A GOOD PRACTICE GUIDE

SUSTAINABLE FOREST MANAGEMENT,

BIODIVERSITY *and* LIVELIHOODS

Convention on Biological Diversity

2010

IUCN

The Convention on Biological Diversity (CBD) is a global agreement that addresses biodiversity, and has 192 Parties today. It was established in 1992, with three main objectives:

1. the conservation of biodiversity;
2. the sustainable use of its components; and
3. fair and equitable sharing of benefits arising out of the utilization of genetic resources.

The Secretariat of the CBD (SCBD) was established to support the goals of the Convention. Its principle functions are to prepare and service meetings of the Conferences of the Parties (COP) and other subsidiary bodies of the Convention, support Parties as appropriate, and coordinate with other relevant international bodies. The SCBD established the Biodiversity for Development Unit in 2008 with the support of the French and German governments. The goal of the Unit is to promote the integration of biodiversity conservation and poverty alleviation objectives in both conservation planning (e.g. National Biodiversity Strategies and Action Plans) and development planning (e.g. Poverty Reduction Strategy Papers or Sustainable Development Strategies).

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The SCBD acknowledges that parts of this guide are based on the *IUCN/ITTO Guidelines for the conservation and sustainable use of biodiversity in tropical timber production forests*, and other publications by members of the Collaborative Partnership on Forests (CPF).

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Foreword to the series

The conservation and sustainable use of biological diversity, and the eradication of extreme poverty are two of the main global challenges of our time. It has been recognized by the international community that these two challenges are intimately connected, and require a coordinated response. The protection of biodiversity is essential in the fight to reduce poverty and achieve sustainable development. 70% of the world's poor live in rural areas and depend directly on biodiversity for their survival and well-being. The impact of environmental degradation is most severe for people living in poverty, because they have few livelihood options on which to fall back.

The Millennium Development Goals (MDGs) were established by the United Nations in 2000 to combat poverty, hunger, disease, illiteracy, gender inequality and environmental degradation. They integrate the 2010 Biodiversity Target set in 2002 by the Convention on Biological Diversity to achieve, by 2010, a significant reduction in the rate of biodiversity loss. Biodiversity is key to the achievement of all MDG goals, and to the fulfillment of this international commitment by 2015.

Building bridges between biodiversity, poverty reduction and development is a crucial task. It involves strengthening the rights of the poor over resources, and developing financial incentive measures through which the poor who are living in biodiversity-rich regions receive payment from those who benefit from those services. It also includes strengthening partnerships and collaboration between biodiversity and development sectors.

This series of guides aims to compile good practices that support biodiversity conservation and poverty reduction in a number of different development sectors. It is our hope that these guides provide practical direction for governments, development agencies, businesses, and non-governmental organisations working to ensure that biodiversity conservation and poverty reduction activities go hand in hand.

Ahmed Djoghlaf, *Executive Secretary*
Convention on Biological Diversity

Foreword from the International Union for Conservation of Nature (IUCN)

The United Nations General Assembly has described Sustainable Forest Management (SFM) as an evolving concept, constantly adapting to new challenges to the effective delivery of forest goods and services. In this respect, one particular area that requires improved understanding and better practical guidance is the relationship between biodiversity and poor people. Indeed, this was identified as a key priority by IUCN at the 4th World Conservation Congress in Barcelona.

Nevertheless, at a preparatory meeting for the Copenhagen climate negotiations earlier this year, SFM came under sustained attack. Some participants rejected SFM as the overarching framework for forest-based mitigation measures because they saw SFM as 'a logger's charter'. It seems that the paradigm shift in forestry over the last thirty years – from narrow 'sustained yield' goals to attempts to safeguard the delivery of all forest functions and values - has still not been properly and widely communicated.

This Good Practice Guide is therefore timely. Intended for government officials, NGOs, donors and others, it focuses on the importance of harmonizing the conservation of biodiversity and poverty reduction in a variety of forest contexts. The guide gives good practical advice with real-life examples from a range of forest situations: protected areas, production forests, agroforestry and degraded forests under restoration. It focuses both on the tools needed for greater sustainability, such as payments for environmental services, and on the actors with whom interaction is needed, from local communities to national level players.

IUCN commends the Guide to its users in the belief that it helps communicate the value of Sustainable Forest Management as a reliable framework for safeguarding and delivering a broad range of goods and services, in a fair and equitable manner, to the widest possible range of stakeholders.

Stewart Maginnis, *Director – Environment and Development*
International Union for Conservation of Nature

Purpose and scope of the guide


UNEP / S. Nazan

Forests are essential for human survival and well-being. They harbour two thirds of all terrestrial animal and plant species. They provide us with food, oxygen, shelter, recreation, and spiritual sustenance, and they are the source for over 5,000 commercially-traded products, ranging from pharmaceuticals to timber and clothing. The biodiversity of forests—*the variety of genes, species, and forest ecosystems*—underpins these goods and services, and is the basis for long-term forest health and stability. Promoting ways to use forest biodiversity in a sustainable way, and with clear social and economic benefits for the poor, is the purpose of this guide.

The Convention on Biological Diversity (CBD) addresses the conservation and sustainable use of forest biodiversity through a comprehensive programme of work, adopted in 2002 and revised in 2008 (see page 39). Many of the activities of the programme of work promote poverty reduction and creation of sustainable livelihoods. The objectives of the work programme can and should be incorporated into national and regional forest policies and strategies, for the benefit of present and future generations.

This booklet is part of a series of *Good Practice Guides* produced by the CBD. It provides a range of case studies and other materials to make the forest sector more biodiversity-friendly, and socially beneficial. It addresses the linkages between **forestry**, **biodiversity**, and **development / poverty reduction**. The summaries and examples included in this booklet show how biodiversity and sustainable economic development can go hand in hand. The primary target audiences for the guide are government officers and decision-makers in the various government agencies related to forestry (at global, regional, national and local levels), as well as development practitioners. The materials presented can also be useful to corporate and NGO planners. Much of the experience presented here is the result of work undertaken by members of the

Collaborative Partnership on Forests (CPF), and readers can find more information on each through the internet links provided and the Resources section (see page 37).

The guide will:

- Introduce public decision-makers to some techniques, technologies and procedures that optimize the social and environmental contributions of forestry and minimize negative impacts;
- Present good practice examples on the interface between forestry, poverty reduction and biodiversity;
- Provide suggestions for the improvement of national and sub-national forest-related policies, strategies, plans and projects that consider poverty reduction and biodiversity;
- Provide suggestions for organising forestry training and workshop sessions;
- Provide sources and references for more detailed information.

Guide components:

1. Booklet: *Sustainable Forest Management, Biodiversity and Livelihoods: A Good Practice Guide*

2. CD ROM (contained in Booklet sleeve). The CD ROM includes PDF versions of the booklet, key reference materials, and a summary slide presentation, which has been included as a tool for forestry planners to share this information in training sessions, workshops, strategic planning meetings, etc. Users can prepare their own presentation by selecting and/or editing each slide.

Note: Links between the Booklet and CD ROM Power Point Presentation are indicated throughout the Booklet.


INTRODUCTION

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Forestry, biodiversity and poverty alleviation

Biodiversity can be described as the diversity of life on Earth. Simply put, biodiversity is the variety of all living things, the places they inhabit, and the interaction between them. Interactions between the components of biodiversity make the Earth inhabitable for all species, including humans. Biodiversity is directly responsible for around 40% of the world's economy, particularly in sectors such as agriculture and forestry, and for providing ecosystem services such as clean water and soil fertility. 70% of the world's poor live in rural areas and depend directly on biodiversity for their survival and well-being.

It is estimated that approximately 60 million indigenous people are almost wholly dependent on forests. 350 million people depend on forests for a high degree for subsistence and income, and about 1.2 billion people rely on agroforestry farming systems (World Bank 2004). These people lack the basic necessities to maintain a decent standard of living: sufficient and nutritious food, adequate shelter, access to health services, energy sources, safe drinking-water, education and a healthy environment. In adopting the Millennium Development Goals (MDGs), the counties of the world have set a target of halving global poverty by 2015. Given the importance of forests for the rural poor, it is widely recognized that forests can be a resource for poverty reduction.

Forest and poverty linkages

The convergence of the poor and forests is a result of many factors. Forests tend to be located in remote areas where the reach of the market economy and technological progress are inhibited or slowed. Often, investments by national governments in rural areas are low. Furthermore, poverty often exists among traditional/indigenous peoples whose dependence on forests is deeply rooted in history and long predates modern social change. Forests are also often a refuge for poor rural people fleeing war. Additionally, due to their open access, forests are a magnet for the poor as they provide new agricultural lands and economic opportunities for

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Forestry, biodiversity and poverty reduction

UNEP

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resources, since they provide new agricultural lands and economic opportunities for people with limited options. Commonly, forest-dependent people who live in or near forests tend to be politically weak or powerless (Profor 2008). The poor rely on forests for a range of basic needs: food, shelter, clothing and heating. A significant number of people living in poverty also depend on forests and trees outside forests to generate income through employment and through the sale of forest-derived products (FAO 2006a).

SCBD / Eric Belvaux

Raffia basket vendor, Madagascar

Strategies for Poverty Reduction and Biodiversity Conservation

In 2001, policy-makers and practitioners from around the world identified ways in which forest policy, legislation and programmes alleviated poverty. Discussions at the Forum on the Role of Forestry in Poverty Alleviation (FAO and DFID 2001) resulted in a four-point agenda for action: strengthening rights, capabilities and governance; reducing vulnerability; capturing emerging opportunities; and working in partnership. The agenda provides a basis for practitioners to design forest management interventions to reduce poverty.

The CBD *Sustainable Forest Management, Biodiversity and Livelihoods: A Good Practice Guide* is intended to fit within the framework developed by the Forum on the Role of Forestry and Poverty Alleviation (FAO and DFID 2001), while highlighting specific practices that serve poverty reduction and biodiversity conservation objectives. The guide provides a selective overview of tools addressing aspects of timber harvesting, agroforestry, non-timber forest products, protected areas, local indigenous uses, and more. It illustrates the potential contributions forest biodiversity can make towards the livelihoods of the poor, and the importance of considering poverty reduction in sustainable forest management. Detailed descriptions of many of the good practices presented in this guide are available in other publications, for example by the Food and Agriculture Organization of the United Nations (FAO), or the International Union for Conservation of Nature (IUCN). The guide provides links and references for further reading, wherever possible.

