic, undergoing rapid changes due to population growth, urbanisation and infrastructure development; about two-thirds of its population live in urban areas.

The direct drivers of deforestation in the Amazon are cattle ranching, soybean production, infrastructure expansion and forest, oil and gas exploitation. Cattle ranching continues to be one of the most important direct causes of deforestation in the Brazilian and Bolivian Amazon. An unprecedented expansion of soybean production has also taken place in some areas. Between 1990 and 2007, area planted in soybeans increased from 1.55 to 5.07 million hectares in the Brazilian state of Mato Grosso. Expansion of road networks is also a driver of forest loss: in the absence of competitive economic alternatives and the rule of law, roads attract poor migrants and commercial interests searching for valuable timber and land for agriculture. It has been estimated that without signifi-

cant improvements in environmental governance, road network expansion in the Amazon will lead to the loss of 40% of the original Amazonian forests by 2050, mainly in Brazil. Since the 1990s, oil and gas exploitation with related environmental pollution has increased considerably, especially in Ecuador and Peru. About 72% of the Peruvian Amazon is included in oil and gas company concessions.

In Brazil, Bolivia and Peru, the timber industry has an important role in forest degradation. Illegal logging is widespread and proceeds with impunity, undermining the success of the two primary approaches to forest conservation, namely environmental legislation and establishment of protected areas (including extractive reserves, indigenous territories and regional conservation areas). Logging is also technically inefficient and often results in excessive waste and forest damage.

Monitoring and enforcement of regulations have vastly improved the ability of authorities to govern resource use and conservation efforts. However, the alarming scale of illegal timber extraction and destructive, unauthorized land conversion illustrate that existing capacities are inadequate for constraining unsustainable economic practices in the region.



FAO/FO-6582/Masakazu Kashio

Drivers of change affect forest landscapes that cut across national boundaries, indicating the need for cross-boarder and regional collaboration.

Key Messages I

- While the global demand for forest products and services increases, deforestation, forest degradation and fragmentation of forested landscapes threaten their availability.
- The drivers of change interact in complex ways and across different levels. Global and regional processes can directly affect ecosystems and sociocultural systems at the local level, while cumulative land-use decisions at local levels can either contribute to problems at the global level or help to mitigate them.
- Increasing demand for forest products and services creates new production and employment opportunities. Capturing these opportunities requires intersectoral coordination and landscape-scale planning and development approaches that simultaneously focus on different economic activities and consider social and environmental values.
- Mechanisms to compensate those who provide environmental services should be further developed and implemented to make SFM and forest conservation more attractive land-use options.



Wil de Jong

Local institutional adaptation is needed to ensure that new policies mesh well with local practices, customs and rules. Also, policies and practices should be easy to comprehend and absorb and should not conflict with local moral, cultural and economic principles.

III Institutional cooperation and broad participation are needed

Need for institutional intersection and cooperation

No single institution (convention, organisation or policy) can address the pressing, complex and interacting challenges related to forests and forestry. Appropriate responses require a focus on institutional and policy intersections and cooperation at and between global, national and local levels.

Contradicting sectoral policies and regulatory and/or market hurdles can lead to unsustainable forest practices and deforestation. Policies aimed at poverty reduction, food security and economic

development can undermine efforts to promote SFM and forest conservation. It is necessary to foster compatibility among the objectives of sectoral policies. Policymakers must also strive to anticipate the potential effects that proposed policies or instruments might have when combined with existing policies and initiatives within and outside the forestry sector.

In many countries decentralisation has resulted in the transfer of governmental functions and responsibilities to provincial or municipal levels, without the transfer of necessary resources and capacity building. This has hampered the success of decentralisation policies to advance sustainable use of natural resources and has, in some cases, even emboldened illegal activities.

Meeting the objectives of global and national policies depends on their successful application at the local level. Cooperation between central authorities, local governments and capacity-building and educational organisations strengthens linkages among policies and their implementation at national and subnational levels and promotes progress toward strategic goals, such as poverty alleviation and SFM. The implementation of national policies (e.g. laws, regulations) rests on awareness raising, training and capacity building. Educational and capacity-building organisations can contribute to the on-the-ground implementation of different policies by transferring the necessary skills and capacities to diverse stakeholders.



