



## CONVENTION ON BIOLOGICAL DIVERSITY

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BIODIVERSITY TARGET  
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### INDICATORS FOR ASSESSING PROGRESS TOWARDS THE 2010 TARGET: TRENDS IN EXTENT OF SELECTED BIOMES, ECOSYSTEMS AND HABITATS – FORESTS 1/

*Note by the Executive Secretary*

#### I. SUMMARY

1. Forests provide a number of functions that are vital for mankind. These include the provision of wood and non-wood goods and the provision of services such as biological diversity, carbon sequestration, watershed protection, soil conservation and recreation. The extent and composition of forests have varied greatly in prehistoric times, due to climatic and geologic fluctuations. In historic times, it is mainly the expansion of human civilizations that has affected large areas of forests in all regions.

2. The Food and Agriculture Organization of the United Nations (FAO) 2/ estimated that the world's forest cover at the year 2000 was about 3.9 billion hectares. About 95 per cent of the forest cover was in natural forest. The loss of natural forest in the 1990s was estimated at 16.1 million hectares per year (equivalent to 0.42 per cent per year). This loss was partially offset by natural expansion of forests amounting to 3.6 million hectares per year. The net change in natural forest cover was a loss of 14.2 million hectares annually in tropical forests, and an expansion of 1.7 million hectares annually in non-tropical areas (see figure 1, page 2). This decrease was partially offset, particularly in non-tropical areas, by natural expansion or planting of forests. However, the rapid loss of tropical forests remains a main feature and concern, contributing to losses of biological diversity, increases of atmospheric carbon and spreading of desertification.

\* UNEP/CBD/AHTEG-2010-Ind/1/1.

1/ The area covered by other ecosystem types, where time series information is available, is being considered in separate documents (see also table 1 and sections on peatlands and coral reefs in document UNEP/CBD/AHTEG-2010-Ind/1/2). When data from other ecosystems are added it will be necessary to review the content of this fact sheet and provide a balanced discussion of forests alongside the other ecosystems.

2/ Global Forest Resources Assessment 2000 Assessing State and Change in Global Forest Cover: 2000 and Beyond. Forest Resources Assessment Programme. Working Paper 31. Rome: FAO.

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## II. RELATION OF INDICATOR TO FOCAL AREA

3. As forests are a very important habitat type for environment protection and human well being at the global level, the indicator “forest area” is highly relevant for ascertaining the status and trends in area covered by selected biomes, ecosystems and habitats. Due to their structural complexity, forests also provide a range of different habitats upon which many species depend, so it complements the information derived from indicators of trends in abundance and distribution of selected species under the same focal area. As forest areas are providers of essential ecosystem services, the indicator also relates to indicators of ecosystem integrity under focal area “ecosystem integrity and ecosystem goods and services”. <sup>3/</sup> The quality and status of this ecosystem type is addressed through separate indicators including those on species trends, forest protected area coverage, area under sustainable management, connectivity/fragmentation and the delivery of goods and services.

## III. GENERAL DESCRIPTION

4. Forests are critically important for maintaining biological diversity. Estimated to contain half of the world's terrestrial biological diversity, natural forests (i.e., excluding plantations) have the highest species diversity levels of any terrestrial ecosystem type. In particular, tropical forests are one of the oldest ecosystems on earth and comprise about half of the remaining global forest cover. Tropical forests harbor millions of different species, many of which occur in very restricted areas and nowhere else. Throughout history, human dependence on forests has been unquestionable. Today, humans are increasingly dependent on forests as an important economic, cultural, ecological, and recreational resource. At the same time forests are an essential habitat for numerous threatened and endangered species of flora and fauna. Some of the most notable services and products provided by forests include: climate control, shelter, food, fibre, fuel, medicines, regulation of the hydrological cycle, and mitigation of extreme weather events. Trends in forest area can serve as a proxy for more specific products and services.

