SFM fact sheet 6

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SFM and biodiversity

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The United Nations General Assembly defines sustainable forest management (SFM) as a "dynamic and evolving concept, which aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations".[1] The SFM concept encompasses both natural and planted forests in all geographic regions and climatic zones, and all forest functions, managed for conservation, production or multiple purposes, to provide a range of forest ecosystem goods and services at the local, national, regional and global levels.

Criteria and indicators developed for boreal, temperate and tropical forests provide a framework to assess, monitor and report on the implementation of SFM based on: the extent of forest resources; biological diversity; forest health and vitality; productive functions; protective functions; socio-economic functions; and the legal, policy and institutional framework. Certification processes and best-practices guidelines have been developed to guide, assess, attest to and monitor SFM at the forest management unit level.

There has been significant progress in implementing SFM, but many challenges remain. The objective of this series of fact sheets produced by the Collaborative Partnership on Forests[2] is to inform decision-makers and stakeholders about some of the issues and opportunities facing the implementation of SFM in the 21st century.[3]

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What is at stake?

The world's forests harbour up to three-quarters of all terrestrial biodiversity, the majority in tropical forests.[4] Biodiversity underpins forest ecosystem services, productivity, resilience and adaptive capacity and is essential for maintaining ecological processes such as carbon sequestration, pollination, seed dispersal and decomposition. Biodiversity is also fundamental to food security (see fact sheet 3).

The role of sustainable forest management (SFM) in biodiversity conservation is debated.[5] Nevertheless, that role is likely to become increasingly important in the face of continuing pressures on forests, such as those exerted by agricultural expansion, climate change, urban development, invasive non-native species and excessive resource extraction.

Key issues

Under threat. The target agreed by the world's governments in 2002 "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level" was not met.[6] Although the extent of biodiversity loss in forests is unclear, forest loss has been substantial for more than three decades. According to the IUCN red list of threatened species, nearly 7000 forest and savanna species are critically endangered, endangered or vulnerable worldwide.[7] Since relatively few of the several million forest-dependent species have been studied, it is difficult to estimate the extent to which the full suite of forest biota is at risk.

Deforestation. The biggest immediate threat to forest biodiversity is deforestation and consequent land degradation, which is due mainly to land-use conversion for agriculture, ranching, infrastructure and urban development. The gross loss of tropical forests in the period 1990–2005 was estimated at about 9 million hectares per year[8], with a high associated loss of biodiversity. The loss of primary forest, which often has very high biodiversity (see fact sheet 2), is of particular concern.

Forest degradation and fragmentation. Large areas of forests are being degraded by pressures such as mining, invasive non-native species, fire, climate change (see below) and unsustainable logging; one estimate puts the total area of degraded forest worldwide at about 850 million hectares.[9] Forests are also becoming increasingly fragmented, with potentially significant negative impacts on biodiversity.[10]

Climate change. Significant, rapid changes in climate could cause widespread forest degradation and an associated loss of biodiversity. Globally, it is estimated that for every 1°C warming, an additional 10 percent of species assessed so far might be at an increasingly high risk of extinction.[11] In tropical montane cloud forests, extinctions of amphibian species have been attributed to recent

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climate change.[12] Feedback loops have been predicted in the northwest of North America in which climate change causes forest dieback (due to the spread of the pine bark beetle), which releases greenhouse gases, which leads to more climate change and, ultimately, to more biodiversity loss. A similar scenario has been predicted for the Amazon[13], host to a large part of global biodiversity.

Wood harvesting. The direct effects of wood harvesting in forests may include the removal of biomass, changes to structural characteristics (e.g. by removing canopy trees and the collateral damage caused by associated extraction processes), changed light regimes and altered microclimatic conditions. These can have both positive and negative impacts on short-term species abundance: a recent review of studies in Borneo, for example, indicated that of the 64 mammal and bird species investigated, 23 percent were recorded as increasing in density following harvesting, 46 percent did not change significantly in density and 42 percent declined significantly.[14] Potential indirect effects, which may have a greater long-term impact on biodiversity, include increased hunting and fire and the advance of settlement and agriculture along logging roads.