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Ecosystem services provided by forests

Ecosystems generate numerous benefits or “ecosystem services”. River systems provide freshwater, recreation, power, and food supply. Coastal wetlands help mitigate against flooding, filter waste, and serve as nurseries for fisheries. Forests provide us a wide variety of ecosystem services, including provisioning, regulating, cultural, and supportive services (see Table 1). These ecosystem services not only deliver the basic material needs for survival, but also underlie other aspects of well-being, including health, security, good social relations and freedom of choice.

Forests are amongst the most biologically-rich terrestrial systems. Together, tropical, temperate and boreal forests offer diverse sets of habitats for plants, animals and micro-organisms, and harbour the vast majority of the world’s terrestrial species. In the past, timber production was regarded as the dominant function of forests. However, in recent years this perception has shifted to a more multi-functional and balanced view. Today, it is understood that forest biodiversity underpins a wide ranges of goods and services for human well-being. Ecologically intact forests store and purify drinking water, they can mitigate natural disasters such as droughts and floods, they help store carbon and regulate the climate, they provide food and produce rainfall, and they provide a vast array of goods for medicinal, cultural and spiritual purposes. The health of forests and the provision of these and further forest ecosystem services depend on the diversity between species, the genetic diversity within species, and the diversity of forest types.

The Millennium Ecosystem Assessment (MEA), a scientific undertaking involving over 1300 experts working in 95 countries, indicates that a large and increasing number of forest ecosystems, populations and species are threatened globally or being lost due to the loss and degradation of forest habitats, and that this reduction of forest biodiversity will be aggravated by the effects of climate change. Tropical moist forests are home to the largest number of threatened species of any biome. It is assumed that numerous, but not yet scientifically described, species are presently being lost together with their tropical forest habitats (MEA 2005).

Conserving forest biodiversity is a prerequisite for the long-term and broad flow of forest ecosystem services.

Table 1: *Forest ecosystem goods and services*

Provisioning Services	Cultural Services
▪ Food, Fiber and Fuel ▪ Genetic Resources ▪ Biochemicals ▪ Fresh Water	▪ Spiritual and religious values ▪ Knowledge system ▪ Education / inspiration ▪ Recreation and aesthetic value
Regulating Services	**Supporting Services**
▪ Invasion resistance ▪ Herbivory ▪ Pollination ▪ Seed dispersal ▪ Climate regulation ▪ Pest regulation ▪ Disease regulation ▪ Natural hazard protection ▪ Erosion regulation ▪ Water purification	▪ Primary production ▪ Provision of habitat ▪ Nutrient cycling ▪ Soil formation and retention ▪ Production of atmospheric oxygen ▪ Water cycling

Source: MEA 2005

In Focus > Protecting Kenya's Water Towers

The 400,000 hectares Mau Forest Complex sits on aquifers that provide water to millions of people in the Rift Valley and western Kenya. The Mau comprises 16 contiguous forest blocks, gazetted as forest reserves or trust land forest. It also includes six satellite forest blocks that are not adjacent to the main blocks but are part of the same ecosystem. Over the years, almost a quarter of this forest has been lost to human settlements, illegal logging, farming and a host of other human activities. UNEP's assessments have unveiled Mau's immense value. At least twelve rivers spring out from the Mau and flow to different corners of the country. The rivers breathe life and vitality into the world famous Maasai Mara National Reserve, Serengeti and Lake Nakuru National Parks. With the advice of UNEP and its partners, the government of Kenya has set up a Task Force to conserve these forest ecosystems on which millions of Kenyans depend for sustenance (UNEP n.d.).

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Environmental impacts of forestry: A snapshot

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Forestry can have a variety of negative impacts on biodiversity, particularly when carried out without management standards designed to protect natural assets.

Biodiversity loss: Unsustainable forest operations and other pressures on forest resources, such as gathering of fuelwood, can lead to forest degradation and permanent losses in biodiversity. Globally, over half of the temperate broadleaf and mixed forest biome and nearly one quarter of the tropical rain forest biome have been fragmented or removed by humans (SCBD 2008).

Illegal hunting: Increased hunting continues to be a major threat to forest biodiversity in many countries. The depletion of wildlife is intimately linked to the food security and livelihood of numerous tropical forest-region inhabitants, as many of these forest-dependent people have few alternative sources of protein and income (see page 25). Unsustainable hunting pressures are often linked to logging activities (Nasi et al. 2008).

Illegal settlements: Another possible side effect of forestry operations, illegal settlements are a threat to forest biodiversity following construction of new forest access roads to previously inaccessible regions.

Livelihoods of forest dwellers: Forestry can also have negative impacts on indigenous and local communities, and on the livelihoods of other forest dwellers by competing with these communities for access to a finite forest resource base, and by disregarding cultural or spiritual sites and practices.

Climate change: As forest ecosystems are important stores for carbon, their loss has serious implications for climate change. Forests account for about 50% of the total above-ground terrestrial organic carbon, and deforestation and forest degradation are estimated to cause about 20% of annual greenhouse gas emissions (SCBD 2008).

Yet, forestry management has evolved considerably in past decades, demonstrating significant positive impacts for biodiversity conservation, while also delivering social and economic benefits to host communities.

Reduced Impact Logging (RIL) can provide both environmental and economic benefits. Studies have found that RIL can be used to reduce carbon emissions by up to 40 tons per hectare of forest compared to conventional logging (Putz et al. 2008). This, combined with the preservation of higher levels of biodiversity in selectively logged forests, lends a strong case for sustainable forest management over standard timber-harvesting techniques. Apart from the environmental benefits, RIL has been shown to reduce the percentage of 'lost' logs (trees that are felled but not extracted because they are not seen by tractor operators), thereby reducing timber wastage. Damage to the forest ecosystem can be tremendously reduced by adopting certain RIL practices including:

- Directional tree felling to inflict the smallest impact on the surrounding forest;
- Cutting climbers and lianas well before felling;
- Establishing stream buffer zones and watershed protection areas;
- Using improved technologies to reduce damage to the soil caused by log extraction;
- Careful planning to prevent excess roads which give access to transient settlers (Mongabay n.d.).

Sustainable Forest Management

The General Assembly of the United Nations adopted in December 2007 the most widely, intergovernmentally agreed definition of *Sustainable Forest Management* (SFM):

Sustainable forest management as a dynamic and evolving concept aims to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations. It is characterized by seven elements, including: (i) extent of forest resources; (ii) forest biological diversity; (iii) forest health and vitality; (iv) productive functions of forest resources; (v) protective functions of forest resources; (vi) socio-economic functions of forests; and (vii) legal, policy and institutional framework.

(Source: UN 2008, Resolution 62/98)

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Some current trends: Forest biodiversity

- **Forest biodiversity is being lost at an alarming rate.** Key publications such as the Millennium Ecosystem Assessment (MEA 2005) and the Red List of Threatened Species™ (IUCN 2004) indicate that a large and increasing number of forest ecosystems, populations and species are threatened globally or being lost due to the loss and degradation of forest habitats, and that this reduction of forest biodiversity will be aggravated by the effects of climate change. Tropical moist forests are home to the largest number of threatened species of any biome. It is assumed that numerous, but not yet scientifically described, species are presently being lost together with their tropical forest habitats (see Figure 1) (MEA 2005).

- **The percentage of forest area designated for the conservation of biological diversity has increased significantly** between 1990 and 2005, with an estimated 11.2% of total forest area having this objective as its primary function. This positive trend was observed in all regions with the exception of Northern, Eastern and Southern Africa (FAO 2006b). However, it is often unclear how effective the protection of these areas is, and different forest types are represented very unequally in the total area of protected forests. The aim of the CBD to achieve effective protection of at least 10% of all forest types by 2010 will presumably not be met (Schmitt *et al.* 2009).

- **Forested wetlands represent a particularly vulnerable forest type.** Forested wetlands are highly biodiversity-rich and provide significant ecosystem services, such as carbon sequestration, and they underpin productive fisheries. A significant proportion of Ramsar Sites include forested areas, although a lack of data constrains estimates of the extent of coverage of this forest type under existing protected area systems. Forested wetlands are vulnerable not only to excessive direct use, but also to the added threat of unsustainable water use (MEA 2005).

- **Areas under agriculture and pasture are expanding, often at the expense of forest.** The Millennium Ecosystem Assessment reports that agricultural land is expanding in approximately 70% of the countries examined. The impact of agricultural expansion has been particularly severe in tropical forest regions, where pasture and crop land is expected to continue to increase over the next 30 to 50 years (MEA 2005).

