GreenFacts
Facts on Health and the Environment

Scientific Facts on

Forests

Source document:
FAO (2006)

Summary & Details:
GreenFacts

Level 2 - Details on Forests

This Digest is a faithful summary of the leading scientific consensus report produced in 2006 by the Food & Agriculture Organization (FAO):
"Global Forest Resources Assessment 2005, Progress towards sustainable forest management"

The full Digest is available at: https://www.greenfacts.org/en/forests/

This PDF Document is the Level 2 of a GreenFacts Digest. GreenFacts Digests are published in several languages as questions and answers, in a copyrighted user-friendly Three-Level Structure of increasing detail:

- Each question is answered in Level 1 with a short summary.
- These answers are developed in more detail in Level 2.
- Level 3 consists of the Source document, the internationally recognised scientific consensus report which is faithfully summarised in Level 2 and further in Level 1.

All GreenFacts Digests are available at: http://www.greenfacts.org/

1. Introduction – Measuring progress towards sustainable forest management

Figure 2.2: The world's forests [see Annex 8, p. 30]

The world's forests fulfill many roles. They provide renewable raw materials and energy, maintain biological diversity, mitigate climate change, protect land and water resources, provide recreation facilities, improve air quality and help alleviate poverty. At the same time forests are affected by fire, air pollution, pests and invasive species, and are often the primary targets of agricultural and urban expansion.

In view of competing interests in the benefits of forest resources and forest land, the Food and Agriculture Organization of the United Nations ( ) has carried out global forest resources assessments at five to ten year intervals since 1946. The most recent and most extensive assessment was completed in 2005 and aimed at measuring progress towards sustainable forest management.

The assessment focused on six themes representing important elements of forest management:

- Extent of forest resources
- Biological diversity
- Forest health and vitality
- Productive functions of forest resources
- Protective functions of forest resources
- Socio-economic functions

Box 1.1 Thematic elements of sustainable forest management [see Annex 1, p. 23]

Information was collected from 229 countries and territories for three points in time: 1990, 2000, and 2005. Many countries have not been able to provide complete data for all variables. However, presenting summed regional data overcomes some of the limitations in data availability at country level. The rate at which variables, such as the extent of forest area, change over time is expressed as a compound annual change rate (in percent).

Such an analysis provides information on overall progress towards sustainable forest management on the global or on the regional scale. It can shed more light on some of the complexities of forest management and lead to additional analyses and debate, thus promoting decision-making and action for further progress towards sustainable management.

2. How much forest is there on the planet and at what rate is it disappearing?

The area of land covered by forest is a key piece of information for forest policy, since it is one of the measures of the importance of forests in a country or region.

Monitoring the extent and characteristics of forest resources aims to reduce unplanned deforestation, restore and rehabilitate degraded forest landscapes, manage forests in a sustainable way and evaluate the importance of carbon sequestration by forests and trees, which contributes to moderating the global climate.

With this aim in mind, individual countries provided information to the Food and Agriculture Organization of the United Nations ( ) on the status and changes over time of four aspects of forests:

- Area of 'forest', 'other wooded land' and 'other land with tree cover';

- Share of these lands classified as primary forests, modified natural forests, semi-natural forests, protective forest plantations or productive forest plantations;
- Standing volume of wood, i.e. the total growing stock in forests and other wooded land;
- Carbon stock contained in living biomass, dead wood, litter and forest soils. (see question 3)

2.1 How much of the planet is covered with/by forests?

Total **forest area** in 2005 was estimated to be around 30% of the planet's land area, just under 40 million km^2. This corresponds to an average of 0.62 ha (6200 m^2) per capita, though this is unevenly distributed. This estimate was based on data on forest area reported by 228 countries and territories.

Figure 2.2: The world's forests [see Annex 8, p. 30]

Among world regions, Europe (which, for the purpose of this assessment includes the Russian Federation) accounts for one-quarter of total forest area, followed by South America and then North and Central America. South America is the region with the highest percentage of forest cover (almost half of the land area) and Asia is the region with the lowest percentage of forest cover (less than 20% of land area).

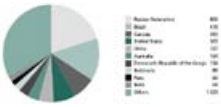


Figure 2.3: Ten countries with largest forest area 2005 [see Annex 9, p. 31]

Table: Forest cover by subregion 2005 [see Annex 22, p. 38]

The five countries with the largest forest areas are the Russian Federation, Brazil, Canada, the United States and China. Jointly they account for more than half of the worlds forest area and the Russian Federation alone accounts for 20% of the world total.

2.2 How fast are forests disappearing?

Overall, deforestation has been taking place at a pace of about 130 000 km^2 (13 million hectares) per year during the period 1990–2005 (an area the size of Greece), with few signs of a significant decrease over time. Though deforestation continues at an alarming rate, the annual net loss of forest area is decreasing due to tree planting and natural expansion of forests in some countries and regions.

Figure 2.5: Forest change dynamics [see Annex 10, p. 31]

Thus when taking into account both estimated gains and losses, the total net loss in forest area between 1990 and 2000 was about 89 000 km^2 per year. Thereafter, in the period between 2000 and 2005 estimated net loss in forest area was somewhat lower with 73 000 km^2 per year, equivalent to a loss of 200 km^2 of forest per day.

2.3 How much is there of the different kinds of forests?

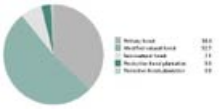


Figure 2.9: Forest characteristics 2005 [see Annex 11, p. 32]

Forests and other wooded land were classified into different types, based on their characteristics. Primary forests and modified natural forests comprise native forest tree species only; semi-natural forests are the result of assisted natural regeneration, planting or seeding. **Forest plantations** are defined as forests of introduced or native species, established through planting or seeding, with few species, even spacing and/or even-aged stands.

Box on planted forests [see Annex 2, p. 24]

When it is possible to classify forest in this way, it helps clarify the extent to which forests are modified and provides an indication of the level of management and of wood production potential. However, information on all classes was not always readily available for all countries.

Primary forest makes up more than a third of total forest area, but these primary forests are unevenly distributed. Only limited areas of primary forests are found in the Caribbean, Europe (excluding the Russian Federation) and the arid zones of Africa and Asia. The largest expanse of primary forest is located in the Amazon. Countries in North and Central America and the Russian Federation also have a high proportion of primary forests.

Modified natural forests cover slightly more than half of total forest area. About 7% of forests are considered semi-natural forests and forest plantations account for about 4% of forests. In the case of other wooded land, over two thirds are considered modified natural wooded land.