Marko Katila



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Consideration of attitudes and values is important for gaining public support and social acceptance for new policies and approaches as well as for their successful implementation. An understanding of local realities is critical to developing policies that respond to the interests and concerns of local communities.

Institutional cooperation should ideally be relatively stable, adaptive and problem-focused. The monitoring of policy impacts is essential to the adjustment of policies over time.

Need for broad participation

There has been a general shift from expert-based natural resource management approaches toward participatory approaches that seek to integrate local knowledge and interests and foster local ownership of policies and approaches. This is necessary to develop appropriate institutions and policies and to gain wide support for them. Awareness raising,

capacity building and empowerment of local people are paramount to increasing participation. Educational, training, research and extension organisations have an important role in fostering stakeholder participation and interactive learning.

Different international, national and local partnerships and collaborative platforms and networks have emerged to facilitate broad stakeholder participation and to integrate diverse and often conflicting interests across large landscapes. Experiences with biological corridors in Costa Rica and natural forest management in Honduras indicate that such platforms work if stakeholders identify with common objectives. The National Forest Programs have been designed to encourage the creation and functionality



Antti Asikainen

of these types of platforms that can guide forestry development at the national level. However, few governments possess the experience, skills, financial resources and willingness to nurture these platforms to encourage broad participation. Of fundamental importance is communication of information to stakeholder groups and development of tools to facilitate decision making within these networks and platforms.

Need for incremental policy development

Incremental, unidirectional policy changes often yield desired results more effectively than drastic and immediate policy changes because they allow for continuous learning from policy outcomes and enable adaptive policy development. Incremental policy development also creates opportunities to correct unintended direct or indirect consequences. Drastic policy changes can lead to overreactions that bring undesirable consequences, such as market

Making REDD+ work

Building credible REDD+ schemes involves long-term efforts to create and reform institutions, strengthen governance processes and build capacity to implement new models of forest management. REDD+ will only be able to proceed at a pace that allows the meaningful participation of all relevant stakeholders in consensus building on approaches that harness the potential of forests to contribute to climate change mitigation.

Successful implementation of REDD+ will in most cases require fostering effective participation of local communities in managing their forest carbon assets and allowing them to

benefit fully from emerging carbon markets and other funding schemes. To accomplish this, the rights of local communities to forest land and carbon need to be clarified and secured.

REDD+ must overcome many challenges to become effective. From an institutional perspective, the main challenges are to (1) improve institutional arrangements that shape and incorporate REDD+ to facilitate broad participation, (2) strengthen monitoring, reporting and verification systems and (3) foster stronger horizontal and vertical linkages for the design, implementation and evaluation of emerging REDD+ schemes.

destabilisation and unsustainable development. Learning from policy outcomes is critical in a world characterised by changing demands for forest products and services and by uncertainty brought on by climate change, for example. Monitoring of policy outcomes is thus necessary for understanding their effectiveness and for adapting policies to changing circumstances.

Need for an enabling environment

Government agencies have an important role in the creation of an enabling environment that facilitates SFM and the contribution of forest-related activities to livelihoods. Regulations and policies must be appropriate to varied ecological, social, cultural and economic contexts; the precise mix needed for success will differ from one region to another. Several common conditions are often considered important for advancing SFM:

Well-defined, secure rights to forests are essential for applying incentives and encouraging investment in forest management and conservation. Unless

rights are backed by law, they can be vulnerable to political pressures and changes. If use rights are suspended or revoked, adverse socioeconomic and environmental impacts can result. Climate-change mitigation (REDD+) instruments being developed further highlight the importance of secure rights to forests, including rights to benefit from ecosystem services and the recognition and formalisation of indigenous rights.

Favourable regulations are vital. Complex regulatory requirements for the management, harvesting, utilisation and commercialisation of forest products often discourage smallholders and communities from practicing sustainable forestry and can encourage illegal practices. Complying with planning and documentation requirements can be costly, inefficient and extremely difficult for forest owners and communities that lack adequate professional support. Simplification of bureaucratic procedures and appropriate adjustment of standards and regulations are often needed. Regulations should accommodate varied local conditions, facilitate rather than restrict responsible stewardship and be simple enough for local actors to understand and enforce.



CIFOR/Peter Cronkleton

To facilitate SFM and the contribution of forest-related activities to livelihoods, legal access to resources must be complemented with the know-how and financial resources required to invest in and benefit from them.