5. The selection of “forest area” as an indicator is further justified by the availability of reliable, global estimates of changes in forest cover, which are being assessed periodically by FAO. <sup>4/</sup> Therefore, global deforestation rate can be used as an indicator of global rate of biodiversity loss.

6. Each year, more than 15 million ha of natural forest are lost, i.e. converted to another land use (e.g. agriculture) or the long-term (more than 10 years) reduction of tree-canopy cover below the 10 per cent threshold. <sup>5/</sup> This loss of forest habitat is usually associated with increased soil erosion, loss of biodiversity and further propensity to global climate change. Figure 1 below shows the change in forest area during the last decade.

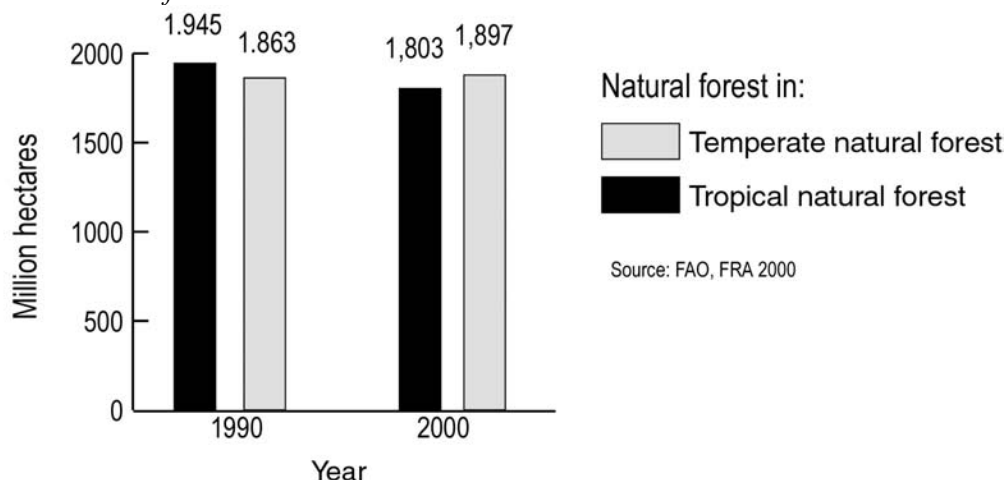
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<sup>3/</sup> Human Development Report 2003, pg. 125, paragraph 2; Mooney and Cropper (Co-chairs). (2003). *Ecosystems and Human Well-Being: A framework for Assessment*. Island Press, Washington, DC.

<sup>4/</sup> Global Forest Resources Assessment 2000 Assessing State and Change in Global Forest Cover: 2000 and Beyond. Forest Resources Assessment Programme. Working Paper 31. Rome: FAO.

<sup>5/</sup> It might be useful to define what a significant reduction in the rate loss by 2010 would mean in terms of this indicator, e.g. a reduction in the annual rate of loss from 15 m ha to 12 m ha or from 0.4 to 0.3 % per year.

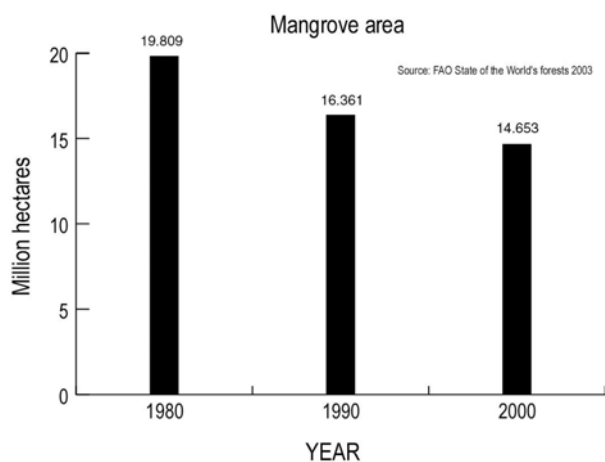
Figure 1. Global trends in forest area



7. The indicator is based on the assumption that loss of natural forest area is associated with diminishing species richness, ecosystem fragmentation and loss of connectivity, a reduction both in range for forest-specific populations and their size and the loss in goods and services. These attributes are assessed through complementary indicators on species trends, connectivity/fragmentation and sustainable use.