The general trend is that areas of primary forest and modified natural forest are decreasing, while the areas of semi-natural forest and forest plantation are increasing. Estimates indicate that about 60 000 km^2 per year of primary forest have been lost or modified by logging or other human interventions since 1990 (not considering losses in the Russian Federation), and there is no indication that the loss of primary forests is slowing down. In Brazil and Indonesia alone 49 000 km^2 of primary forest are lost on average per year. However, a number of countries which have been setting aside natural forest areas have registered increases in primary forest area, since with time, these areas evolve into forests which fit the definition of primary forests.

Two specific forest types, mangroves and bamboo, have been the subject of supplementary study. Mangroves cover an estimated 152 000 km^2 and bamboo some 400 000 km^2.

Box on mangroves [see Annex 3, p. 25]

Box on bamboo [see Annex 4, p. 26]

3. How can forests affect climate change?

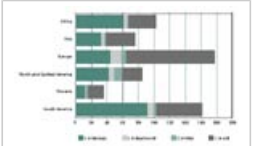


Figure 2.12: Total carbon stock in forests by region [see Annex 7, p. 30]

Forests influence climate change largely by affecting the amount of carbon dioxide in the atmosphere. When forests grow, carbon is removed from the atmosphere and absorbed in wood, leaves and soil. Because forests (and oceans) can absorb and store carbon over an extended period of time, they are considered "carbon sinks". This carbon remains stored in the forest ecosystem, but can be released into the atmosphere when forests are burned. Quantifying the substantial roles of forests in absorbing, storing, and releasing carbon is key to understanding the global carbon cycle and hence climate change.

Growing stock is a measure of the volume of stemwood in a given area of forest or wooded land, usually measured in solid cubic metres (m^3). It provides information on existing wood resources but also a basis for estimating the amount of carbon contained. The world's total growing stock is estimated at 434 billion m^3, of which some 30% are found in South America. Overall, growing stock has been decreasing slightly with some regional differences: Africa, Asia, and South America show a slight decrease, while Europe as well as North and Central America show a slight increase.

Carbon stock refers to the amount of carbon stored in the world's forest ecosystem, mainly in living biomass (44%) and soil (46%), but to a lesser extent also in dead wood (6%) and litter (4%). The amount of carbon stored in a hectare of forest and the relative contribution of the different parts of the ecosystem to the total carbon stock vary from region to region (Table 2.8 [see Annex 24, p. 40]).

Overall, the world's forest ecosystems are estimated to store some 638 Gt (638 billion tonnes) of carbon, which is more than the amount of carbon in the entire atmosphere. Because of large data gaps for soil carbon in major boreal forests, this figure probably underestimates the total amount of carbon stored in forest ecosystems.

From 1990 to 2005, the overall amount of carbon stored in living biomass decreased, mainly as a result of decreases in South and Southeast Asia Western and Central Africa, and South America. The amount of carbon stored in living biomass remained approximately constant in Oceania and increased in Europe and in North and Central America (see Table 2.10 [see Annex 23, p. 39] for regional breakdown).

4. What is the biological diversity of the world's forests?

See also GreenFacts' MA Biodiversity Study [see https://www.greenfacts.org/en/biodiversity/index.htm]

The concept of biological diversity, or biodiversity, encompasses the variety of existing life forms, the ecological roles they perform, and the genetic diversity they contain. In forests, this diversity allows species to adapt continuously to changing environmental conditions and to contribute to the functioning of the ecosystem. From a human perspective, forest biodiversity also maintains the potential for tree breeding and improvement, in view of meeting human needs for goods and services.

While timber production often dominated the way in which forests were managed during the past century, new pressures have now given rise to a more balanced approach of sustainable forest management. This approach involves the conservation of biodiversity in view of obtaining multiple goods and services.

Though monitoring biodiversity and the way it is affected by forestry practices is important, there is no single measure that reflects all aspects of biodiversity.

For policy purposes, various ecological indicators can be used to monitor a few relevant aspects of biodiversity over time, though so far this has mainly been done at a local level.

4.1 How much primary forest is left on the planet?

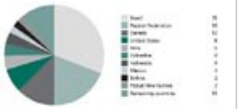


Figure 3.3: Ten countries with the largest area of primary forest 2005 [see Annex 14, p. 33]

Primary forests are forests where native tree species grow, where ecological processes are not significantly disturbed, and where there are no clearly visible indications of human activities. The size of primary forest is an important indicator for assessing the state of forest ecosystems even though primary forest in temperate and boreal zones may have fewer plant and animal species than some modified forests.

An estimated 13 million km^2 of forest, a little more than a third of the world's forest area, are considered primary forest. Nearly half of all primary forest is found in South America, a quarter in North and Central America, and nearly a fifth in the Russian Federation alone.

A number of countries reported that they have no primary forests left. These were mostly countries in Europe and in the arid zones of Africa and Western Asia.

Though primary forests still represent a little more than a third of the world's forest area (36.4%), in absolute terms, the area of primary forest has been shrinking by about 60 000 km^2 per year over the last 15 years. While the loss has been slowing down in some regions, it has been increasing in South America and some other regions. Brazil and Indonesia alone accounted for a loss of 49 000 km^2 per year during the period 2000–2005.

Several western European countries as well as Japan noted an increase in the area of primary forests, mostly because they have been setting aside natural forest areas in which no intervention takes place; such areas eventually evolve into forests which meet the definition of primary forests.

4.2 How much of the forest are has been set aside for conservation?

Setting aside land as protected areas and managing it accordingly is a key part of ongoing global efforts to conserve biological diversity. The amount of land designated for the conservation of biodiversity is thus an important indicator of progress. This land can be located within a protected area, but may also be found outside such legally designated areas.

More than 4 million km^2 of forest which represents more then a tenth of total forest area (11.2%) are designated as having conservation of biodiversity as their primary function [Table 3.3 [see Annex 25, p. 41]].

In absolute terms, the biggest forest area designated for conservation of biodiversity is found in South America, followed by North America.

In relative terms, the regions with the largest percentage of forests designated primarily for conservation are Central America as well as Western and Central Africa. Europe and

Western and Central Asia have the lowest percentage of forests designated primarily for conservation.

Between 1990 and 2000, the area of forest devoted to biodiversity conservation has increased by at least 960 000 km^2 or 32%. This increase has taken place across the world except in Northern, Eastern and Southern Africa.