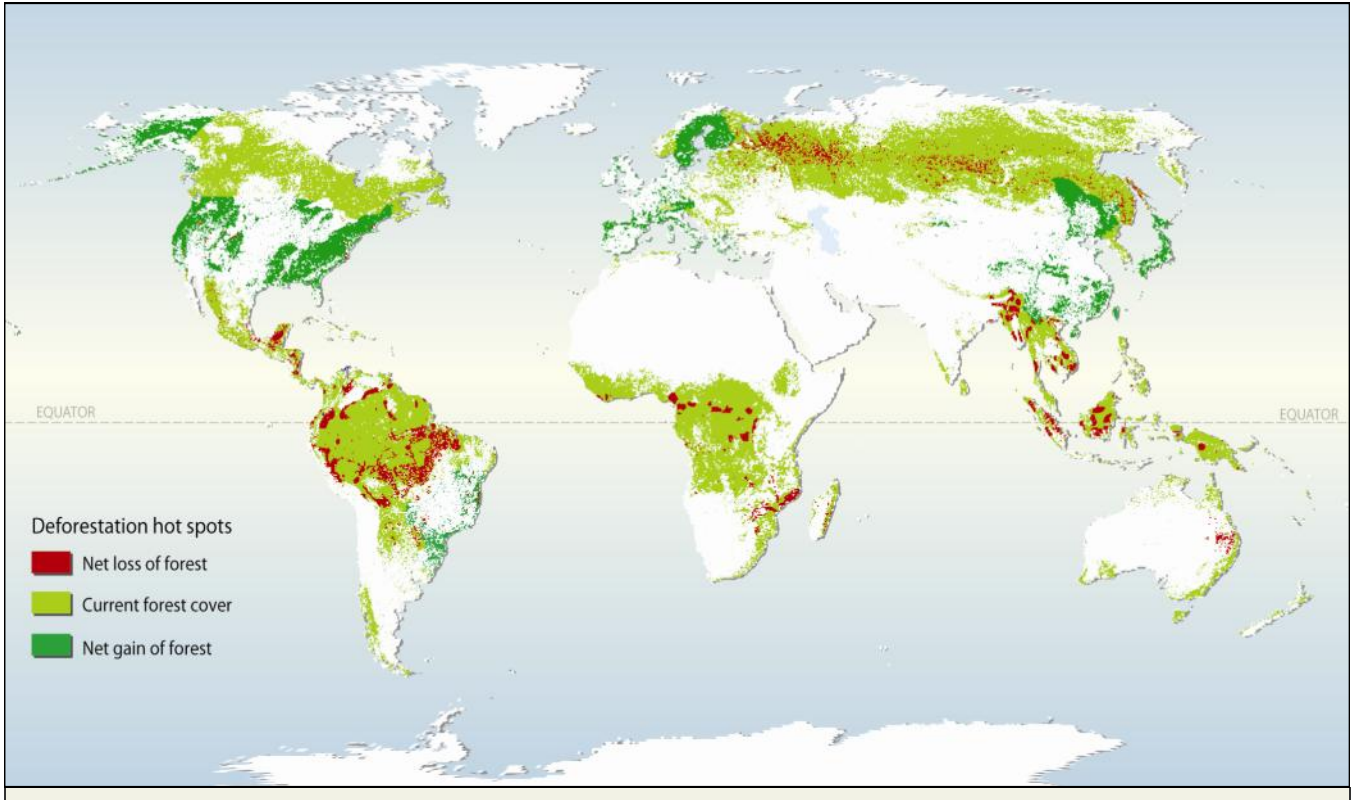

Figure 1: *Global forest cover and deforestation hotspots.*

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Some current trends: Sustainable use and consumption

- **More than 1.6 billion people depend to varying degrees on forests for their livelihoods**, e.g. fuelwood, medicinal plants and forest foods. Approximately 300 million depend on forests directly for their survival, including about 60 million people of indigenous and tribal groups, who are almost wholly dependent on forests. Forests play a key role in the economy of many countries (MEA 2005, World Bank 2003). Urban areas often depend on forested areas for their water supply and benefit from the multiple environmental services of urban forests and trees (FAO 2007).

- **The consumption of main timber products (roundwood, sawnwood, pulp, paper) is expected to increase over the next 30 years.** The use of solid biofuels for electricity production could be three times larger by 2030 than current levels (FAO 2007). Globally, by 2050, the demand for industrial roundwood is expected to increase by 50 to 75% (Sedjo 2001). In consequence of growing demand, tropical forest plantation area more than doubled between 1995 and 2005, to 67 million hectares, mostly in Asia. Other plantations, in boreal and temperate regions, have also increased in area. This trend is expected to continue (ITTO 2006). The use of relatively few tree species in plantations and modified natural forests is an issue of concern for a number of forest dependent species and for ecosystem resilience (EEA 2005, Hagar 2007).

- **Illegal and /or unsustainable logging and harvesting of forest products seriously undermine national efforts to improve sustainable forest management in many countries.** Governments, mostly in developing countries, lose an estimated US$15 billion a year as a result of uncollected taxes and royalties. Recent estimates suggest that up to 15% of internationally traded roundwood might originate from illegal sources (Brack *et al.* 2002, Contreras-Hermosilla *et al.* 2007). Rare tree species and those with high value for timber or non-timber forest products are often in danger of becoming locally extinct (FAO 2006b, IUCN 2004).

- ***Market-based responses*** **are redistributing rights to stakeholders, making them more effective in securing both wood supplies and other ecosystem services**. Market approaches to allocating use rights to public lands, and voluntary certification, are helping to change the structure of wood industries. However, it is usually existing ''good practice'' companies that are benefiting. Step-wise incentives are needed to encourage the bulk of wood producers to gradually

develop existing capacity, to cover transaction costs, and hence improve forest management practice. Other responses are needed to ''close doors'' to bad practice; these are unlikely to be market-based, but will need legal action and enforcement (MEA 2005).

- **There has been significant growth in some non-timber forest products (NTFP) markets with extension of market systems to more remote areas**; growing interest in products such as herbal medicines, wild foods, handcrafted utensils, and decorative items; and development projects focused on production and trade of NTFPs. Few NTFPs have large and reliable markets, and those tend to be supplied by specialized producers using more intensive production systems. Many other NTFPs are vital to the livelihoods of the poor but have little scope for commercialization (MEA 2005).

- **Civil society and private sector players are playing an increasingly important role in management of forest products**, reflecting the public's desire to secure a range of ecosystem services from forests. Consequently, multi-stakeholder processes, from a local to an international level, are becoming significant in developing, debating, and reviewing response options. They are important in determining a suitable distribution of public and private benefits from the use of forests (MEA 2005).

- There has been a **strong move toward both *privatization* and the *decentralization* of control over forests**, forest management services, and enterprise. This, together with other forms of liberalization and structural adjustment, has helped to remove perverse incentives that acted against sustainable wood supply. This has helped to create a wider range of "willing stewards" of forests, but has not always conferred adequate rights and powers on them to enable them to exercise stewardship (MEA 2005).

- **The forest area under certification has increased rapidly in recent years**. However, to date this trend is seen primarily in industrialized countries, and only locally in developing countries, and certification does not yet seem to be affecting timber production or trade at a significant scale (ITTO 2006). Certification can be an effective tool for change, improving the sustainability of forest management both in developed and developing countries, but only where timber markets are interested in sustainably produced timber. These are currently very much in the minority (SCBD 2008).

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Biodiversity and livelihoods in forest management > *Biodiversity in production forests*

The International Tropical Timber Organization (ITTO)[†] and the International Union for Conservation of Nature (IUCN)[‡] have developed and field-tested "Guidelines for the conservation and sustainable use of biodiversity in tropical timber production forests" (2009). The guidelines are designed to assist forest stakeholders in reducing their impacts on biodiversity in tropical production forests, and can in many cases, be equally applied to other types of forest ecosystems. A selection of guidelines is presented below:

1. **Observe national laws/plans and practices** of local communities in forest management activities, and support the implementation of international biodiversity related agreements.

2. **Establish a forest management plan in which biodiversity conservation objectives are clearly and explicitly identified** for each area of forest under management (see Figure 2) . Actual, potential and emerging threats to biodiversity must be anticipated and contingency plans prepared.

3. **In preparation of harvesting plans, pay particular attention to the local occurrence of species or habitats of special conservation concern and species that perform vital ecological functions** using the expertise of biodiversity specialists during inventory. Use reduced impact logging that does not place important biodiversity features at risk.

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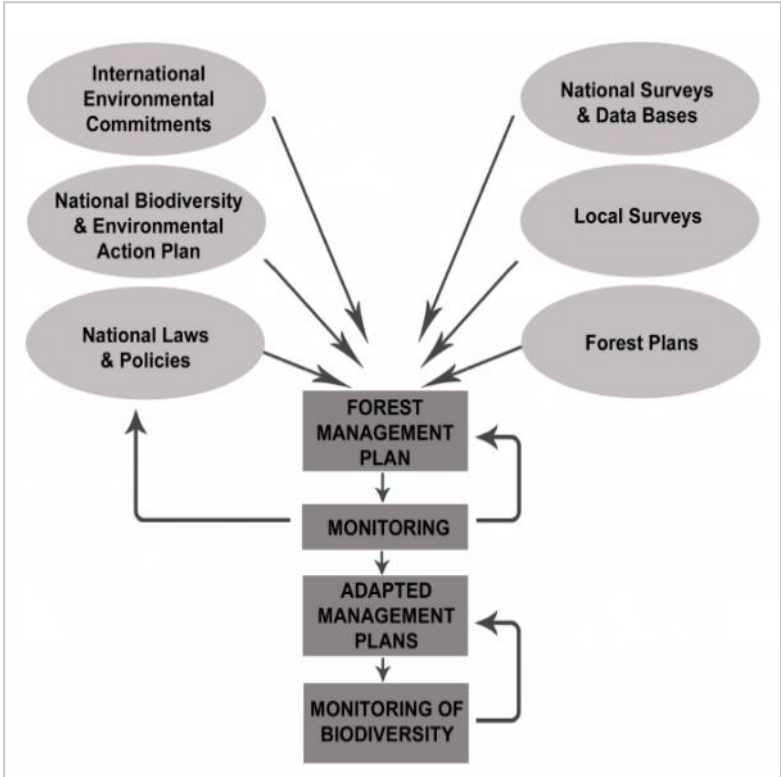
[†] The ITTO is an intergovernmental organization promoting the conservation and sustainable management, use and trade of tropical forest resources.
[‡] IUCN is a global conservation network, with a membership of more than 1,000 government and NGO organizations in more than 160 countries.

4. Plan the allocation of tropical production forests at a landscape scale and plan harvesting blocks in ways that do not disrupt the continuity of mature forests. Protect populations of, and maintain the genetic diversity of valuable timber species and populations of seed trees.

5. Raise public and political awareness on international/national laws and disseminate biodiversity information and strategies using various media. Improve the availability of information on biodiversity and transfer of knowledge and technology in libraries, reference collections, online databases and traditional knowledge. Encourage the creation of specialized courses and training activities in tropical forest taxonomy, ecology and biodiversity management.