8. The indicator does not distinguish different forest types and therefore does not provide information on forest areas under threat and/or with high conservation value—such as mangroves, cloud forests and dry tropical forests. Figure 2 shows that the relative loss in mangrove area is significantly higher than the overall loss in forest area. Such information is important for decisions on management and restoration.

Figure 2. Global trends in mangrove area



#### IV. POLICY RELEVANCE

9. Most countries have adopted policies to promote the sustainable management of forests and many are now committed to monitoring progress in this area—a major development since the early 1990s and the United Nations Conference on Environment and Development (UNCED). The indicator on forest area thereby provides an important opportunity to link biodiversity concerns with other natural resource management sectors.

10. The indicator on forest area links to other indicators and processes at national, regional, and international level, including, *inter alia*:

- (a) The nine international and regional processes and initiatives that are developing criteria and indicators for sustainable forest management;
- (b) The United Nations Forum on Forests (UNFF) process and the IPF/IFF Proposals for Action;
- (c) Coverage of protected forest areas assessed through the World Database on Protected Areas process;
- (d) The Clean Development Mechanism of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC);
- (e) The non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests (1992 Forest Principles) (Agenda 21).

11. Forests are one of the biomes considered under target 1.1 of decision VII/30 (At least 10 per cent of each of the world's ecological regions effectively conserved), which is equivalent to target 4 of the Global Strategy for Plant Conservation. By distinguishing different forest types and areas of particular conservation value, the indicator can also be a measure for target 1.2 of the same decision (Areas of particular importance to biodiversity protected). The indicator also provides information for target 5.1 (Rate of loss and degradation of natural habitats decreased) and potentially 8.2 (Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained).

12. The indicator relates to target 9 of the Millennium Development Goals (Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources), indicator 25 (Proportion of land covered by forest); para. 42 (b) of the Plan of Implementation of the World Summit on Sustainable Development (WSSD) in relation to mountain forests (Implement programmes to address, where appropriate, deforestation, erosion, land degradation, loss of biodiversity, disruption of water flows and retreat of glaciers); para. 45 of WSSD Plan of Implementation on sustainable forest management; para. 62 (n) of WSSD Plan of Implementation (Provide financial and technical support for afforestation and reforestation in Africa and to build capacity for sustainable forest management, including combating deforestation and measures to improve the policy and legal framework of the forest sector). <sup>6/</sup>

## V. TECHNICAL INFORMATION

13. The FAO Forest Resources Assessment (FRA) is conducted once every ten years. The definition of forest used in this assessment includes natural forest and tree plantations and refers to land with a tree canopy cover of more than 10 per cent and area of more than 0.5 ha. For the purpose of the assessment, forests are characterized both by the presence of trees and the absence of other predominant land uses. Trees should be able to reach a minimum height of 5 metres. Young stands that have not yet but are expected to reach a crown density of 10 per cent and tree 5 metres height are included under forest. The definition thus mixes land cover and land use components, i.e. it includes both land currently occupied by forest and land designated as forest but not currently forested.

14. Data collection is based on active participation in information-gathering by 160 countries and supplementary information from various sources, including satellite imagery and primary technical documents as sources of statistical information for the assessment, to yield a global coverage. National forest inventories may differ in their methodologies and data quality, and depend on the statistical set up and inventory methods used in the national surveys. The process of conversion of national data to a common definition and baseline may introduce an element of inaccuracy.

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<sup>6/</sup> The discussion on relevance to the global goals and targets could be better presented in a table or box, which lists the relevant targets with some explanatory notes. This should improve the visibility of cross-referencing between indicators and targets.

15. The indicator in the Pressure-State-Response (SPR) framework as a state indicator. The data needed to compile the indicator are collected periodically in the FAO FRA and available from FAO. FRA is an established and ongoing process. In most countries provisions exist of periodic reviews of forest area.