4.3 What is the distribution of tree species in forests?

Figure 3.11: Number of native forest tree species [see Annex 12, p. 32]

Monitoring the growing stock in forests and other wooded lands provides information on of the total standing volume of wood. However, focusing on the growing stock of the three or ten forest tree species, which are most common in that area, provides an indication of changes in forest tree composition.

In natural and semi-natural forests, generally, the larger the share of growing stock made up by the three most common forest tree species, the smaller the overall number of tree species in that area.

Quantitative information on the ten most common species has been gathered for 60% of the world's total forest area located in 82 countries.

This information revealed a great variation in terms of species diversity. The ten most common tree species represent less than 30% of total growing stock in Congo, Viet Nam, Myanmar, Panama, Ghana, Madagascar, Indonesia and India. This small proportion of the total species represented by the most common species which indicates high species diversity. The lowest species diversity tends to be found in boreal forests of the Northern Hemisphere. Unfortunately, information is missing from areas of known high species diversity such as many countries in South America and the Congo Basin.

Five species groups – pines, oaks, spruces, firs, and beeches – make up almost a third of the most common species reported.

Between 1990 and 2000, the relative ranking of the top 10 tree species in the eighty-two reporting countries has remained the same. Moreover, no significant change in the share of growing stock occupied by the three main species was observed in the countries and areas that had provided complete data series (56 out of the 229 reporting countries).

The absence of an authoritative world list of trees and shrubs is a serious impediment to assessing and monitoring one of the most basic components of forest biodiversity – tree species richness at the national level.

A first global attempt was made to systematically record the number of native forest tree species by country and area, including species such as bamboo, palm and other woody species. The number of native tree species in individual countries ranged from a minimum of three to a maximum of 7 880 as illustrated in Figure 3.11 [see Annex 12, p. 32]

South America has the highest average number of native forest tree species per country. Brazil reports the largest number of native tree species and high species diversity in the Amazon basin and in the Atlantic coastal forest. High species richness is also reported by countries in Central Africa, Central America, East Asia, Madagascar as well as South and Southeast Asia. The lowest average number of trees per country is found in Europe (Iceland, for example has only three native tree species). Species diversity in boreal forests is usually

relatively low, and vast expanses of such forests are dominated by a small number of tree species.

4.4 How many tree species are threatened?

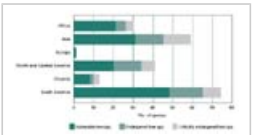


Figure 3.13: Average number of threatened forest tree species by region [see Annex 13, p. 33]

Rare tree species and those highly valued for wood or non-wood forest products are often in danger of becoming extinct within parts of their range. On average, 5% of the tree species native to a country are threatened.

Countries across the world reported information on the number of forest tree species considered threatened. Threatened species were classified in accordance with the IUCN red list ranking system as either 'vulnerable', 'endangered' or 'critically endangered'.

Most countries and areas reported that one or more tree species are threatened in their jurisdiction. The highest number of threatened tree species is found in South America as well as in South and Southeast Asia.

No simple relationship was found between loss of forest and number of threatened tree species. In some countries, though relatively high proportions of natural forests and protected areas remain, many individual tree species are at risk.

5. How healthy are the world's forests?

Forests need to be managed so that the risks and impacts of unwanted disturbances are minimized, including wildfires, airborne pollution, storm felling, invasive species, pests, diseases, and insects. Disturbances and their impacts vary from place to place and even the definition of what constitutes disturbance events varies among countries.

Forest disturbances can be devastating, but they have been severely underreported. Based on available data, this assessment focused on three kinds of disturbances:

- **Forest fires**: Fire often gets out of control and destroys forest vegetation and biomass. Both uncontrolled agricultural expansion and recreational uses increase the risk of forest fires.
- **Insects and diseases**: While insects and diseases are integral components of forests, outbreaks can have adverse effects on tree growth and survival, yield and quality of wood and non-wood forest products (NWFP), wildlife habitat, and the social value of forests.
- **Other disturbances (including wind, snow, ice, floods, tropical storms, drought, and damage by animals)**: Climatic events have always influenced forest ecosystems, but now global climate change primarily resulting from human activities appears to make forest ecosystems more prone to damage.

Disturbances interact with one another, for instance damage caused by fires or storms can facilitate insect pest outbreaks. Hence they need to be considered as a whole. Several disturbance factors were not taken into account in this assessment since quantitative information was lacking on illegal logging, encroachment, unsustainable management practices, pollution, and the impact of invasive plant species.

5.1 What are the impacts of forest fires?

Fire, from natural and human causes, has been a major factor in the development and management of forests. Though some forest ecosystems have adapted to frequent fires and benefit from them, others are damaged by them. Every year, millions of hectares of forests are consumed by fire, with loss of human and animal life and substantial economic damage along with loss of biodiversity and release of carbon to the atmosphere. Most fires today are caused by humans, when fire is misused in order to convert forests into agricultural lands or for other uses, and to maintain grazing lands, extract mineral resources, or settle ownership conflicts.

Around 2000, the area burned per year was at least about 277 000 km^2 of forests, equivalent to roughly 1% of the forest area of the 91 countries that reported data on this subject. An additional 51 000 km^2 of other wooded land were reported as significantly affected by fire. The largest shares of forest area affected by fire were reported from Africa and Asia, while Europe reported the smallest. Information was missing from many countries in Oceania and Africa.

Table on area of forest affected by fire [see Annex 26, p. 42]

Between 1990 and 2000, the average area of forest affected by fires each year was reported to have increased in 35 countries, decreased in 31, and remained almost constant in 25 countries. From the data provided, it is difficult to discern any global trends.

5.2 How are forests affected by insect and disease outbreaks?

The types of problems caused by insects and diseases — often interlinked— have changed rapidly in recent years. Movement of insects and diseases has been facilitated by faster long-range air travel along with increased international trade of agricultural and forest products, and the exchange of plant material.

Identifying insects and diseases as the cause of damage to forests is difficult and the available data mainly focuses on the overall extent of forest affected, and not on the specific underlying causes.

Insect and disease problems are often either cyclical or chronic and determining when they begin or end can be a challenge. Because of such difficulties in assessment few countries provided data for insect infestations and diseases.

Globally, from 1998 to 2002, an average of 680 000 km^2 of forest area were harmed by insects and/or diseases every year. The largest area of insect disturbance reported for a single country was 142 000 km^2 (Canada), and that of disease disturbance, 174 000 km^2 (United States) – both countries within the top five in terms of forest area and with good data-collection systems.