6. Coordinate actions of forest owners, users and managers across landscapes to best ensure the maintenance of sufficient high quality connected habitat for species. Promote collaboration between research organizations and forest industry to develop silvicultural knowledge and practices. Develop and expand networks of field practitioners.



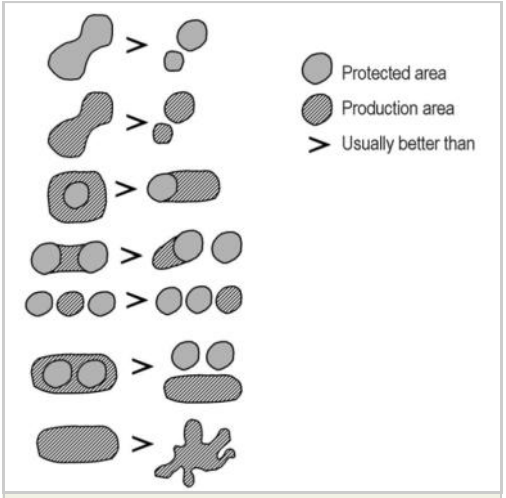
ITTO and IUCN 2009

Figure 2: *Sequence of actions to achieve biodiversity conservation and sustainable use in production forests.*

7. Large-scale planted forests can provide a forest matrix within which areas of high conservation value can be protected and managed (see Figure 3). Encourage the establishment of representative natural forest within the plantation estate and, where possible, the restoration of natural forests on appropriate sites.

8. Facilitate ecological research and monitoring systems (including long-term monitoring plots) with the aim of providing useful guidance on forest dynamics, regeneration and genetic diversity of valuable tree species. Collaborate to collect, synthesize, analyse and share data on forest biodiversity based on permanent forest plots, inventories and other sources and make these accessible to forest planners, forest managers and other stakeholders.

9. Minimize the risk of invasive species and eradicate those that become established. Develop management systems that favour natural processes and preferably plant native species that enhance the productivity and resilience of the forest.



ITTO and IUCN 2009

Figure 3: *Configurations of protected and production forest that favour biodiversity.*

10. Manage planted forests in ways that benefit biodiversity, both within the planted forest itself and in areas of natural forest that are retained within the planted forest landscape (e.g. Establish planted forests on degraded sites and retain areas of high biodiversity value protected).

11. Improve ecological knowledge to ensure that forest management enhances or maintains biodiversity and ensures forest functions such as pollination, seed dispersal and nutrient cycling. Areas of forest and other habitats that provide important ecological functions should be identified and measures taken to ensure their protection. (Source: ITTO & IUCN 2009)

CASE STUDY / Biodiversity in production forests (Malaysia)

Within Malaysia's production forests, ***reduced-impact logging*** *is now widely practised. Seed trees and fruiting species are protected in residual stands. Specific measures to help conserve biodiversity are included in the Forest Department of Peninsula Malaysia's reduced-impact logging guidelines.*

Approximately 1.5 million hectares in the Malaysian state of Sarawak are degraded forests, earmarked for tree plantations (*Hevea brasiliensis* (rubber) and *Acacia mangium*) as part of the state's development plan. The project will eventually produce 5 million tonnes of industrial wood per year and simultaneously play a crucial role in biodiversity conservation in the state of Sarawak.

Flickr.com/tk yeoh

Rubber tree stand, Malaysia

To address the full range of socio-economic and environmental issues involved in implementing the project, Grand Perfect Sdn Bhd, a consortium of local timber companies, has planned three types of land uses in the project area: 1. state lands earmarked for *A. mangium* planting (230,000 hectares); 2. indigenous customary rights and former shifting cultivation lands (110,000 hectares); and 3. conservation zones (150,000 hectares) that contain high conservation value or other kinds of ecologically important forests. Two large set-asides, the Bukit Sarang and Binyo-Penyilam conservation areas (approximately 12,000 hectares and 18,000 hectares respectively) contain numerous endemic, rare or endangered species (orchids, begonias, snails, lizards, birds, mammals, etc). The conservation program seeks to maintain high biodiversity values within the planted forest zone, minimize biodiversity losses due to development, and integrate biodiversity conservation with the economic and social needs of local communities. Indigenous customary lands and other former shifting cultivation sites, which contain forests of varying ages and are rich in non-timber trees, such as those bearing wild fruits, provide additional feeding opportunities and habitat for wildlife. (Source: ITTO and IUCN 2009)

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Biodiversity and livelihoods in forest management > *Agroforestry*

The numerous benefits that trees provide can be sustained in productive landscapes by integrating them into agricultural systems – a practice known as agroforestry. Agroforestry is defined as "a land-use system in which woody perennials (trees, shrubs, palms, bamboos) are deliberately used on the same land management unit as agricultural crops (woody or not), animals or both, either in some form of spatial arrangement or temporal sequence" (ICRAF n.d.[a]).

Farmers have practiced agroforestry for centuries. Agroforestry focuses on the wide range of working trees grown on farms and in rural landscapes. Among these are fertilizer trees for land regeneration, soil health and food security; fruit trees for nutrition; fodder trees that improve smallholder livestock production; timber and fuelwood trees for shelter and energy; medicinal trees to combat disease; and trees that produce gums, resins or latex products. Many of these trees are multipurpose, providing a range of benefits. As a considerable environmental benefit, agroforestry landscapes have higher biodiversity per unit than agricultural landscapes, and they offer habitats to numerous rare species. The gradual, mosaic-like interfaces between forest and agricultural land offer a wide range of different habitats. The use of a balanced population of predators controlling pest outbreaks is one key element of the benefits of agroforestry, e.g. in combination with organic farming.

Agroforestry contributes to human well-being through a number of ways: by providing additional income, by increasing food security through a higher diversity of agricultural products (e.g. fruits, nuts, medicinal plants and edible oils), by providing fuelwood and construction material and thus reducing deforestation, and by stabilizing soil and water tables. Agroforestry can contribute to gender equality and equitable sharing of biodiversity benefits by providing negotiation support for women and rural residents when negotiating land use rights. It increases accessibility to medicinal trees, in particular for the rural poor (e.g. the majority of Africa's population uses trees and shrubs as their main source of medication). It also provides a buffer against expected impacts of climate change by increasing the diversity and resilience of agricultural landscapes. Many of the trees used in agroforestry systems are multipurpose, providing a range of the above mentioned benefits.

(Source: ICRAF n.d.[b])

CASE STUDY / Biodiversity conservation and local livelihoods – Traditional Rubber Agroforestry (Sumatra)

The introduction of *Hevea brasiliensis* or 'para rubber' at the beginning of the 20th century caused a dramatic change in land use patterns in Indonesia, especially Sumatra. Of 3.5 million hectares of rubber in Indonesia, 84% is smallholder rubber (less than 5 ha plots) producing nearly 67% of the national production. 20% of smallholder rubber farmers adopted the monoculture system while the majority still practice the traditional "jungle rubber" agroforestry. The traditional rubber agroforests are complex multi-strata systems important for biodiversity. They act as corridors between national parks and protected areas and provide important alternative habitat for the orang-utan population. However these systems are being destroyed by the intensification of agriculture and other land uses. Additionally, economic analysis of these agroforest systems indicate that its profitability is marginal compared to other land uses. Therefore the potential to conserve biodiversity and other environmental services within rubber agroforests depends on appropriate innovative interventions, including payment mechanisms.

ICRAF / V. Meadu

Jungle rubber ready for market. Jambi, Indonesia

The World Agroforestry Centre (ICRAF) in partnership with local NGOs WARSI and Gita Buana, implemented an action-research project in Bungo district in Jambi, Sumatra on reward mechanisms for conservation of traditional rubber agroforests. Agreements to conserve 2,000 ha of jungle rubber were made with four villages. Intermediate rewards in the form of support to establish micro-hydro power generators, local tree nurseries and model village forests were provided. The conservation agreements also set the stage for potentially pursuing eco-certification as an approach that can benefit jungle rubber farmers for the biodiversity services they provide. Eco-certifiers guarantee to consumers that producers have followed a set of standards that offer ecosystem protections. One important step toward certification has been made through the communities' commitments and the identification of their conservation practices. (Source: Joshi, L. 2009)

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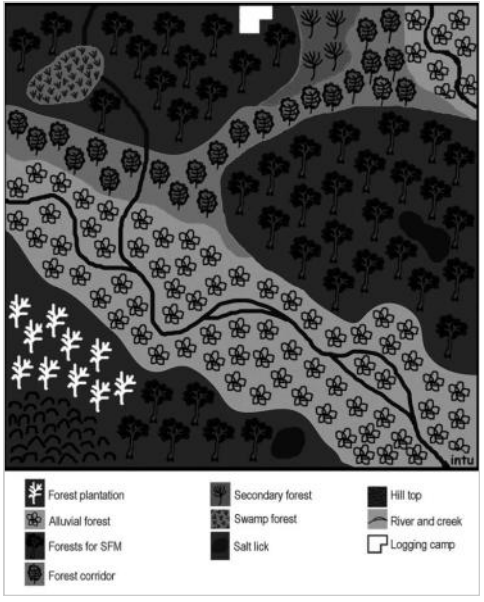
Biodiversity and livelihoods in forest management > *Forest landscape restoration*

Estimates of the amount of land available for forest landscape restoration (FLR) activities range from 350 to 850 million ha. Legal, social and other factors may reduce the area that is actually available, but nonetheless, the extent of forest land degradation and resultant opportunity for landscape restoration is significant. The Global Partnership on Forest Landscape Restoration, a network of governments, organisations, communities and individuals, identifies three principles which characterise FLR: 1. Restoration of a balanced and agreed-upon package of forest functions; 2. Active engagement, collaboration and negotiation among a mix of stakeholders; and 3. Working across a landscape.