## **VI. APPLICATION OF THE INDICATOR AT NATIONAL/REGIONAL LEVEL**

16. The indicator is already widely applied, including through the FRA reporting process, and many countries have more specific indicators, e.g. distinguishing forest area by forest type or by some qualitative measures (e.g. natural, vs. semi-natural vs. anthropogenic forest).

## **VII. SUGGESTIONS FOR THE IMPROVEMENT OF THE INDICATOR**

17. If data on forest cover can be disaggregated by major forest types, the data on natural forest cover provide a simple and cost effective overview of the loss of forest areas for forest biological diversity and for the provision of essential ecosystem services. The value and accuracy of the data and their actuality could be improved by combining land based data and remote sensing at more frequent than the 10-year intervals of the FRA. Drawing from the progress of intergovernmental processes related to forests and the global forest resources assessment process such indicators could include: (a) area covered with natural forest by major forest type and successional stage; (b) forest area designated for conservation of biological diversity by type, successional stage and protection category (as a subset of the indicator on protected area coverage); (c) degree of fragmentation by forest type (addressed in a separate indicator on connectivity/fragmentation); (d) rate of conversion of forest cover (by type) to other uses; (e) area and percentage of forests (by type) affected by anthropogenic and natural disturbance; (f) Complexity and heterogeneity of forest structure; (g) numbers and conservation status of forest-dependent species; (h) forest carbon content. <sup>7/</sup> If feasible, several independent monitoring efforts might go in parallel including:

- (a) High-resolution sampling on a yearly basis (e.g. as conducted by FAO and EU);
- (b) Coarse-resolution sampling on a yearly basis (e.g. as conducted by EU and several NASA-supported groups);
- (c) High-resolution wall-to-wall mapping on a several- to five-year basis (e.g. as has been done for some countries by NASA- or NGO-supported projects).

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<sup>7/</sup> A discussion on these indicators is provided in Newton, A.C. and V. Kapos. 2002. Biodiversity indicators in national forest inventories *Unasylva* 53(210): 56-64. <http://www.fao.org/DOCREP/005/Y4001E/Y4001E09.htm>

18. Such information could also help to provide better coverage of degradation and, particularly, degree of fragmentation. A recent paper on global estimates of forest fragmentation <sup>8/</sup> suggests a methodology that could be applied to assess connectivity/fragmentation of forests and other ecosystem types. The analysis would have to be repeated based on a future set of satellite images to provide a time-series, which could inform on indicator on connectivity/fragmentation, which is yet to be developed. Examples of a fragmentation index have been proposed. <sup>9/</sup> The analysis is based on the WWF ecoregional approach as a way to discern specific forest types and their degree of fragmentation. Future FRA efforts (FRA 2010) in ascertaining changes in forest cover based on FRA 2000 “global ecological forest map” can also be used for data break down. Complementing the data with remote sensing information for selected regions could also be relevant. <sup>10/</sup>

19. Further development of this indicator should seek to be fully linked to the FAO forest resources assessment process and should encourage collaboration with partners to evaluate additional data sources to supplement its data and provide context for the trends measured globally. These additional sources should include single-country remote sensing and other studies conducted by, for example, NGOs and programmes such as Global Forest Watch (<http://www.globalforestwatch.org>).

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<sup>8/</sup> Wade, T. G. *et al.* 2003. Conservation Ecology 7(2) [online]. [www.consecol.org/vol7/iss2/art7](http://www.consecol.org/vol7/iss2/art7)

<sup>9/</sup> Newton, A.C. and V. Kapos. 2002. Biodiversity indicators in national forest inventories Unasylva 53(210): 56-64. <http://www.fao.org/DOCREP/005/Y4001E/Y4001E09.htm>

<sup>10/</sup> E.g., Achard, F. *et al.* 2002. Determination of deforestation rates of the world’s humid tropical forests. Science 297: 999-1002.