The wide diversity of non-wood forest products (NWFPs), especially in tropical forests, makes it difficult to generalize about the impacts of their harvest on biodiversity. There is a lack of research to underpin the sustainable management of natural populations of NWFP species.[15]

Lack of landscape-scale approaches. Forest management planning and practices tend to be site-based and have little influence on the wider landscape, which is the scale at which many forest species need to be managed. There have been recent efforts to broaden approaches to the landscape scale, however, with the potential to significantly improve biodiversity conservation. For example, SFM can play a role in improved land-use planning at the landscape scale to increase ecological connectivity between habitats. Agroforestry has been shown to be an option for creating production landscapes with high biodiversity while mitigating pressures on forests.[16]

Experience and knowledge

Guidance for forest managers. Considerable progress has been made in the development of SFM tools to assist forest managers in managing biodiversity in forests, and many guidelines exist at the global, regional and national levels.[17] SFM is also being improved through the use of tools such as remote sensing, geographic information systems, statistical modelling and community monitoring, all of which can be deployed to quickly assess the impacts of management actions on biodiversity.[18]

Forest certification. SFM practices usually required in certified forests, such as the protection of streamside buffer zones and other set-asides, high-conservation-value forest management and the use of reduced impact harvesting, are likely to be beneficial for biodiversity, although there is a paucity of quantitative studies.[19] Nevertheless, the total area of certified forest remains low, especially in the tropics.[20]

Selective harvesting. There is evidence that well-managed forests can provide substantial biodiversity benefits.[21] A recent review of 138 studies of primary and degraded tropical forests in 28 countries and 92 landscapes found that while biodiversity values were highest in primary forests and declined with increasing human disturbance, they declined least in selectively harvested forest.[22] Biodiversity has been shown to be greater in forests under SFM (including wood harvesting) than in forests harvested under regimes that did not employ SFM practices.[23] In many tropical forests, however, the time allowed between harvesting events has rarely been sufficiently long to allow biodiversity to fully recover.

Increasing recognition of traditional models. Indigenous and local forest management systems offer viable approaches to SFM for achieving both biodiversity conservation and local economic benefits. For example, rubber gardens in Sumatra and Kalimantan involve forest cycles of 40–70 years and harbour considerable numbers of indigenous plant and animal species.[24] Similar positive results have been noted in other forms of tropical agroforestry, such as home gardens. There are inspiring examples of traditionally managed semi-natural forest landscapes in Europe and Japan that are maintaining important biodiversity and other environmental values.[25]

Adaptive forest management. Approaches to SFM that aim to build resilient, adaptable social–ecological systems using adaptive management are increasingly being advocated and tested.[26] Under such approaches, local knowledge is recognized, valued and used, and management is adaptive based on monitoring, evaluation and learning.

Challenges

Lack of implementation of guidelines. While various international, regional and national guidelines and tools have been developed to reduce the impact of wood harvesting on biodiversity, their uptake has been limited, especially in the tropics.

Inadequate knowledge and capacity. Notwithstanding the large existing body of research, more knowledge is needed on the most effective measures for biodiversity conservation under differing circumstances, and better tools are needed for assessing and monitoring the impacts of such measures over time. In many developing countries there is a general need for increased capacity to undertake SFM.

Landscape planning. Landscape-scale biodiversity conservation requires an understanding of species' distributions over a matrix of pristine and modified habitats. However, many countries lack adequate capacity and processes to plan and implement biodiversity conservation strategies across a range of habitats, tenures and land uses.

Managing for resilience and adaptation. Biodiversity confers resilience on forest ecosystems, and diversity at the genetic level enables species to adapt to changing conditions. A challenge for SFM is to maintain species' and genetic diversity to maximize ecosystem resilience and species' adaptation in the face of climatic and other environmental change.[27]

Opportunities

New global commitments. REDD+ (see fact sheet 5) and other global commitments have increased political attention on forest conservation and sustainable use. The Strategic Plan for Biodiversity 2011–2020[28] includes the following ambitious forest-related targets, to be achieved by 2020:

- Target 5 - to halve, and where feasible bring close to zero, the rate of deforestation, and to significantly reduce degradation and fragmentation.
- Target 7 - to manage all areas under forestry sustainably.
- Target 11 - to conserve at least 17 percent of all terrestrial ecosystems.
- Target 15 - to restore at least 15 percent of degraded ecosystems.