Table on area of forest affected by insects [see Annex 27, p. 43]

Table on area of forest affected by diseases [see Annex 28, p. 44]

Between 1990 and 2000 the level of disease reported increased while the level of insect damage decreased.

5.3 What other disturbances can affect forests?

Other forest disturbances include climatic factors such as wind, snow, ice, floods, tropical storms and drought, or impacts of animals such as camels, beavers, deer and rodents. Because "other disturbances" cover many different causes, information about them is highly erratic and not comparable.

The average area affected by other disturbances between 1998 and 2002 was about 84 000 km^2 per year. Other disturbances included:

Table on area of forest affected by other disturbances [see Annex 29, p. 45]

- major catastrophic events such as hurricanes, which may not only cause widespread destruction but also make forests susceptible to infestations.
- chronic pressures, such as constant feeding by animals which either cause direct damage to trees or have indirect effects such as increased soil compaction beneath the trees leading to dieback and decline.

However, very little detailed data is available on these other disturbances and countries have varying perceptions about what is included in 'other disturbances'. In Europe the average area affected by other disturbances per year almost doubled between 1990 and 2000. This was primarily due to the effects of severe storms such as those that hit Western Europe in December 1999.

6. What products are extracted from forests?

Forests are increasingly managed for a variety of uses and values, often in combination.

Earlier assessments emphasized wood for timber, but the concept of forest production has now grown to include other types of forest products. Forests and trees outside forests provide many different products, ranging from timber and fuelwood to food (berries, mushrooms etc.), fodder, and other non-wood forest products. An underlying objective of forest management is maintaining an ample and valuable supply of forest products while at the same time ensuring that production and harvesting are sustainable and do not compromise the management options of future generations.

6.1 How much of the forest area has been set aside for production?

Forest areas can be set aside for production, either by laws or by management decisions.

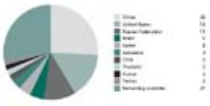


Figure 5.5: Ten countries with the largest productive forest plantations 2005 [see Annex 16, p. 34]

Overall, about half the world's forest are designated for production of forest products (as either primary or secondary function). At the global level, 34% of total forest area has production designated as its main purpose. In Europe, some 73% of forest area has production as the primary function, while North America reported only 6% designated primarily for production –most of its forests being designated for multiple use.

Globally, there has been a slight decrease in the area of forests with production as the primary function. Some, but far from all, of these forests are productive forest plantations.

Table on area of forest designated primarily for production [see Annex 32, p. 47]

Forest plantations are defined as forests of introduced or native species, established through planting or seeding, with few species, even spacing and/or even-aged stands.

'Productive' forest plantations are forest plantations predominantly intended for the provision of wood, fibre, and non-wood forest products, though they can also have protective, recreational and other functions. Some forests classified as **semi-natural** include planted trees of native species, most of which are used for productive purposes, but as these forests do not fall under the forest plantation definition, they are not included in this analysis.

Unfortunately, information is missing from many of the smaller islands and from some of the countries in the Congo Basin. Furthermore, some countries whose forest plantations are managed for multiple purposes could not differentiate between predominantly productive or protective functions.

In 2005, productive forest plantations represented about 1.09 million km^2, which corresponds to 2.8% of the global forest area. The ten countries with the greatest area of productive forest plantations account for 73% of the total global area of productive forest plantations. China, the United States, and the Russian Federation together account for more than half the world's productive plantations. Areas with the least area of productive forest plantations are Africa , the Caribbean, Central America and Western and Central Asia.

All subregions except Northern Africa show an increase in productive forest plantations, and productive forest plantations accounted for 1.9% of total global forest area in 1990, 2.4% in 2000, and 2.8% in 2005. However, the annual increase varied considerably from region to region. China, the Russian Federation and the United States, together account for 71% of the global annual increase in productive forest plantations.

6.2 How much wood is available for commercial exploitation?

Growing stock is a measure of the volume of stemwood in a given area of forest or wooded land, usually measured in solid cubic metres (m^3). Forest growing stock has traditionally been a key indicator of wood production and is used as a basis for estimating biomass and carbon stocks in most countries.

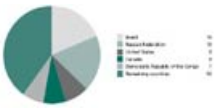


Figure 5.8: Five countries with greatest total growing stock 2005
[see Annex 17, p. 35]

Total global growing stock is estimated at 434 billion m^3, of which about 30% is found in South America. The five countries with the greatest total growing stock account for almost 60% of the global total. Brazil alone accounts for 19% of the total.

Growing stock per hectare of forest area is a good indicator of how well stocked forests are. The global average for growing stock is 110 m^3 per hectare (11 000 m^3 per km^2) and has not changed significantly over the last 15 years.

Commercial growing stock includes only species that are sold or could potentially be sold on domestic and international markets. Global commercial growing stock amounts to some 202 billion m^3 , which represents nearly half of the total growing stock. Europe (including Russian Federation) and North and Central America account for about 64% of global commercial growing stock. Tropical forests are very rich in species of which only a few are considered commercial, and harvesting is usually carried out through selective logging, while temperate forests are dominated by a smaller number of species of which many are commercial.

Globally there has been a slight decrease in total growing stock between 1990 and 2005. Commercial growing stock has decreased slightly at a global level mainly due to a decrease in Europe while other regions show only small changes.

Although many countries provide information on growing stock, the quality of the information is variable. A few countries which regularly carry out national forest assessments have very reliable information, but many countries do not have good inventories. In many cases, a single estimate of growing stock per hectare has been used for all reporting years. Furthermore, the original data on which the estimates are based are often old and not representative of all forests in the country. Comparisons between individual countries become more difficult since definitions of growing stock may vary.

Table comparing forest area and growing stock [see Annex 33, p. 48]

Table on commercial growing stock [see Annex 34, p. 49]

6.3 How much wood is harvested?

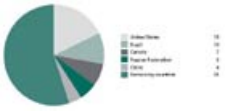


Figure 5.10: Five countries with largest volume of wood removals 2005
[see Annex 15, p. 34]

The volume of wood removed for production of goods and services (industrial roundwood) and for energy production (fuelwood) provides an indication of the economic and social usefulness of forest resources. This information also helps monitor forest use by comparing actual wood removal with sustainable limits.

Wood removals are influenced by a number of factors:

- organizational issues, such as legal constraints, ownership of forest, and availability of forest management plans;
- harvesting systems and practices;
- country specific institutional framework conditions in terms of timber extraction fees, forest law compliance, subsidies and incentives, and concession agreements;
- governance issues and the ability to detect and prevent illegal logging.