ITTO and IUCN (2009) recognizes the importance of FLR activities (e.g. see Guideline 22) which incorporate biodiversity conservation goals, such as planting native species and creating corridors on degraded land to increase habitat and allow species to move between fragmented natural forest patches. Restored forest landscapes may include areas protected for watershed management and nature conservation, well-managed commercial plantations, tree buffers along rivers to protect against flooding and erosion, and agroforestry systems, among others. Restored forest landscapes can provide a range of benefits including sustainable income, timber for industries and local communities, increased habitat, increased resilience to climate change, a secure and quality supply of water, and recreation and tourism opportunities.



ITTO and IUCN 2009

Schematic description of a forest landscape.

FLR involves the participation of everyone who has a stake in the role of forests, including local farmers, government managers, private forest owners, municipal water providers, logging companies, game hunters, and others. They must identify the various forest goods and services that matter most, and work out how best to restore them.

(Sources: ITTO and IUCN 2009, GPFLR n.d.)

CASE STUDY / Restoring forests in the Miyun Reservoir watershed benefits rural and city communities (China)

Despite tree-planting efforts and a logging ban that has been in force since the late 1970s, three quarters of the forests in the watershed of China's Miyun Reservoir – which provides most of the drinking water for Beijing's 17 million residents – are in poor condition. Many of the residents of the watershed are poor and economically disadvantaged, especially compared to their neighbours in the city. However, restrictive policies prevent local residents from reaping the full benefits of their resources and are contributing to poor forest health. Moreover, inappropriate fuelwood collection practices have prevented forests from developing and maturing into more productive and biodiverse stands.

Ricardo Furman / IUCN

Planning forest management, Huayuan, China

With the encouragement of the State Forestry Administration of China (SFA), the IUCN Livelihoods and Landscape Strategy is working with the Beijing Forestry Society to demonstrate the valuable role forests can play in improving the lives of the rural poor. Ultimately the project aims to enhance local peoples' access to forest products, improve benefits for community livelihoods, and increase household income by 25%. This is being done through the following activities:

- Developing a multi-stakeholder landscape and biodiversity restoration plan for the Miyun reservoir watershed based on an assessment of participatory forest resources and biodiversity
- Investigating and improving the potential for alternative energy sources, NTFP production and ecotourism
- Establishing cross-boundary and cross sectoral collaboration mechanisms for FLR and livelihood improvement
- Improving compensation schemes for the ecosystem services of the Miyun reservoir
- Establishing a platform for exchanges of lessons learnt among various regions

As this project demonstrates how forests can be managed to deliver multiple benefits to the local population while recovering their productivity, biodiversity and watershed functions, it becomes a demonstration case that can be the catalyst for policy change at a larger level in China and elsewhere. *(Source: IUCN 2009)*

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Biodiversity and livelihoods in forest management > *Forest protected areas*

A protected area is defined as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN n.d.) (see Table 2 for different protected area categories). Forested protected areas can help safeguard a range of ecosystem goods and services, and are therefore a vital tool in managing for resilient forest ecosystems, and forest-dependent communities.

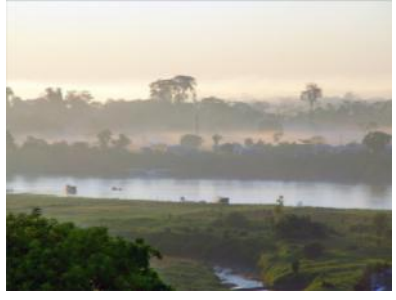
Protected areas provide valuable and numerous benefits to:

- Protect biological diversity and evolutionary processes
- Prevent and reduce poverty by supporting livelihoods, providing social and cultural governance and subsistence values
- Ensuring breeding grounds for wildlife and fish, critical to food security
- Provide medicinal plants, biochemical components for the pharmaceutical industry and ecological balance that controls and acts as a barrier for diseases (e.g. malaria)
- Filter and supply fresh water for both rural and urban populations around the world
- Mitigate the effects of natural disasters by acting as barriers and buffer zones for storms, floods and drought
- Generate tremendous direct economic benefits, and serve as a key asset for the tourism industry—critical to many developing economies
- Hold irreplaceable and immeasurable spiritual value for particular communities
- Protect the territories and rights of indigenous and local communities, which provide them with the resources and space to continue traditional lifestyles.

Table 2: *IUCN Protected Area Categories*

Ia — Strict Nature Reserve: managed mainly for science
Ib — Wilderness Area: managed mainly for wilderness protection
II — National Park: managed mainly for ecosystem protection and recreation
III — Natural Monument: managed mainly for conservation of specific natural features
IV — Habitat / Species Management Area: managed mainly for conservation through management intervention
V — Protected Landscape / Seascape: managed mainly for landscape/seascape conservation and recreation
VI — Managed Resource Protected Area: managed mainly for the sustainable use of natural ecosystems

CASE STUDY / Livelihood benefits of an extractive forest reserve (Brazil)



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Brazil's extractive reserves were conceived as a way to improve the rights of forest-dwelling populations, while also providing protection measures for the Amazonian forest. The first extractive reserve, the 506,200 ha Alto Juruá Extractive Reserve (AJER), is located in the westernmost part of the Amazon, and was created in 1990.

The AJER area is sparsely populated with approximately 4600 people (circa 2000), who are primarily rubber tappers and riverine agriculturists. The creation of AJER has allowed inhabitants within the reserve to organise to create management plans, and to allocate responsibilities for reserve governance. More secure land and tenure rights accompanying reserve creation have led to diversification of the local economy — beans have replaced rubber as the primary commodity, and are grown mainly on riverbanks. The population has grown in riverbank areas, while declined in remote forest areas, as a result of changing economic opportunities, and increased availability of services such as health care and schooling. The AJER has also seen an increase in livestock raising, which has become the second largest source of income. Subsistence uses of forest resources in AJER (for food production, home construction, etc.) have changed little since the establishment of the reserve, and have been estimated at 65% of total extractive production.

Analysis of forest cover changes during the first decade of AJER's establishment (1989-2000) indicates deforestation to have occurred in only 1% of the area. AJER continued to support a primarily mature forest cover over 99% of its area during this time period. Deforestation activity occurred primarily in the early 1990s in riverbank locations, following an increase in agriculture activities. There have been indications of recovery of threatened species such as jaguar, tapir, peccaries, and several species of primates, assumed to be linked to the depopulation of remote forest areas. The commercial shift to beans and cattle-raising compete with forests and could create conflicts between the goals of providing livelihood opportunities and conserving forests. At present, however, the AJER reserve "has been reasonably able to match the conservation, social, and development targets envisioned" (Ruiz-Pérez *et al.* 2005).

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Biodiversity and livelihoods in forest management > *Non-timber forest products (NTFPs)*

The Millennium Ecosystem Assessment estimates that up to 96% of the value of forests is derived from non-timber forest products (NTFPs) and services (MEA 2005). In Central Africa, for example, the use of wildlife from forests (bushmeat) accounts for up to 80% of protein intake in rural households (Nasi *et al.* 2008). Yet, the important role of NTFPs in the national and particular rural economy is often not reflected in national statistics, or in relevant strategies and plans.

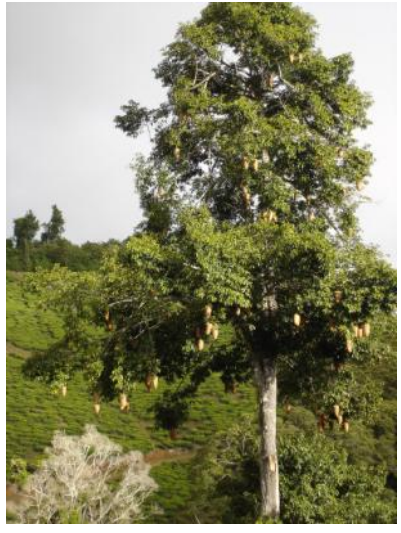
Most of the more than 5,000 commercial forest products are non-timber products, including pharmaceuticals and food. Forests are often the 'pharmacy' and 'supermarket' for the rural poor, and much of the traditional knowledge of uses of forests for medicine and food rests with women. Including gender aspects into development cooperation efforts to improve the sustainability of non-timer forest product use is therefore a key prerequisite for success.

Many NTFPs are also harvested and traded on a larger commercial scale, for example the açaí berry in the Amazon region. For some indigenous populations in Brazil, the açaí palm provides up to 42% of the total food intake by weight (Murrieta *et al.* 1999), and it is used for other products, e.g. hats, mats, baskets, brooms and roof thatch for homes (Silva and Tassara 2005). Good forest governance and the integration of NTFPs in relevant national strategies and action plans are important steps for the conservation and sustainable use of these important resources. The biodiversity of tropical forests, with its millions of species which have not yet been scientifically described, might hold many NTFPs for future uses in medicine, the food industry, or other sectors. Conserving this biodiversity for present and future generations is essential. The study on 'The Economics of Ecosystems and Biodiversity' (TEEB) calculates that the loss of tropical forests causes an annual loss to the global economy of between 2 and 5 Trillion USD (European Communities 2008).

>> GOVERNANCE OF NTFPs: Good forest governance, including clear tenure rights and proper law enforcement, plays a crucial role for the sustainable use and marketing of NTFPs. Progress has been made in many countries through national or regional "FLEG" (Forest Law Enforcement and Governance) processes. The European Community has launched a FLEG T Action Plan (FLEG and Trade), which relies on bilateral Voluntary Partnership Agreements with producer countries. The most successful national approaches for improved governance are based on a 'tri-partite approach', with government, civil society, and the private sector jointly agreeing upon necessary reforms and improvements.

CASE STUDY / The Novella Africa Initiative (East, Central and West Africa)

The *Novella Africa Initiative* is a public-private partnership formed in 2002 by Unilever, The World Agroforestry Centre (ICRAF), IUCN, and the Netherlands Development Organisation (SNV), and involves UNDP, and a number of governmental organizations and NGOs in Africa. The initiative is undertaking commercial scale collection and extraction of oil from seeds of the Allanblackia (AB) tree, which is native to tropical forests of West, Central and East Africa. This edible oil is used by Unilever to make food products, such as spreads, and detergents, like soaps. The project is unique in its goals to sustainably use non-timber forest products on a commercial scale, undertake forest reforestation through planting of AB trees, and provide significant employment benefits to subsistence farmers (NAF n.d.).