Payments for ecosystem services. Forest-owners usually pursue land uses that provide the highest financial returns. Biodiversity conservation and many other ecosystem services, however, have a low or no value in the market place. Payments for ecosystem services have been shown to stimulate the uptake of SFM, such as in Mexico, Costa Rica and an increasing number of other developing countries.[29]

Climate-change mitigation. Forest biodiversity and its inherent biomass is essential for forest resilience and for the quantity and stability of forest-based carbon sequestration and should therefore be considered in the design, implementation and regulatory framework of climate-change mitigation initiatives.[30] The adoption of SFM as part of landscape-scale approaches may be most effective in mitigating the impacts of climate change on forests.

What is still to be learned?

Better understanding is needed of:

- The value of forest biodiversity and genetic resources for medicine, food, energy and other uses and how to ensure equitable access and benefit-sharing of such resources.
- The full range of biodiversity in forests, especially tropical forests (including dry forests).
- The effects of forest management interventions and approaches on genetic and species diversity and on plant community characteristics.
- How to plan and implement sustainable land use options, including SFM and agriculture, at the landscape scale, taking into account ecological, economic and social synergies and tradeoffs.


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Key messages

- Biodiversity confers health and resilience on forests and underpins the functioning of forest ecosystems.
- Payments for ecosystem services and other innovative ways to value and sustainably use forest biodiversity can help to address deforestation and forest degradation.
- SFM techniques, such as reduced impact harvesting, forest certification, the provision of adequate recovery time and locally adapted approaches, as well as the implementation of biodiversity conservation guidelines, can help to limit biodiversity loss.
- Forest biodiversity conservation is best achieved if planned at the landscape scale. SFM and biodiversity conservation strategies should be complementary.
- In many countries, the capacity to implement SFM needs to be strengthened to ensure the conservation of biodiversity.

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Collaborative Partnership on Forests

The Collaborative Partnership on Forests consists of 14 international organizations, bodies and convention secretariats that have substantial programmes on forests. The mission of the Collaborative Partnership on Forests is to promote sustainable management of all types of forests and to strengthen long-term political commitment to this end. The objectives of the Partnership are to support the work of the United Nations Forum on Forests and its member countries and to enhance cooperation and coordination on forest issues.

Endnotes

1 United Nations General Assembly (2008). Non-legally binding instrument on all types of forests. UN General Assembly Sixty-second Session Second Committee Agenda item 54. A/RES/62/98. 31 January 2008.

2 Center for International Forestry Research (CIFOR), Food and Agriculture Organization of the United Nations (FAO), International Tropical Timber Organization (ITTO), International Union for Conservation of Nature (IUCN), International Union of Forest Research Organizations (IUFRO), Convention on Biological Diversity (CBD) Secretariat, Global Environment Facility (GEF) Secretariat, United Nations Convention to Combat Desertification (UNCCD) Secretariat, United Nations Forum on Forests (UNFF) Secretariat, United Nations Framework Convention on Climate Change (UNFCCC) Secretariat, United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), World Agroforestry Centre (ICRAF), The World Bank.

3 Topics: SFM and the multiple functions of forests; SFM and primary forests; SFM, food security and livelihoods; SFM and indigenous peoples; SFM and REDD+; SFM and biodiversity; SFM and gender; and SFM and adaptation to climate change. The Partnership hopes to periodically update these fact sheets and to prepare new fact sheets on other important topics, including financing.

4 Collaborative Partnership on Forests (2008). *Strategic framework for forests and climate change. A proposal by the Collaborative Partnership on Forests for a coordinated forest-sector response to climate change*. Collaborative Partnership on Forests.

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16 e.g. ASB Partnership for the Tropical Forest Margins (2010). *Co-existence of people and orangutan in Sumatra. Stabilising gradients for landscape multifunctionality.* Policy brief 20. ASB Partnership, Nairobi, Kenya.

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19 Zagt, R., Sheil, D. and Putz, F. (2010). Biodiversity conservation in certified forests: an overview. In Sheil, D., Putz, F. and Zagt, R. (eds) *Biodiversity conservation in certified forests. ETFRN News* 51:v–xviii.

20 Blaser, J., Sarre, A., Poore, D. and Johnson, S. (2011). *Status of tropical forest management 2011*. ITTO, Yokohama, Japan.

21 ITTO and IUCN (2009), as cited in endnote 17.

22 Gibson, L., Lee, T. and Koh, L. et al. (2011). Primary forests are irreplaceable for sustaining tropical biodiversity. *Nature* 478: 378–381.

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