In 2005, global forest wood removals amounted to just over 3 billion m^3, of which about 60% were industrial roundwood and 40% fuelwood. An additional 7 million m^3 of fuelwood were harvested from other wooded land. In Africa, the Caribbean, Central America and South & Southeast Asia, wood removals are mainly fuelwood for cooking and heating. However, in Central and North America, East Asia, Europe and Oceania, wood removals are mainly industrial roundwood.

Global wood removals remained relatively stable, without significant changes over the last 15 years. So did the proportion between industrial roundwood and fuelwood (60 and 40% respectively). Eastern and Southern African countries reported steadily increasing wood removals: from 153 million m^3 in 1990 to 185 million m^3 in 2005. Northern, Western and Central Africa also show a steady increase in the amount of wood harvested.

East Asia reported a decline in wood removals, mainly as a result of a logging ban in China. Decreases were also reported in India, Indonesia and Malaysia in the South and Southeast Asia region. Some European countries show a slight decrease, mainly due to reduced removals of fuelwood in certain countries.

Globally, quantitative data on wood removals, especially fuelwood, are often based on population figures and consumption estimates, and are weak for this reason. Also, countries usually do not report illegal removals or informal fuelwood gathering, which would make the figures higher.

Table on trends in commercial growing stocks [see Annex 30, p. 46]

6.4 What other products can be obtained from forests?

Non-wood products provided by forests include food – such as berries, mushrooms, edible plants, game and bushmeat – fodder, and medicinal plants. These products perform a crucial role in meeting the subsistence needs of a large part of the world's population living in or near forests and providing them with income-generating opportunities. Non-wood forest products are collected for local household use or trade, though some find export markets.

Understanding their potential contribution to sustainable rural development, reducing poverty and food security, requires good statistical data. Problems linked to sporadic and unreliable data are compounded by the lack of a uniform classification system and limited institutional resources. Even where national statistics exist, all removals are not always recorded, so the figures reported are in many cases considered underestimates. Asia and Europe show the greatest availability of information. In fact, Asia has traditionally used non-wood forest products and often includes them in official national accounts and international trade statistics, which is not generally the case in other regions. Asia accounts for the largest removals of non-wood forest products.

With a share of 74%, China reports by far the world's largest removals of forest plant products for **food**, consisting mainly of oil seeds, nuts and bamboo shoots. Other countries with significant removal volumes for food are India, the Republic of Korea, and Pakistan in Asia; the Czech Republic, Finland, Italy, and Sweden in Europe; and Brazil in South America. China also accounts for 72% of removals in the category of **exudates**, such as tannin extract and raw lacquer. India accounts for half of reported removals of plant raw materials for **medicinal and aromatic** uses. India also has a 42% share of total removals of **other plant products**, such as tendu leaves and lac, followed by Brazil and Mexico. **Fodder removals** were reported by only 16 countries, which however reported very large quantities, showing that this is a very important product category. **Ornamental plants** like Christmas trees were reported in large quantities in European countries.

Table on removals of non-wood forest products [see Annex 31, p. 46]

7. What are the protective effects of forests?

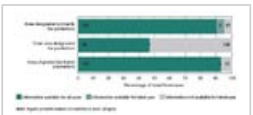


Figure 6.1: Information availability – protective functions of forest resources [see Annex 18, p. 35]

Apart from providing wood and other products, forests and trees outside forests play a protective role, for instance in ecosystem conservation, in maintaining clean water, and in reducing the risks of impacts of floods, avalanches, erosion and drought. Many countries have identified and given special status to protective forest areas.

Protective functions can be local or global and include:

- Influence on climate.
- Protection from wind erosion.
- Coastal protection.
- Protection from avalanches.
- Air-pollution filters.
- Protecting water resources.

Though information available on areas that have protective purposes is somewhat limited, the information presented here is a start and shows the importance of the protective functions of forests.

7.1 How much of the forest area has been set aside for protective purposes?

In 2005, the total area of forests designated as having protection as their primary function was, close to 10% of total forest area (3.5 million km^2) [Table 6.2 [see Annex 35, p. 50]]. Asia has the highest proportion of forests with a primary function of protection, followed by South America and Europe.

The reported figures for Western and Central Africa are quite low. This may be explained by the fact that only a few countries in those regions have adequate data. In North and Central America and in Oceania a relatively small proportion of forests has been designated as having protection as primary function, because protective forest areas in USA, Canada and Australia tend to be classified as having multiple purposes, and not as being primarily protective.

In 2005, all forest areas with protection as primary or secondary function represented about a third of total forest area (11.9 million km^2) [Table 6.3 [see Annex 36, p. 51]].

According to available data, there has been an overall increase in the area of forests with protection as their primary function, from 8% in 1990 to 9% in 2005, as well as in the area of forests with protection as one of their designated functions from 61% in 1990 to 65% in 2005.

7.2 How much forest is planted for protective purposes?

Recognizing the important protective role of forests, many countries have planted substantial areas of forests and trees for this purpose, for example to stabilize sand dunes or provide windbreaks. Protective forest plantations may be subject to some harvesting of wood, or other products, but their main objective is protection.

In 2005, the global area of protective forest plantations was 301 000 km^2 (a little less than 1% of global forest area). The ten countries with the largest area of protective forest plantations accounted for 85% of the global protective forest plantation area [Table 6.5 [see Annex 39, p. 52]].

The global area of protective forest plantations increased on average by 4050 km^2 per year between 1990 and 2000 and 3300 km^2 per year between 2000 and 2005. Such plantations represent a small, but increasing proportion of total forest area, 0.63% in 1990, 0.75% in 2000, and 0.82% in 2005. In addition to the establishment of new protective forest plantations, this trend also reflects the reclassification of existing areas (e.g. in Japan).

8. What are the economic and social benefits of forests?

Forests provide a wide range of economic and social benefits for instance through employment, value generated from the processing and trade of forest products, and investments in the forest sector. Benefits also include the hosting and protection of sites and landscapes of high cultural, spiritual, or recreational value. Economic benefits can usually be valued in monetary terms but the social functions of forests are more difficult to measure and can vary considerably among countries, depending on their traditions and level of development. Maintaining and enhancing these functions is a part of sustainable forest management, hence information on status and trends in socio-economic benefits is essential.

8.1 What is the total value of harvested wood?

The combined value of wood harvested is an indicator of the contribution of forests to national economies, and this information is used to develop and monitor national policies, set priorities and allocate resources.