ICRAF / Moses Munjuga

Allanblackia tree, East Usambara, Tanzania

Ghana is the first country to implement the production process, from seed gathering to the generation of crude AB seed oil, and involves approximately 4000 seed collectors in the project (IUCN 2008). In Tanzania, about 60 villages participated in the project in 2008. Harvested seeds are purchased by transport companies in Tanzania, who sell them to local crushing companies, which then process the seeds into crude oil. Unilever guarantees purchase of sustainably produced AB seeds at a pre-agreed price and transports the crude oil to the Netherlands, where it is processed into consumer products (UNDP n.d.). AB trees grow in relatively degraded lands, meaning that the initiative contributes to the rehabilitation of unproductive areas. Increases in farmland productivity reduce the frequency of forest clearance, protecting natural flora and fauna (ICRAF n.d.[c]). In Ghana and Tanzania, the planting of AB trees is increasing from several thousand to about 100,000 trees a year and is being incorporated into forest landscape restoration projects (IUCN 2008). The project is expected to grow to include 150,000 farmers in Ghana, Tanzania, Nigeria, Cameroon, and Liberia over the next decade, generating US$100 million in returns (UNDP n.d).

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Biodiversity and livelihoods in forest management > *Unsustainable, unregulated and unauthorized harvesting: Non-timber forest products*

Non-timber forest products (NTFPs) and other forest ecosystem services are largely omitted from government development strategies. This is unfortunate, as NFTPs and forest services such as medicinal and food plants, clean water, rattan, bushmeat and bamboo play an important role in rural livelihoods and local and national economies, and yet are mostly under-represented in development strategies and in national databases (SCBD 2008). The omission of NFTPs from government development strategies and policies makes them more susceptible to unsustainable, unregulated and unauthorized harvesting, as in the case of bushmeat hunting.

Bushmeat hunting is the extraction from the wild of any non-domesticated terrestrial mammal, bird, reptile, and amphibian. Hunting for food in tropical forests is an issue of concern as there is strong evidence that the scale of hunting occurring in these regions poses a serious threat to many tropical forest species. Additionally, the depletion of wildlife is intimately linked to the food security and livelihood of numerous tropical forest-region inhabitants, as many of these forest-dwelling or forest-dependent people have few alternative sources of protein and income. The “bushmeat crisis” is a problem of unmanaged common resources being unsustainably harvested because of inadequate governance and policy frameworks. Many of the underlying causes of the unsustainable use of wildlife are the same as those underlying poverty. Greater attention must therefore be given to governance issues (e.g. policy and legislation, links to development assistance) and treating the high-value bushmeat trade as an aspect of the national economy.

Local empowerment of resource users is a potential key strategy to achieve long-term sustainability. However, the transfer of rights has to be coupled with the transfer of responsibility for the conservation of the resource, in accord with the resources’ characteristics (e.g. biodiversity) as a national and global good. At the same time, one cannot credibly transfer rights to bushmeat resources to local communities without addressing rights to other resources such as timber and mining products. No universal solutions exist to solve the problem of unsustainable bushmeat hunting in tropical forests. Approaches must be nation, site and context-specific, based on a detailed knowledge of hunting patterns and the ecology of the hunted species, and be tailored to local cultural, socioeconomic and political conditions (Nasi *et al.* 2008).

CASE STUDY / Wildlife management in a community reserve (Peru)

The Reserva Comunal Tamshiyacu-Tahuayo in the Peruvian Amazon comprises some 3,225 km^2. The diversity of mammals in the reserve is greater than in any other protected area in the Amazon, and possibly globally. The reserve has at least 14 species of primates. Local human population density is extremely low; only nine villages consider themselves close enough to the reserve to be involved in management. The closest city, Iquitos, has 300,000 residents, but is more than 100 km away, with no road access linking the two.

Flickr.com/Smithsonian's National Zoo

White-lipped peccary, Peruvian Amazon

Management of the reserve legally lies with the local communities. Hunting pressure is limited to local subsistence consumption, some sales of dried meat to Iquitos, and peccary pelts for sale to overseas markets. There is almost no hunting by outsiders within the reserve. Wildlife management involves a combination of community-based and co-management strategies, involving local communities, government agencies, NGO extension workers and researchers. Decisions on resource use and management are voted upon during community meetings, and are informed by NGO extension workers, based on detailed research and monitoring by researchers. This allows communities to experiment with different types of management, and to find management systems which are compatible with their culture. Communities are not too large for effective communication, and can easily define their boundaries and membership. The area is divided into strictly protected zones and buffer zones. Data shows that harvests of all species except tapir are apparently sustainable, and ways are being sought to ensure that tapir hunting is also reduced to sustainable levels.

(Source: Nasi et al. 2008)

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Payments for environmental services

Payments for environmental services (PES) can be defined as voluntary transactions whereby a defined environmental service (or a land-use likely to secure that service) is bought by a buyer from a provider, on the condition that the provider secures provision of the service (Wunder 2008). PES is a type of economic instrument that provides incentives to land owners to supply environmental services, which benefit society more broadly. Environmental services markets have been developed for carbon sequestration, watershed services, biodiversity conservation, and landscape beauty / recreation.

PES projects can potentially serve the dual goals of preserving critical ecosystem services and the biodiversity upon which they depend, while also contributing to poverty reduction (UNEP and IUCN n.d.). The provider-beneficiary relationships of PES schemes can often be described as rural-urban, or south-north. Downstream urban water users, for example, pay upstream rural land owners to sustain watershed services such as flow regulation, erosion control, and filtration. Rural land owners can therefore earn additional and stable sources of monetary income for adapting their land uses to meet broader societal needs. Current PES programmes fall into two basic categories: small-scale user-financed schemes, usually focused on a single service, such as carbon or watershed protection; and larger government-financed PES schemes, typically multi-service and much larger in scale. PES schemes have a number of preconditions, including: a divergence of interests between resource providers and beneficiaries, whereby the service will be lost if the provider is not compensated; trust and compliance between providers and beneficiaries; and recognition of the provider's exclusive right to the land producing the environmental services in question (Wunder 2008).

>> ***Reducing Emissions from Deforestation and Forest Degradation (REDD)***

The 2007 Climate Change Conference in Bali opened the possibility of developing an incentive mechanism for Reducing Emissions from Deforestation and Forest Degradation (REDD). Under such a scheme, landowners and users would be compensated for measureable reductions in the rate of deforestation and forest degradation, thereby lowering carbon emissions and potentially increasing carbon storage. In addition to mitigating climate change, REDD can support livelihoods, maintain vital ecosystem services, and preserve globally significant biodiversity. For information on poverty reduction through REDD, see Making REDD Work for the Poor (Peskett *et. al* 2008).

CASE STUDY / Pioneering payments for forest environmental services (Costa Rica)

Costa Rica's *Pagos por Servicios Ambientales* (PSA) programme is recognized as a pioneering example of a large-scale payment for environmental services initiative. The PSA programme is based on Forest Law No. 7575, which provides for contracts to be made with landowners for services provided on their lands, and establishes the National Fund for Forest Financing (*Fondo de Financiamento Forestal, FONAFIFO)*, which manages the programme. The law recognizes four environmental services provided by forest ecosystems: mitigation of greenhouse gas emissions, hydrological services, biodiversity conservation, and provision of scenic beauty for recreation and ecotourism. Funding for the PSA programme has come from a 3.5% fossil fuel sales tax, loans and grants from various donor agencies, and from payments by beneficiaries of environmental services.

Flickr.com/dmason

Osa Peninsula, Costa Rica

In order to participate, landowners must submit a sustainable forest management plan, prepared by a licensed forester, describing plans for preventing poaching and illegal harvesting, and outlining monitoring schedules, etc.. Once approved, land owners receive payments at a rate of US$64/ha/year for forest conservation plans, and US$816/ha over 10 years for plantations. As of 2005, about 270,000 ha were enrolled in the programme, primarily as forest conservation contracts.

The PSA programme has been partly credited for helping Costa Rica, once having some of the world's highest deforestation rates, to achieve zero net deforestation by the early 2000s. Tattenbach *et al.* (2006) estimated that the programme prevented the loss of 72,000 ha of forest in biodiversity priority areas between 1999 and 2005. FONAFIFO has attempted to strengthen poverty reduction impacts by adding particularly disadvantaged districts to priority areas of the programme. Evidence of pro-poor impacts has been mixed with several studies reporting that the bulk of benefits go to relatively better-off farmers; while Muñoz (2004) reports the programme has benefited poor land holder in the Osa Peninsula. Continued research is required to better understand how the PSA programme is generating environmental services that would otherwise be lost, and how the programme can better contribute to livelihoods. *(Source: Pagiola 2008)*

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The role of indigenous and local communities

Forests are home to an estimated 60 million indigenous people, who are directly dependent on forest resources and the health of forest ecosystems for their livelihoods. The cultural and spiritual identity of indigenous peoples is often linked to intact primary forests with their rich biodiversity. There are approximately 400 million indigenous people across more than 70 countries, with a high percentage located in tropical areas. They depend on the forest to sustain their ways of life, including their cultures and spiritualities (MEA 2005). In the Amazon basin, for example, knowledge of the medicinal, nutritional and cultural uses of over 1,300 different forest plants is common in local indigenous communities.

The Convention on Biological Diversity recognizes the importance of traditional knowledge, innovations and practices of indigenous and local communities for the conservation and sustainable use of biodiversity and Article 8(j) of the Convention aims to respect, preserve, and promote such traditional knowledge. The Convention also recognizes the interdependence of indigenous and local communities and biodiversity. Forest operations, as well as landscape-level planning, should take into account both the rights and traditional knowledge of indigenous and local communities. The main principle for achieving this is through the effective participation of indigenous peoples and local stakeholders in decision-making and governance processes, on the basis of free, prior and informed consent to any projects, plans or changes that affect their communities, traditional lifestyles, and environment.