The policy and regulatory environment should be relatively stable. Frequently changing policies create uncertainty and discourage investments in forests. Long-term commitment should be reflected in public investments and continuity of support to sustainable forestry activities and forest conservation.

Effective control of illegal activities and corruption that undermine the development and consolidation of sustainable forestry practices is critical. In many countries laws are not implemented or effectively enforced. Curbing illegal activities requires capacity building for monitoring and enforcement as well as compliance with forest rules and regulations at all levels. The success of schemes to compensate local actors for environmental services they provide, such as REDD+, hinges on effective law enforce-

ment and legality. Benefits must also be channelled to the true providers of environmental services.

Sustainable livelihoods are a prerequisite to the achievement of sustainable forest management. The availability of basic services such as education, health care, water and adequate local infrastructure lay the foundations for sustainable livelihoods. Beyond subsistence use, forests can contribute to income generation. The identification of commercial opportunities and favourable integration of small and medium forest enterprises into supply and value chains increase opportunities to generate income, as do access to capital and technology. Public-private and community/smallholder-corporate partnerships can provide means to overcome common challenges.



FAO/FO-6810/ Masakazu Kashio

Key Messages II

- Addressing the complex challenges forests and forestry are facing requires a focus on institutional intersections and cooperation at and between different levels (global, national, local). It is important to advance compatibility among the objectives of sectoral policies and increase cooperation among central authorities, local governments, educational and capacity-building institutions.
- Raising awareness, building capacity and empowerment of local people are of paramount importance for broadening participation and fostering local ownership of policies and approaches. Partnerships, collaborative platforms and networks at different levels can also strengthen stakeholder participation and participatory policymaking, and can promote consensus on common objectives and strategies.
- Incremental, adaptive unidirectional policy changes may better respond to real-world challenges and yield results more effectively than do drastic policy changes, by creating opportunities for continuous learning from policy outcomes.
- Government institutions must strive to create an enabling environment that facilitates SFM and livelihoods by establishing secure rights to forest goods and ecosystem services and a favourable regulatory environment and by controlling illegal activities.

IV Intersectoral landscape-scale management approaches are necessary

Broaden SFM and strengthen its implementation

Sustainable forest management (SFM) has become the dominant international paradigm in forestry – the overarching principle for forestry practices and forestry development. In general, SFM aims to balance the increasing demands for forest products and services with the need for conserving forest area, health and diversity. Globally, however, SFM has still not been broadly applied and its implementation must be strengthened.

SFM goes beyond management practices being implemented in a particular forest area, although this has often been its main focus. Instead, an appropriate understanding of SFM encompasses a wide range of social, economic and environmental processes and interrelationships that affect decision making, benefit sharing, and environmental effects related to forests, as well the interrelationships between forestry and other sectors within a given territory. Policies in each country should integrate forest adaptation into the framework of SFM and promote intersectoral coordination for linking the forest sector and other sectors in adaptation policies. In a world characterised by changing social, economic and environmental circumstances and uncertainty stemming from climate change, SFM must embrace the idea of continuous and adaptive development of approaches and objectives.

Need for adaptive management at the landscape scale

Adaptive management provides a flexible and responsive means to deal with uncertainty and unpredictability. It is a dynamic approach to forest management in which the effects of decisions and management practices are continually monitored and utilised, along with research results, to modify activities, thereby ensuring progress toward management objectives.

Monitoring landscape change is a key component of an adaptive management strategy. Adaptive collaborative management can help foster the reconciliation of divergent interests regarding the use of forested landscapes. Landscape modelling is a useful tool to anticipate and quantify change and change dynamics and bring science to bear on policy decisions that guide forest management.

To sustain biological diversity and ecosystem services, efforts must be made to conserve trees and a large spectrum of forest types across the landscape through a combination of protected areas and the application of sustainable management practices. The reduction of landscape fragmentation is also necessary for conservation of biodiversity and related ecosystem services. More attention must be directed to restoration of landscape integrity through biological corridors and landscape connectivity, which facilitate species migration and the long-term viability of populations.



Metla/Erkki Oksanen

Adaptive collaborative management can help address various stakeholder interests and facilitate the integration of different land uses across landscapes.