Globally, the total reported value of wood harvested in 2005 was US$57 billion for industrial roundwood and US$7 billion for fuelwood, which adds up to a total of US$64 billion [Table 7.2 [see Annex 37, p. 51]]. This contrasts with the fact that in terms of m^3 the amounts of industrial roundwood and fuelwood harvested are roughly the same. These figures thus show that fuelwood is roughly ten times less valuable per m^3 than industrial roundwood.

Globally, the value of wood removals appears to have increased slightly, from US$53 billion in 1990 to US$55 billion in 2000 and US$59 billion in 2005. However, after adjusting for inflation, the value of wood removals has actually fallen at the global level.

On average, the reported value of wood harvested appears to have increased in all regions except Asia and South America. In Asia, the significant decline in total value is attributable to a reduction in the volume harvested. In Brazil, the value of wood removals declined and then recovered, following a shift from harvesting natural forests to forest plantations which led to lower prices, but a greater productivity. The gross value of wood removals is not necessarily a good indicator of the economic sustainability of forestry. A decline in the value of wood removals (as observed in Brazil) could indicate that the sector has become more cost-efficient. Collecting statistical data about the value-added for the whole forestry sector (including processing) would give a better indication of economic sustainability.

8.2 What is the value of other forests products harvested?

The value of non-wood forest products harvested, like the value of wood production, is an indicator of the contribution of forests and woodlands to national economies. It also indicates the contribution of the sector to reducing poverty since non-wood forest products such as food and fodder are mostly collected in rural areas by relatively poor people.

Availability of information about non-wood forest products is very low. Figures provided are likely underestimates since many of those products do not enter conventional markets and are not easily reported. In 2005, the total reported value of non-wood forest products harvested was about US$4.7 billion [Table 7.4 [see Annex 38, p. 52]]. Plant products accounted for about three-quarters of this value, with food having the highest value (US$1.3 billion), followed by other plant products. Three specific products and countries accounted for the relatively high value of other plant product removals: bidi leaves in India, cork in

Spain and green manure in the Republic of Korea. Bushmeat was by far the most important animal product, with a value of US$0.6 billion.

Asia and Europe accounted for almost 90% of the total reported value of non-wood forest products harvested with other regions reporting minimal values owing to limited information availability. For example, the reported value of bushmeat outside Europe was only US$5 million, likely an underestimate since much of the bushmeat produced in other regions is unreported, unregulated or illegal.

The total value of international trade in non-wood forest products amounted to US$11.0 billion which indicates that the total value of non-wood forest products harvested (US$4.7 billion) is an underestimate.

Due to the lack of reliable information, trends are difficult to discern for non-wood forest products. The general trend between 1990 and 2000 is an increase of 26% in the reported value of non-wood forest products, from US$4.8 billion to US$6.1 billion. Though these trends may not be very reliable for all regions, the reported value increased significantly in Asia and slightly in Europe.

8.3 How many people are employed in forestry?

The level of employment in forestry is an indicator of the socio-economic value of the sector as well as of the impact of forests on people. Only information on employment related to the primary production of forest goods and related services is presented here.

Overall, in 2000, 11 million people were reported as being employed in forestry [Table 7.6 [see Annex 39, p. 52]], of which over half were employed in the primary production of goods. Most of these jobs (8.3 million) were based in India and China.

The reported employment in forestry declined globally by about 10% from 1990 to 2000. On average, employment declined in Asia and Europe, while in the other regions, employment increased slightly. Most of the decline can probably be attributed to increases in productivity achieved for example by increased mechanization. In Europe (including the Russian Federation), the decline in employment numbers can also be explained by the restructuring and privatization of forest activities.

The countries who reported employment information account for about 67% of global forest area. However, the quality of information poses some problems. Countries took different approaches to the inclusion or exclusion of public sector workers in their reported statistics. Some included all public-sector workers, while others apparently did not include any. Some countries, notably India, may have reported the number of people employed part time in the sector, without converting these figures to full-time equivalents. Some reported statistics may include the numbers of people collecting fuelwood and non-wood forest products for subsistence purposes rather than strictly the number of people working in forestry for a wage or salary.

8.4 Who owns forests and wooded lands?

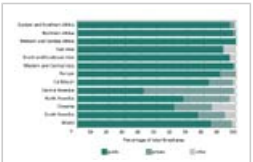


Figure 7.7: Ownership of forests by subregion 2000 [see Annex 19, p. 36]

The formulation of effective policies for sustainable forest management requires an understanding of ownership issues. Forest ownership is changing in many countries: increasingly shifting from the state to local communities and to individual households, resulting in an increasing complexity in stakeholder relations. These changes affect the way forests are managed and have social, political, and economic implications.

These changes have been assessed here for the first time, and countries had to classify their forests as "public", "private", or "other".

Box 7.1 on forest ownership and resource tenure [see Annex 5, p. 27]

Public ownership of forests is predominant in all regions. Globally, 84% of forests and 90% of other wooded land are public. Since 'public forests' include those owned by villages, communities, and indigenous groups, it is difficult to draw conclusions about the management of public forests.

Table on ownership of forests [see Annex 40, p. 53]

In absolute terms, the largest areas of private forests are found in North America, Europe, and Oceania. In relative terms, private forests are more prevalent in Central America (56% of forest area), Europe excluding Russian Federation (51% of forest area), and North America (29% of forest area). In the Russian Federation, less than 10% of total forest area is private. In Africa, private forests represent less than 2% of total forests.

Overall, forests are more and more under private ownership, and private forests represented 11% of global forests in 1990 and 13% in 2000. There does not seem to be clear regional trends except in Europe, where private forests increased from 8 to 9.7%.

Countries reporting on forest ownership account for 77% of total forest area. The percentage is slightly lower for ownership of other wooded land. Uncertainty in ownership issues, lack of up-to-date information, rapid changes, and the fact that forest ownership has been inserted only very recently into forest inventories limit the availability of reliable information.

8.5 How much of the forest area has been set aside for recreation and other social functions?

Recreation, tourism, education, and conservation of sites with cultural or spiritual importance are examples of some of the social functions played by forests. The area of forests that is set aside for such functions indicate to what extent this role of forests is taken into account by countries and forest managers.

About a third of countries and territories reported having forest areas designated for social services, and East Asia, Europe, and South America have good availability of information, while data are largely missing from other regions. Moreover, 80%, of the 1.41 million km^2 of forests designated for social services worldwide are located in Brazil since this country reported all its 'indigenous lands' and 'sustainable development reserves' in this category.