Recent developments for reducing emissions from deforestation and forest degradation (REDD) have the potential to provide benefits to local and indigenous communities. However, a number of conditions would need to be met for these co-benefits to be achieved. Indigenous peoples are unlikely to benefit from REDD where they have no secure land tenure; if there is no principle of free, prior and informed consent concerning the use of their lands and resources; and if their identities are not recognized or they have no space to participate in policy-making processes and/or lack the capacity to engage on an equal footing. There is a need for different types of capacity-building on indigenous issues and rights, both on the side of governments, as well as for indigenous peoples and local communities. This should include education and awareness-raising, indigenous to indigenous transfer of knowledge, and capacity building (SCBD 2009).

CASE STUDY / Pygmy communities use GPS and community radio to protect cultural sites (Congo)

Congolaise Industrielle des Bois (CIB) manages a 1.3 million hectare area of Congolese forest home to 9,000 Mbendjele Pygmies. Compliance with Forest Stewardship Council (FSC) regulations prompted CIB to work closely with the Tropical Forest Trust (TFT) and concerned Pygmy communities in developing and using new means of communication to help exchange information about sensitive locations in the forest. Standards set by FSC require CIB to protect 'sites of special cultural, ecological, economic or religious significance to indigenous peoples'. Such information can only come directly from the Mbendjeles. These people live in small groups of 30 to 60 people, dispersed throughout the forest, have no chiefs or community leaders, and most do not speak any European languages.

COMIFAC

Mbendjele Pygmies identify areas to be protected.

TFT engaged partner organizations and anthropologists familiar with the Mbendjele lifestyle, language and traditions, to create the Indigenous People's Voices project which lets the Mbendjeles plot significant areas using a geographic information system (GIS) which stores and analyzes reference points. The data is incorporated into the CIB's system to produce accurate harvesting maps. Through GIS and radio technology, the Mbendjele can keep each other informed about areas to be protected and areas to be logged. CIB's investment in this initiative helped the company gain FSC certification for its Kabo concession. The project itself was recognized in November 2007 by the Tech Museum of Innovation in the social equality category of their Laureate awards scheme. State of the art technology is helping the Mbendjele Pygmies protect their land and culture (CTA 2008).

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Forest biodiversity in national strategies and action plans

National Biodiversity Strategies and Action Plans (NBSAPs) are important national tools for the conservation and sustainable use of forest biodiversity, but forests are also addressed in a number of other strategies and action plans, such as Poverty Reduction Strategy Papers (PRSPs). It is often a challenge for developing countries to harmonize implementation activities between various international commitments which all address forests, and to implement these policies on the ground. A main requirement in this respect is that PRSPs, NBSAPs, National Forestry Programmes, and other strategies and plans converge towards a more holistic approach to natural resource management at a landscape level. Capacity-building activities on mainstreaming biodiversity into relevant policies are very important in this context. Table 3 provides an overview of the most common national and regional forest-related strategies and action plans.

National Strategy / Action Plan	Description	Leading International Process	Links
National Biodiversity Strategies and Action Plans (NBSAPs)	Main policy document for national implementation of CBD	Secretariat of the Convention on Biological Diversity	www.cbd.int/nbsap/
National Forest Programmes (NFPs)	National strategy for sustainable forest management	FAO / UNFF	www.nfp-facility.org/home/en
National Adaptation Programmes of Action (NAPAs)	National plans for implementation of adaptation measures under the UNFCCC	UNFCCC / international implementing organizations / bilateral cooperation agencies	www.unfccc.int
Poverty Reduction Strategy Papers (PSRPs)	National and regional strategies for development	World Bank and International Monetary Fund	www.imf.org/external/np/prsp/prsp.asp
National and local forest inventories and management plans	Basic tool for forest decision-making at local level	National and local forest administrations	

Table 3: *Selected national and regional forest-related strategies and action plans with common objectives to conserve and sustainably use forest biodiversity.*

CASE STUDY / Local tenure facilitating forest restoration and poverty reduction (Tanzania)

Flickr.com/April Rinne

Tanzania has made important progress during the past decade to integrate poverty reduction objectives within forest policy and practice, as well as mainstreaming the contribution of forestry and natural resources within broader poverty reduction policies. At the local level, the HASHI project in Shinyanga (northwestern Tanzania) has been highly successful in using new opportunities presented under the Forest Act to empower local stakeholders in forest restoration and sustainable management in a region that is highly vulnerable to environmental degradation.

The HASHI (Hifadhi Ardhi Shinyanga—Swahili for soil conservation) project has supported restoration of forests through the recognition and restoration of *ngitili* (forest and shrubland set aside as traditional grazing and fodder reserves). The project has been facilitated by the 2002 Forest Act, which permits forest tenure at the local level through Village land forest reserves and Community forest reserves. Through the HASHI project, rights to use and sell forest products from *ngitili* are recognized, and technical support is provided to improve productivity. Support is also provided for expanding markets for products and for the development of new products. By 2004, at least 350,000 hectares of *ngitili* were restored or created in 833 villages, encompassing a population of 2.8 million. It has been estimated that the benefit per person per month of *ngitili* is US$14. Income from *ngitili* has also been used to support schools and other forms of rural development.

Prior to the establishment of HASHI, the forest lands of Shinyanga were highly degraded, largely as a result of government (both colonial and postcolonial) policies, such as villagization and commercial coffee growing. The relationship between poverty and degradation, and the relationship between local use and degradation, were reversed as a result of policy changes, which returned control to the community and transformed pressures to degrade the environment into incentives to restore it (Fisher *et al.* 2005).

(Source: PROFOR 2008)

>> LINK: Slide 31

Access and benefit-sharing

The third objective of the Convention on Biological Diversity provides for "the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources…" The Convention establishes that a person or institution seeking access to a biological resource in a foreign country in order to use its genetic material, should seek the prior informed consent of the country in which the resource is located. Moreover, this individual or institution must also negotiate and agree on the terms and conditions of access and use of this resource. This includes the sharing of benefits arising from the use of this resource, with relevant authorities in the provider country, in order to obtain permission to access the genetic resource and to use it. Conversely, countries, when acting as providers of genetic resources, should try to create conditions to facilitate access to their genetic resources for environmentally sound uses.

Genetic resources, whether from plant, animal, or micro-organisms, are used for a variety of purposes ranging from basic research to the development of products. Users of genetic resources may include research institutes, universities, and private companies operating sectors such as pharmaceuticals, agriculture, horticulture, cosmetics and biotechnology.

The sharing of benefits, through technology transfer, research results, training, and profits can contribute to poverty reduction and sustainable development in biodiversity rich developing countries. Access to genetic resources in exchange for fair and equitable sharing of benefits can contribute to further research and development contributing to human well being through its use in pharmaceuticals, cosmetics, agriculture and many other sectors.

The sharing of benefits may materialise in various ways:

- Provision of equipment, infrastructure support and technologies: e.g. the user of genetic resources sets up laboratories or a drug manufacturing facility in the provider country;
- Joint ownership of intellectual property rights: e.g. joint ownership of IPRs between the user and the provider of genetic resources is sought for patented products based on the genetic resource accessed;
- Training of the provider country's scientists/researchers with respect to the use and handling of genetic resources;
- Monetary benefits, such as the payment of royalties: royalties generated through commercialisation of products are shared between the provider and the user of genetic resources and associated traditional knowledge.

EXAMPLES / Genetic resources from timber and non-timber forest products

COMIFAC / Frank Ribas

Bark harvested from the Prunus Africana is used for treatment of a variety of illnesses.

Natural resources found in forests have for centuries contributed to human well-being. Forests are the source of many hidden treasures and a fertile ground for scientific research. In particular, the properties of some genetic resources from timber and non-timber forest products have contributed to the development of a broad range of products, including pharmaceuticals and cosmetics. Examples include the following:

Calanolide A and Calanolide B, compounds isolated from the latex of *Calophyllum* tree species, found in the Malaysian rain forest, have shown potential to provide treatment for the human immunodeficiency virus type 1 (HIV-1). Research on Calanolides' anti-HIV activity is still ongoing (FDS n.d., and Bernama 2009). Prostratin, an active component contained in the bark and stemwood of the mamala tree (*Homalanthus nutans*) found in Samoa, is also being studied as a potential drug to fight the human immunodeficiency virus (HIV) (Cox 2001, and Pacific Islands Treaty Series 2004).

Other forest resources with potential for development include:

- A Madagascan tree commonly called "handy" (*Neobeguea mahafalensis*), used as a "sexual enhancer" in the island nation (ACB 2009);
- A tree, *Cussonia zimmermannii*, found in Tanzania, Kenya, Uganda and Mozambique and widely distributed in South Africa is used as a remedy for mental disorders (ACB 2009);
- The bark of the *Prunus Africana* tree, in sub-Saharan Africa has been used by local communities for the treatment of a variety of illnesses, including malaria, syphilis, high blood pressure, Asthma, etc. (ABS Capacity Development Initiative for Africa n.d.).

>> LINK: Slide 33

Communication, education and public awareness

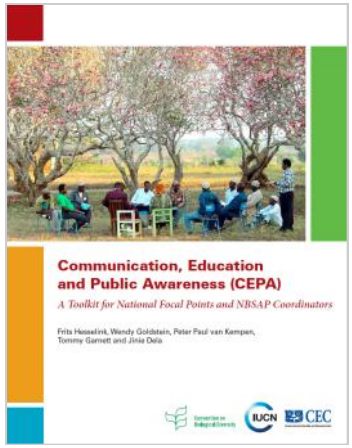
One of the core principles of Sustainable Forest Management (SFM) is that it reflects a diverse range of societal values in reference to forest conservation and use. For this reason, the active and informed participation of communities and stakeholders affected by forest management decisions is critical to the credibility and sustainability of management processes. Public awareness raising and communication activities play a critical role in informing and educating the public, thereby allowing them to more effectively participate in SFM decision-making.

SFM requires the support at varying times and places from different government departments, NGOs, indigenous and local communities, business and industry, scientists, women's groups, youth, and community-based groups. To work with these different groups, communication, education and public awareness (CEPA) are crucial instruments to build trust, understanding and shared agreements for action and to reduce conflict. CEPA is needed to help people work together and innovate, and spread information, knowledge, values and goals. CEPA supports capacity development so that various actors can take responsibility for forest biodiversity.