More than half of the world's forests (57%) have been affected by human activities indicating that more attention should be paid to recognising the value and importance of altered and secondary forests. In the tropics, management approaches for restoring these forests are sparse. About 7% of the

world's forests are planted. Well-established and properly managed plantations can play an important role in meeting the demands for forest products and in the restoration of degraded lands.

Secondary forests in West Africa

Secondary forests are forests that have regenerated after significant human and/or natural disturbance. They represent about 90% of the forests in West Africa. Secondary forests are often degraded and fragmented and under strong pressures, especially from slash-and-burn agriculture. In most cases secondary forests are not sustainably managed. A better understanding of these ecosystems and the demands and expectations of people living near these forests is required in order to develop viable management options. Progress in the management of secondary forests can be achieved by (1) involving local communities, (2) reducing destructive forest agents such as fire, grazing, farming and unsustainable timber harvesting and (3) taking into account management planning factors such as age and composition, site history and condition, and multiple-use and management objectives of the forests. Agroforestry practices and the utilisation of non-wood forest products can serve to complement the silvicultural management of secondary forests. A number of smallholder/community-corporate partnerships have shown potential to encourage tree growing.

Maintain healthy forests

New approaches are needed to sustain and improve forest health in changing environments. These include a large number of technical and ecological considerations that go beyond management for the sustainable production of wood and non-wood forest products and reducing the impact of harvesting operations. While these objectives continue to be important, threats and uncertainty associated with climate change call for management approaches that sustain ecosystem complexity.

Biodiversity is closely linked to the provision of ecosystem services. Changes in species richness, abundance and composition of an ecosystem may adversely impact the quantity and quality of services

Ecosystem-based adaptation

Ecosystem-based adaptation (EBA) is an emerging multi-scale, multisector approach that takes into account the role of ecosystem services in reducing the vulnerability of society to climate change. To ensure that forests will contribute to the adaptation of the broader society in the future, EBA aims to reduce current threats to ecosystem services by preserving forests, managing them in a sustainable fashion and by fostering forest adaptation. EBA devotes careful attention to the use of forest ecosystem services for societal adaptation. This means, for instance, that access and rights to forest products are considered and awareness is raised about the importance of forests for the adaptation of society.

provided, such as carbon sequestration, pollination and pest control. A number of ecosystem services can be at least partially restored by land-use practices that favour the conservation and restoration of specific functional groups and communities. Biological diversity also has a direct link to the capacity of ecosystems to resist and adjust to changes.

Genetically diverse ecosystems with diverse age and species structures are considered to have the best chance of adapting to future changes. Forest resistance to a climate-induced decline in forest health can be increased by a number of measures, which include increasing forest complexity, conservation of genetic variability by protecting key populations, and assisting forest plants to migrate and adapt to change. A retooling of conventional management approaches, which are characterised by central planning for stability and control, is required to nurture the capacity of ecological and social systems to cope with, adapt to and shape change.



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Key messages III

- Implementation of SFM needs to be strengthened and more attention devoted to decision-making processes, benefit sharing and environmental issues, involving a host of stakeholders that include actors outside the forest sector.
- Measures to promote adaptation of forests and forest-dependent people to climate change should be advanced and incorporated into the framework of SFM. Intersectoral coordination to integrate the forest sector with other sectors in adaptation policies is vitally important.
- Adaptive management approaches provide a flexible and responsive means to deal with uncertainty and unpredictability by integrating research and monitoring of outcomes to improve the effectiveness of management interventions.
- Maintaining biodiversity is important for the provision of forest ecosystem services. Biologically diverse ecosystems are also considered to be best able to adapt to future changes.

V Capacity building, research and education are critical

Capacity building is crucial for SFM

Capacity building is essential for bridging the gap that often exists between policy formulation and its widespread implementation. It must target a wide array of actors at different levels – decision makers, forest administrators, forest owners, community and company representatives, forest workers, etc. – and provide them with necessary skills and knowledge. Depending on the target group, the skills needed range from social and organisational aspects, including enhancement of leadership skills for sustainable development, ecological and technical aspects that encompass research and monitoring capabilities, business development and administrative aspects, and political-legal aspects and governance to networking, communication and information exchange, including the important skill of negotiation. For example, successful participation of local communities in the planning, management and use of forests requires adequate organisational capabilities, local leadership and the capacity to plan and carry out a gamut of activities, including those of a technical nature, those related to business organisation and administration, and others. Capacity building must continue to evolve in order to respond to changing socioeconomic, environmental and technological conditions.

