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# SFM and primary forests

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”.<sup>1</sup> 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<sup>2</sup> is to inform decision-makers and stakeholders about some of the issues and opportunities facing the implementation of SFM in the 21st century.<sup>3</sup>

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## What is primary forest?

Definitions of primary forest vary, but the central notion is that it is forest that has been little disturbed by human activity for a very long time (except use by indigenous and local communities living traditional lifestyles). FAO defines a primary forest as:

*Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.*

The terms primary forest and old-growth forest are sometimes used interchangeably, although there is no broadly agreed definition of the latter and many forest scientists consider it possible for disturbed forests to retain old-growth structural and functional characteristics.<sup>4</sup> Brazil has the most primary forest (about 477 million hectares), followed by the Russian Federation (256 million hectares) and Canada (165 million hectares).<sup>5</sup>

## What is at stake?

**Biodiversity.** Primary forests, in particular tropical moist forests, are species-rich, diverse terrestrial ecosystems.<sup>6</sup> A recent review of 138 studies of primary and other tropical forests spanning 28 countries (mostly in South America and Asia) and 92 landscapes found that biodiversity values were highest in primary forests and declined with increasing disturbance.<sup>7</sup> Given that tropical forests contain 50 percent or more of all terrestrial biodiversity, this finding has major implications for global biodiversity conservation.

**Livelihoods.** Many primary forests<sup>8</sup> are inhabited by indigenous peoples and local communities who pursue traditional lifestyles within them.

The food security, livelihoods and cultural and spiritual identity of many indigenous peoples is often linked to primary forests (see fact sheet 4).<sup>9</sup>

**Carbon.** Primary forests constitute a very large carbon pool. Certain temperate primary forests in Australia, for example, contain up to 2840 tonnes of carbon per hectare, the highest known forest-carbon density in the world.<sup>10</sup> Primary forests also sequester carbon from the atmosphere. In temperate forests in Oregon, United States, the amount of carbon stored in forest trees has been shown to increase with the age of the stand beyond 200 years, and some old forests are as productive as younger forests.<sup>11</sup> Forests ranging in age between 15 and 800 years may actively sequester carbon and even old-growth forest can continue

to accumulate carbon.<sup>12</sup> The total mass of carbon being sequestered in tropical forests worldwide is about 1.3 gigatonnes of carbon per year, including 0.5–0.8 gigatonnes per year in the Amazon.<sup>13</sup> This Amazonian sequestration is occurring in old-growth forests, most likely driven partly by an increase in concentration of atmospheric carbon dioxide.<sup>14</sup>

*Other ecosystem services.* Primary forests perform a wide range of ecosystem services, such as soil and water protection, the prevention of land degradation and desertification, the provision of recreation opportunities, and visual amenity. Because they are stable ecosystems, primary forests often perform such services better than forests at early development stages.

*Natural reference.* Primary forests have immense scientific value because they provide a reference for the 'natural' state of ecosystems.

## Key issues

*Continued loss of primary forest.* In 2010 the global area of primary forest was estimated at 1.36 billion hectares, which was about 36 percent of the total forest area. The rate of loss of primary forest in the period 2000–2010 was estimated at 0.37 percent per year (about 42 million hectares over the decade), with the largest losses occurring in South America, Western and Central Africa, Oceania, and South and Southeast Asia. The table below summarizes changes in primary forest area between 1990 and 2010.

In many countries, the area of forest in protected areas is used

as a proxy for primary forest. There is no guarantee, however, that forests in protected areas will not be degraded or indeed are even primary. For example, a recent study of two adjacent biosphere reserves on the border of China and the Democratic People's Republic of Korea showed that over half of the primary forest landscapes had been degraded by unsustainable seed harvesting and logging.<sup>15</sup> In general, the continued loss of forests, including primary forests, is likely to result in significant greenhouse gas emissions, losses of biodiversity and cultural values, and land degradation and desertification. Harvesting in primary forests and the related increased accessibility can lead to forest degradation, for example through increased hunting pressure, and can be a precursor to forest conversion.<sup>16</sup>

*Impacts of climate change.* Significant, rapid changes in climate could have a major effect on primary forests (see fact sheet 8). For example, the Amazon forests, which account for up to half of global primary forests, are likely to be vulnerable to water deficits, with the potential for large losses of carbon and biodiversity, should the regional climate become drier.<sup>17</sup> There is conjecture that a drought in six Amazonian countries could be

pushing tropical forests to an ecological tipping point requiring species to adapt, move or die.<sup>18</sup>