Globally, an estimated 3.7% of forest area (1.7% if Brazil is not taken into account) is primarily devoted to social functions. This percentage increases to 30.9% when considering

the total area that has social services among its functions. After South America, Europe (without the Russian Federation) has the highest percentage of forests designated for social services (8.3% of total forest area).

A clearer definition of social services provided by forests is needed for future assessments to help reduce the inconsistencies between country reports. The only clear conclusion is that Europe seems to give the most attention to the social services provided by forests as evidenced by active designation of areas for this purpose.

9. Are forests managed in a sustainable way?

Given the complexity of the question of sustainable forest management, the answer cannot be a definitive one. Trends were analysed for 21 variables as part of this study. There are many good signs and positive trends, but many negative trends remain. While intensive forest plantation and conservation efforts are on the rise, primary forests continue to be degraded or converted to agriculture at alarming rates. The answer also depends on the scale and perspective applied.

It must be noted that the findings on forest management have some limitations, because of a lack of information at the global level. Some aspects of sustainable forest management such as the legal, institutional and policy framework were not covered. Nevertheless, the results provide a global picture of key trends and should be seen as an illustration of progress, or lack of progress, towards sustainable forest management.

9.1 Is the world making progress towards sustainable forest management?

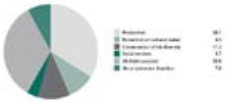


Figure 8.1: Designated functions of forests globally 2005 [see Annex 20, p. 36]

At **global level**, trends with respect to sustainable forest management have remained relatively stable over the last 15 years. On the one hand, there has been a decrease in the area of primary forest and in employment, and an increase in the area of forest adversely affected by insects, diseases, and other disturbances. On the other hand, there has been an increase in the area of forest designated for biological diversity and social services, as well as in the area of productive and protective forest plantations, amount and value of non-wood forest product removals, and area of forests under private ownership.

Table on global trends [see Annex 41, p. 54]

9.2 Are different parts of the world making progress towards sustainable management?

9.2.1 In **Africa**, progress towards sustainable forest management appears to have been limited during the last 15 years. There are some indications that the net loss of forest area has slowed down and that the area of forest designated for conservation of biological diversity increased slightly. However, the continued rapid loss of forest area - the largest of any region during the last 15 years - is particularly worrying.

Table on trends in Africa [see Annex 42, p. 55]

9.2.2 In **Asia**, forest area was almost the same in 2005 as in 1990, mainly due to large-scale efforts to replant forests (afforestation), particularly in China. Though forest health

deteriorated, the area affected by forest fires, pests, and diseases is still a relatively small proportion of the total forest area. The rapid decrease in area of primary forest is cause for concern, while the increase in area designated for conservation of biological diversity and for protective functions is commendable.

Table on trends in Asia [see Annex 43, p. 56]

9.2.3 In **Europe**, the status of forest resources has essentially been stable, with the severe storms of 1999 being the main reason for the negative trend in the health and vitality of forests. The focus of forest management in Europe has moved from productive functions towards conservation of biological diversity, protection, and multiple uses.

Table on trends in Europe [see Annex 44, p. 57]

9.2.4 In **North and Central America**, progress towards sustainable forest management was generally positive for the region as a whole except in terms of area adversely affected by insects, diseases, and other disturbances which has increased. There was, however, considerable variation among the subregions.

Table on trends in North and Central America [see Annex 45, p. 58]

9.2.5 In **Oceania**, information availability was generally very weak in terms of comparable time series and data were insufficient for determining regional trends for most of the variables. Thus, it is difficult to assess progress towards sustainable forest management for that region.

Table on trends in Oceania [see Annex 46, p. 59]

9.2.6 In **South America**, progress towards sustainable forest management was mixed. The increasing net loss of forest area and the rate of loss of primary forest are cause for concern. However, an increasing area of forest has been designated for conservation of biological diversity and for social services. The decrease in removals of fuelwood may reflect a reduced demand for this product in the region, but was partly offset by an increase in removals of industrial roundwood. The area of productive forest plantations increased and may meet a larger proportion of the demand for wood in the future.

Table on trends in South America [see Annex 47, p. 60]

9.3 Are different sub-regions progressing differently?

Figure 1.1: Regional and subregional breakdown [see Annex 6, p. 29]

Africa, Asia as well as well as North and Central America were each divided further into three geographic subregions.This analysis can reveal patterns that are not prominent at a regional scale, just as the regional breakdown can highlight variations masked at global scale.

In Africa, the Western and Central regions had more positive than negative trends, while the Eastern and Southern regions had predominantly negative trends. However, limited information availability for Western and Central Africa may have affected the results. North America and the Caribbean also had a majority of positive trends, whereas Central America had a preponderance of negative ones. The most significant difference between subregions occurred in Asia, where East Asia had many positive trends, while the South and Southeast Asia subregion was dominated by negative trends.

Figure 8.2: Distribution of subregional trends [see Annex 21, p. 37]

Table 8.9: Trends towards sustainable forest management by region [see Annex 48, p. 61]

In considering progress towards sustainable forest management, the very large differences among the subregions in terms of size and population structure must be taken into consideration. In terms of forest area, Europe, North America, and South America weigh most heavily and worldwide there seems to be a balance between positive and negative trends. When weighing progress in each country by the percentage of rural poor population, the picture becomes radically different with a higher proportion of negative trends. In that case, some of the African subregions are more prominent and the subregion of South and Southeast Asia dominates.

10. Conclusions

The 2005 Global Forest Resource Assessment coordinated by the Food and Agriculture Organization of the United Nations ( ) is the most comprehensive assessment of forests to date, in terms of content and the number of contributors. Information was collected from 229 countries and territories for three points in time: 1990, 2000 and 2005. A series of variables, related to the extent, condition, uses, and values of forests and other wooded land, were analysed. It tells us that forests cover 30% of the land area of planet Earth and range from boreal and temperate forests to arid woodlands and tropical moist forests; from undisturbed primary forests to forests managed and used for a variety of purposes.

The assessment also tells us that deforestation continues at an alarmingly high rate, but that the net loss of forest area is slowing down thanks to forest planting, landscape restoration, and natural expansion of forests on abandoned land. Forests are increasingly being conserved and managed for multiple uses and values, and play a crucial role in climate change mitigation as well as in the conservation of biodiversity and of soil and water resources. If managed sustainably, forests also contribute significantly to local and national economies and to the well-being of current and future generations.

Overall, progress towards sustainable forest management has been mixed. Using the thematic elements of sustainable management as an assessment framework has helped broaden the perspective and the result is a much richer review of key trends in forest resources, their functions and benefits.