Technology transfer is an important issue for global forest-sector development and for overcoming the existing asymmetries between developed and developing countries. It also constitutes a central

part of the forthcoming climate change mitigation mechanisms by transferring technologies needed to monitor carbon balance and impacts of mitigation measures. Technology transfer must be combined with capacity building, which in the case of climate-change mitigation schemes can also include building capacity at the community level to monitor changes in forests and carbon stocks.

Research and monitoring – foundations for adaptive management and institutional development

While the complexity of forestry is increasing and the need for information to drive decisions is greater than ever, research capacity in many parts of the world has stagnated or diminished, especially in developing countries. Research must be carried out on an array of topics such as the composition and development of forests, genetic diversity and regeneration, numerous socioeconomic and governance issues, and policy aspects of SFM, as well as on the effects of climate change on forests and forest-dependent people. Baseline data has to be generated to track changes in forest cover and condition and other variables such as biodiversity and forest carbon stocks.

Monitoring of forest cover, ecological changes in forests and environmental and socioeconomic effects of different policies and management practices is needed for adaptive management and adaptive policy development.



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Better utilisation of traditional knowledge and integrating traditional knowledge with scientific knowledge can and should offer new perspectives and understanding.

Since forestry issues cut across different research disciplines, an interdisciplinary perspective is needed if research is to respond to the information needs of policymakers and decision makers. A vital area for research is the identification and quantification of extrasectoral pressures on forests in order to estimate the real costs of land-use change and to look for new forms of integrating different land uses across landscapes in a sustainable manner.

Need for new professionals

The need for change in forestry education has been recognised; however, many curricula remain outdated and fail to address important issues such as integrated natural resources management, forest governance, biodiversity, forests and climate change, forests and livelihoods, and rural enterprise development. Professionals must be educated to understand the broad implications of the drivers of change and to be capable of taking part in and leading interdisciplinary efforts to promote and consolidate SFM. Professionals who devote themselves to international processes and global policies must have an adequate understanding of the factors and conditions that are important for SFM.

At the same time, professionals engaged with producers, including community-based forestry enterprises and indigenous groups, must understand the implications of global dialogue in order to take advantage of the opportunities created. Since no professional can be expected to manage all of the complex dimensions of forestry, the new professional should have the capability to recognise the importance of bringing qualified institutions and individuals together to address problems in a more comprehensive fashion. They should also understand the need for and be able to facilitate wide participation both in relation to national-level policy development and local-level initiatives.

Continuing education of professionals and practitioners is critical for responding to changing circumstances and developing and updating new competencies over time; for example, the adoption of a community forestry strategy requires a whole new set of knowledge, skills, values and attitudes within the forestry bureaucracy.

It is also important to link research to education and training for effective dissemination of relevant new knowledge and to link students with real-world processes through mechanisms such as thesis research.



Bruno Locatelli

Key messages IV

- Capacity building is crucial for ensuring that those involved in forest management possess the necessary skills and knowledge to foster SFM and take advantage of the opportunities it provides.
- Forestry issues cut across different research disciplines. An interdisciplinary perspective is needed if research is to provide forest managers and policymakers and decision makers with the skills, information and knowledge they require.
- Research must be strengthened in an array of topics such as the composition and development of forests, genetic diversity and regeneration and the effects of climate change on forests and forest-dependent people. The complex interactions among the drivers of change and their collective impacts on forests and society pose a further challenge for research.
- Monitoring of forest cover, ecological changes in forests and the environmental and socioeconomic effects of different policies and management practices is necessary for adaptive management and adaptive policy development.
- Professionals must be educated to have a broader, multidisciplinary understanding of the forestry sector and its role in meeting the needs for ecosystem services, in fostering rural development and in ameliorating the impacts of climate change. They need to take part in and provide leadership in interdisciplinary efforts to promote and consolidate SFM.

Afterword and acknowledgements

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of change and their direct and indirect effects on forests, forestry and forest-dependent people, and it proposes ways to respond to the drivers of change and to take advantage of the opportunities they may provide. This policy brief conveys in a concise format some of the main findings, conclusions and recommendations of this book.

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