*The right to pursue development.* In some countries, primary forests still constitute a large proportion of forest cover. For example, primary forests comprise an estimated 95 percent of the total forest area in Suriname, 92 percent in Brazil, 91 percent in Papua New Guinea, 89 percent in Peru and 65 percent in Gabon.<sup>19</sup> Such forests are a potential resource for development but, in the absence of effective governance, wood and land shortages could increase incentives for the unsustainable harvesting and clearing of primary forests. On the other hand, the widespread introduction of REDD+ could encourage the protection of primary forests (as well as other SFM approaches such as afforestation and reforestation; see fact sheet 5).

*Indigenous and customary rights.* Increased attention on primary forests, especially their role in the mitigation of climate change, has led to fears that traditional and indigenous peoples who live in primary forests may be marginalized by schemes such as REDD+ aimed at protecting such forests.

## Area of primary forest and change over time, 1990–2010

Region	Area of primary forest ('000 ha)			Annual change ('000 ha)		Annual change (%)	
	1990	2000	2010	1990–2000	2000–2010	1990–2000	2000–2010
Eastern and Southern Africa	7594	7024	6430	-57	-59	-0.78	-0.88
Northern Africa	15 276	14 098	13 990	-118	-11	-0.80	-0.08
Western and Central Africa	37 737	32 540	27 527	-520	-501	-1.47	-1.66
East Asia	28 179	26 456	25 268	-172	-119	-0.63	-0.46
South and Southeast Asia	87 062	83 587	81 235	-348	-235	-0.41	-0.29
Western and Central Asia	2924	3083	3201	16	12	0.53	0.38
Europe	5183	5360	5438	18	8	0.34	0.14
Caribbean	207	206	205	n.s.	n.s.	-0.07	-0.02
Central America	5766	5226	4482	-54	-74	-0.98	-1.52
North America	274 920	273 795	275 035	-113	124	-0.04	0.05
Oceania	41 416	39 191	35 493	-222	-370	-0.55	-0.99
South America	684 654	653 691	624 077	-3096	-2961	-0.46	-0.46
World*	1 190 919	1 144 258	1 102 382	-4666	-4188	-0.40	-0.37

Note: The slight gains in forest area in Western and Central Asia, Europe and North America are due mainly to changes to previously disturbed forests such that they now qualify as primary forest under the FAO definition. n.s. = not significant, indicating a very small value.

\*The Russian Federation is not included in this table and therefore the total area shown here is less than the global area of primary forests. Note also that the data do not include estimates of primary forest in a number of other countries likely to have large areas of primary forest, such as the Democratic Republic of the Congo.

Source: FAO (2010). *Global forest resources assessment 2010*. FAO Forestry Paper 163. FAO, Rome, Italy.

## Experience and knowledge

*Increasing awareness.* Awareness is increasing of the importance of primary forests, especially their role in the mitigation of climate change. As part of a partnership between Indonesia and Norway to reduce greenhouse gas emissions from deforestation and forest degradation, for example, the Government of Indonesia recently suspended, for two years, concessions for the conversion of primary forest and peatlands.<sup>20</sup> The high genetic diversity of primary forests – and the potential use of those genetic resources for pharmaceuticals, cosmetics, food and other products – has received increased attention since the adoption of the Convention on Biological Diversity's Nagoya Protocol in October 2010. The Nagoya Protocol is an international agreement that aims to regulate the use of genetic resources in a fair and equitable way.

Among international bodies, the World Bank has a policy of not financing projects that would involve significant conversion or degradation of critical forest areas or related critical natural habitats.<sup>21</sup> The GEF does not fund logging operations in primary forests or initiatives that promote the conversion of forests to alternative land uses.<sup>22</sup>

*Increase in protected forests.* Reflecting growing awareness and political will, the area of forest in protected areas has increased globally, from about 297 million hectares in 2000 to 361 million hectares in 2010. Nevertheless, it is difficult to assess the effective protection of these areas, the extent to which primary forests are represented in such protected areas, and how their inclusion is safeguarding them from human disturbance. For example, illegal logging and unsustainable harvesting of wildlife is a threat to many forest protected areas, including primary forests.<sup>23</sup> A recent analysis of research in the tropics has shown

that community-based forest management provides better fire management than that in some protected areas.<sup>24</sup>

## Challenges and opportunities

Although awareness of the valuable ecological and cultural roles played by primary forests is growing, such forests continue to be lost (i.e. either deforested or changed to other successional stages), due to a wide range of social, political and economic factors. In many countries more effort (and finance) is needed to identify forests with high conservation value, including primary forests, and their management needs, and to protect such forests from destructive practices.