It should be recognized that effective public awareness raising requires a planned systematic approach to really understand the interests of stakeholders and beneficiaries. Approaches need to be tailor-made to the local context, culture and traditions (consult the SCBD/IUCN CEPA toolkit for examples). (Hesselink *et al.* 2007).

Forest Events Calendar:

- 22 May, 2011: International Biodiversity Day theme *Biodiversity and Forests*.
- Year 2011: The United Nations declared 2011 as the International Year of Forests.



>> A KEY RESOURCE

The *Communication, Education and Public Awareness (CEPA) Toolkit for National Focal Points and NBSAP Coordinators* is a comprehensive resource, outlining where, when and how to use education and communication interventions (Hesselink *et al.* 2007).

CASE STUDY / The Green Wave for biodiversity

GEF Small Grants Programme Nicaragua

Green Wave volunteers, Nicaragua

The Green Wave is an ongoing global biodiversity education project that encourages young people to make a difference in conserving the basis for life on Earth. *The Green Wave* promotes participation in local action and the building of partnerships around the world. The campaign supports the aims of the Convention on Biological Diversity to strengthen awareness and education on biodiversity. It contributes to the celebration of the International Day for Biological Diversity, and also supports the Billion Tree Campaign led by the UN Environment Programme.

The Green Wave promotes learning and action throughout the year. But as a special initiative, it invites children and youth in schools and groups worldwide to plant a tree at 10 a.m. local time on 22 May – the International Day for Biological Diversity – creating a "green wave" across time-zones. Participants upload photos and text to *The Green Wave* website (http://greenwave.cbd.int/) to share their tree-planting stories with others. An interactive map goes live in the evening at 20:10 local time, creating a second, virtual, "green wave". Through action-oriented learning, *The Green Wave* teaches children and youth the importance of biodiversity for our well-being and our planet. *The Green Wave* supports schools around the world to educate tomorrow's leaders on the crucial tasks of protecting Earth's biodiversity.

Example >> **Green Wave 2009 (Nicaragua):** In 2009, 42 schools and 1430 students in Managua, Nicaragua participated in *The Green Wave* campaign. The Small Grants Programme of the Global Environment Facility helped plan and coordinate the campaign, in partnership with other UN programmes, the Ministries of Education, Environment, and Forestry, and the Finance Bank - BDF. On 12 May, a workshop was held for 39 volunteers who were given training on biodiversity issues, and on how to plant and care for trees. Each volunteer was then assigned to support a participating school for the duration of the initiative. On 22 May, each school planted its trees and a ceremony was held in one of the schools with the representatives of the partnering institutions.

Suggestions for training sessions in sustainable forest management

Information in this guide can be used to inform strategic planning, policy and legislative development, and project design. It can also be used for **educational** or **training** purposes. Training programmes can follow the suggested sequence and content, or select only the appropriate good practices and examples, as needed. The CD in the booklet jacket includes a slide presentation summarizing the content of the booklet and is included to assist in the dissemination of information. The information presented in this section has been adapted from the CBD guide *Tourism for Nature and Development*.

When organising educational / training programmes, some of the following suggestions may help to improve outcomes:

1. Ensure a balanced composition of stakeholders, including public and private players. Participation of stakeholders involved in, or affected by, forestry is essential for the integrated management of forestry, biodiversity and poverty alleviation.

2. Train-the-trainers strategies can often ensure that a critical mass of experts and experience is made available on a larger scale. Providing a small number of participants with the skills to train, educate, and service workshops, can have significant positive impacts over time on the industry as a whole.

3. A “hands-on” approach should be used to explain the concepts and principles of sustainable forestry. Whenever possible, trainers should use local examples and case studies, employ learning field-trips, involve local experts, and include face-to-face meetings with both local and national forestry players to help foster information exchange.

4. When planning training programmes the cultural norms and values of trainees should be considered. In some cultures, open discussion between hierarchical levels and age groups is accepted and encouraged, while in others, guidance from supervisors is expected. Successful training carefully considers the background, motivations, circumstances, capacities and expectations of participants, peers, supervisors and institutions. Involving target public representatives early on (to design the process and content of a training programme) can facilitate this process.

5. Problems often appear after a training session (and not before)! Training needs to be complemented with coaching, individual technical support, and demonstration models. Supportive activities can include ongoing information support systems using Web 2.0 technologies before and after, newsletters, etc..

COMIFAC / Frank Ribas

6. Forestry specialists are often not experienced trainers. Training / educational specialists should therefore be involved in the development of training materials and organization of a training programme. Trained facilitators and presenters, as well as communication specialists, need to be part of the team.

7. Training is lost if it is not part of a broader capacity building / empowerment effort that allows participants to use acquired skills. There is often a gap between an existing situation and future planned status – people who are trained do not use the techniques and contents of training not only because they may not yet possess the skills, but also due to other institutional and systemic constraints.

8. In order for training to be effective, a need has to be identified, stakeholders need to be organized prior to training, and a multi-stakeholder framework or governance structure may need to be set up to organize the training, and ensure that participants actually use the skills and knowledge they acquire. In governments, it is essential to involve all relevant ministries and agencies, not only in forestry, but also environment, education, foreign affairs, planning, and finance/ budgeting, etc.. Focal Points of the CBD, as well as the UNFCCC, UNCCD and UNFF, and other forest-related experts and agencies can play an important role in linking local issues with global agreements. At times, it may be important to institutionalize these multi-stakeholder and inter-institutional boards, so that initiatives can survive beyond short political mandates and/or circumstances. Local ownership of the training process and of its content development, as well as the explicit support of top management, are critical for training programmes to leave lasting results.

CBD Programme of Work on forest biodiversity (Decision IV/22 and IX/5)

The 192 Parties to the CBD have committed themselves to implement 129 actions under the programme of work on forest biodiversity, which is structured into 3 thematic elements and 12 goals (see below). Many of the actions are directly aimed at reducing deforestation and forest degradation, and creating or maintaining sustainable livelihoods.

1. Conservation, sustainable use and benefit-sharing (e.g. Forest fires, climate change, protected areas, invasive alien species, habitat fragmentation, pollution, forest restoration, species conservation, illegal logging, indigenous and local communities, access and benefit-sharing). This programme element has five goals:

- Apply the Ecosystem Approach to the management of all types of forests
- Reduce the threats and mitigate the impacts of threatening processes on forest biodiversity
- Protect, recover and restore forest biodiversity
- Promote the sustainable use of forest biodiversity
- Access and benefit-sharing of forest genetic resources.

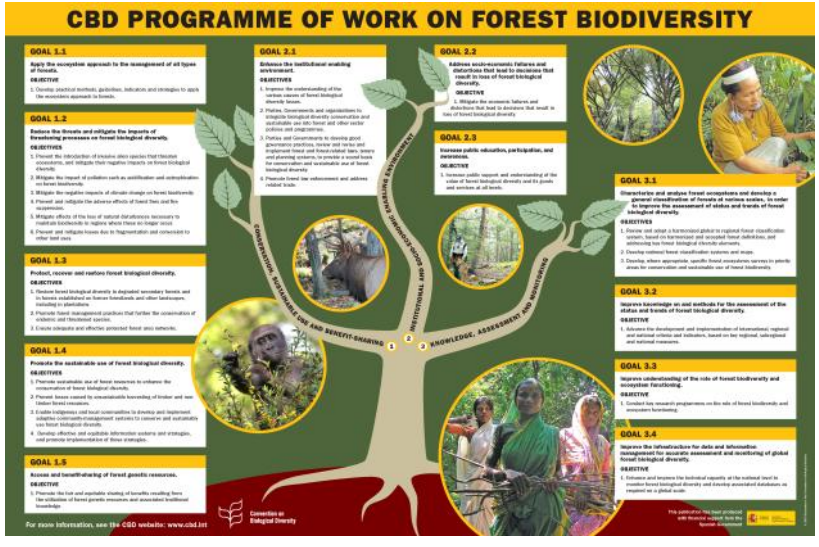
2. Institutional and socio-economic enabling environment (e.g. incentive measures, understanding causes of biodiversity loss, sectoral integration and mainstreaming, land tenure, forest Law

FAO/ David Gilbert

Enforcement and Governance (FLEG), CEPA). This programme element includes three goals:

- Enhance the institutional enabling environment
- Address socio-economic failures and distortions that lead to decisions that result in loss of forest biodiversity
- Increase public education, participation and awareness.

3. Knowledge, assessment and monitoring (e.g. Global forest classification system, assessment methods, understanding ecosystem functioning, data and information management). This programme element includes four goals:



Visit www.cbd.int/forest to view the Overview of the Expanded Programme of Work on Forest Biodiversity.

- Characterize and analyse from forest ecosystem to global scale and develop general classification of forests on various scales in order to improve the assessment of status and trends of forest biodiversity
- Improve knowledge on and methods for the assessment of the status and trends of forest biodiversity
- Improve understanding of the role of forest biodiversity and ecosystem functioning
- Improve the infrastructure for data and information management for accurate assessment and monitoring of global forest biodiversity.

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Contents of the CD Rom

Power Point Presentation:
This presentation summarises the content of this booklet and has been included as a tool for forestry planners to share this information in training sessions, workshops, strategic planning meetings, etc.. The slide show can be customized for presentation to a particular audience through the following steps: 1) On the Slide Show menu, click Custom Shows; 2) click New; 3) Add the slides that you wish to present.

Key Documents:
1. Secretariat of the Convention on Biological Diversity. 2009. CBD Programme of Work on Forest Biodiversity. Also available at: http://www.cbd.int/decision/cop/?id=7196.

2. International Tropical Timber Organization and the International Union for the Conservation of Nature. 2009. ITTO/ IUCN Guidelines for the Conservation and Sustainable Use of Biodiversity in Tropical Timber Production Forests. Second Edition. ITTO Policy Development Series 17. Also available at: http://www.itto.int/en/policypapers_guidelines/.

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