It is possible that forest management interventions, such as selective wood harvesting, if carried out with minimal impact, limiting road access and allowing for sufficient recovery time, will not unduly affect many of the values of primary forests.<sup>25</sup> More research is needed, however, to fully assess their effects in the full range of forest types likely to be subject to such interventions, as well as to guide them with science-based information.

While sustainable forest management (SFM) often includes extractive uses such as wood harvesting it can also be applied in non-extractive scenarios to help maintain primary forest values. For example, SFM can be used as a framework for national strategies for the conservation, management and sustainable use of primary forests in landscape approaches that include decisions to set aside forests temporarily or indefinitely; the management of invasive non-native species in primary forests; the restoration of primary-forest buffer zones; the sustainable production of goods and especially ecosystem services in primary forests; the certification of forest operations in primary

forests; and the delivery of innovative financing mechanisms for all types of forests, including the conservation of primary forests.

The importance of primary forests in the carbon cycle could help to increase the financial incentive for their protection through mechanisms such as REDD+. A challenge for the international community is to increase understanding of the role of primary forests in climate change and to develop effective approaches for delivering payments that will maintain the ecological integrity of primary forests.

The potential vulnerability of primary forests to climate change poses a dilemma for forest managers and policymakers. By definition, primary forests are not subject to significant human disturbance, yet management interventions may be required in some primary forests to reduce the impacts of climate change on them.

## What is still to be learned?

Better understanding is needed of:

- The long-term impacts of forest management interventions – and other activities such as hunting – in primary forests, especially on biodiversity, carbon, livelihoods and cultural values, and their interactions with other forms of disturbance.
- The role of primary forests in the carbon cycle and their vulnerability to climate change.
- The adaptive management of primary forests in the face of climate change.
- How to ensure the involvement of all relevant stakeholders, including indigenous peoples, in the implementation of SFM.

## Key messages

- Primary forests continue to be lost despite growing recognition of their immense value for the provision of ecosystem services at the local, national and global scales.
- Many of the ecosystem services that primary forests provide (such as carbon sequestration and the conservation of genetic resources) are undervalued. The introduction of payments for such services is an important step towards the conservation of primary forests.
- The conservation of primary forests will often require the exclusion of large-scale extraction activities. However, management interventions may be necessary in the face of climate change or to meet local development needs. Criteria and indicators for SFM and guidance from CPF members provide a robust framework for this.



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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.

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## 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 Hilbert, J. and Wiensczyk, A. (2007). Old-growth definitions and management: A literature review. *BC Journal of Ecosystems and Management* 8(1):15–31.
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- 6 Although there are exceptions – such as Africa's monodominant Gilbertiodendron forests and the oligarchic palm forests of Latin America.
- 7 Gibson, L., Lee, T. and Koh, L. et al. (2011). Primary forests are irreplaceable for sustaining tropical biodiversity. *Nature* 478: 378–381.
- 8 The designation of inhabited forests as primary is arguable and may depend on the impact of forest use: harvesting, fire, hunting and gathering in otherwise primary forests will modify the forest to the extent that they may be categorized as secondary or modified.
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- 17 Phillips, O., Lewis, S. and Baker, T. et al. (2009). Drought sensitivity of the Amazon rainforest. *Science* 323: 1344–1347.
- 18 See <http://www.profor.info/profor/notes/amazon-tipping-point>.
- 19 FAO (2010), as cited in endnote 5.
- 20 Initially this moratorium was reported to cover about 64 million hectares of primary forests and conservation areas, but recently the Indonesian government revised this figure to 55 million hectares. Another estimate (Murdiyarto et al. 2011, see below) puts the figure of primary forest subject to the moratorium at 7.2 million hectares, highlighting the large uncertainty around data on primary forests. Murdiyarto, D., Dewi, S., Lawrence, D. and Seymour, F. (2011). *Indonesia's forest moratorium: a stepping stone to better forest governance?* Working Paper 76. CIFOR, Bogor, Indonesia.
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