At the global level, the world's forest resources appear to be doing relatively fine: changes in most variables are fairly small and the larger changes indicate more positive than negative trends. However, **at regional and subregional** level, this picture changes dramatically revealing considerable differences, with alarming trends in several tropical subregions.

Alarming trends include:

- Deforestation continues at an alarming rate in several regions and countries and shows no sign of slowing down at the global level.
- The area of primary forest is decreasing by about 60 000 km^2 each year; partly due to deforestation and partly to other human activities affecting the structure of these forests.
- In some regions, the area of forest adversely affected by forest fires, insects, and diseases is increasing.
- When taking the inflation into account, the value of wood removals has been decreasing over the past 15 years. Wood removals being one of the main sources of income for the forest owner, this may have negative impacts on future investments in forest conservation and management.
- The level of employment in forest management and conservation is decreasing in some regions and at the global level.

Although not all of the above trends are universally seen as negative — for example a decrease in the value of wood removals may indicate that functions other than wood production are given priority — considerable efforts will be needed in order to progress towards sustainable forest management in all countries and regions. However, it is also clear that there are many positive developments regarding forest resources, their management and uses.

As clearly illustrated in previous sections, the assessment of progress towards sustainable forest management depends on the context, the scale and the perspective applied.

Annex

Annex 1:

Box 1.1 Thematic elements of sustainable forest management

The seven thematic elements of sustainable forest management described below are based on the nine ongoing regional/international processes on criteria and indicators for sustainable forest management [1] and have been acknowledged by FAO member countries and the UNFF.

1. Extent of forest resources

The theme expresses an overall desire to have adequate forest cover and stocking, including trees outside forests, to support the social, economic and environmental dimensions of forestry. For example, the existence and extent of specific forest types are important as a basis for conservation efforts. The theme encompasses ambitions to reduce deforestation and to restore and rehabilitate degraded forest landscapes. It also includes the important function of forests and trees outside forests to store carbon and thereby contribute to moderating the global climate.

2. Biological diversity

The theme concerns the conservation and management of biological diversity at ecosystem (landscape), species and genetic levels. Such conservation, including the protection of areas with fragile ecosystems, ensures that diversity of life is maintained, and provides opportunities to develop new products in the future, including medicines. Genetic improvement is also a means of increasing forest productivity, for example to ensure high wood production levels in intensively managed forests.

3. Forest health and vitality

Forests need to be managed so that the risks and impacts of unwanted disturbances are minimized, including wildfires, airborne pollution, storm felling, invasive species, pests, diseases and insects. Such disturbances may impact social and economic as well as environmental dimensions of forestry.

4. Productive functions of forest resources

Forests and trees outside forests provide a wide range of wood and non-wood forest products. This theme expresses the ambition to maintain an ample and valuable supply of primary forest products, while at the same time ensuring that production and harvesting are sustainable and do not compromise the management options of future generations.

5. Protective functions of forest resources

The theme addresses the role of forests and trees outside forests in moderating soil, hydrological and aquatic systems, maintaining clean water (including healthy fish populations) and reducing the risks and impacts of floods, avalanches, erosion and drought. Protective functions of forest resources also contribute to ecosystem conservation efforts and have strong cross-sectoral aspects, because the benefits to agriculture and rural livelihoods are high.

6. Socio-economic functions

The theme covers the contributions of forest resources to the overall economy, for example through employment, values generated through processing and marketing of forest products, and energy, trade and investment in the forest sector. It also addresses the important forest function of hosting and protecting sites and landscapes of high cultural, spiritual or recreational value, and thus includes aspects of land tenure, indigenous and community management systems, and traditional knowledge.

7. Legal, policy and institutional framework

TThe theme includes the legal, policy and institutional arrangements necessary to support the above six themes, including participatory decision-making, governance and law enforcement, and monitoring and assessment of progress. It also involves broader societal aspects, including fair and equitable use of forest resources, scientific research and education, infrastructure arrangements to support the forest sector, transfer of technology, capacity-building, and public information and communication.

[1]African Timber Organization (FAO, 2001a); Dry-Zone Africa Process on Criteria and Indicators for Sustainable Forest Management; International Tropical Timber Organization; Lepaterique Process of Central America on Criteria and Indicators for Sustainable Forest Management; Montreal Process on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests; Near East Process on Criteria and Indicators for Sustainable Forest Management; Pan-European Forest Process on Criteria and Indicators for Sustainable Forest Management; Regional Initiative for the Development and Implementation of National-Level Criteria and Indicators for the Sustainable Management of Dry Forests in Asia; and the Tarapoto Proposal of Criteria and Indicators for Sustainability of the Amazon Forest.

Source & © www.fao.org/forestry/site/24447/en [see http://www.fao.org/forestry/site/24447/en]

Annex 2:

Box 2.1 FRA 2005 thematic study on planted forests

This study complements FRA 2005 with more detailed data, information and analysis on planted forests around the globe. its aims are to: provide inputs into a global outlook on the future supply of forest products and services from planted forests; better understand the role of planted forests in the mosaic of land uses in the broader landscape; and offer factual inputs into the ongoing process of deriving a planted forest code.

A survey is being undertaken of countries reporting high proportions of seminatural forests and large areas of forest plantations. As a first step, the survey requested countries to differentiate the planted forest component of semi-natural forests and forest plantations, collectively known as the planted forest subset.

Management and ownership of planted forests have changed over the period 1990–2005. Consequently, countries were asked to report their management designation for primarily productive or primarily protective purposes, as well as ownership, for the reporting periods 1990, 2000 and 2005. Planted forests managed primarily for productive purposes supply wood, fibre, fuelwood and NWFPs for industrial purposes, but can also provide social, cultural and environmental services. Planted forests managed primarily for protective purposes protect soil and water, rehabilitate degraded lands and conserve biological diversity and carbon sinks, but can also include minor harvesting of forest products. Management parameters reported include the top ten species, growth rates, rotation lengths and age and class distributions for both productive and protective designations, as well as harvest yields for planted forests managed for productive purposes. Ownership is reported as state, private-sector corporate, smallholder or ‘other’.

Countries were also asked to report on the main forest products, including sawlogs, pulpwood and fibre, industrial bioenergy, NWFPs and 'unspecified'. in addition, data were solicited on the services offered by planted forests, including the environment, recreation, non-industrial fuelwood and 'unspecified'.

Data collection was carried out by FRA 2005 national correspondents, with the participation of in-country specialists in planted forests. At the time of writing, analysis was being completed for release of the study during 2006. A Web-based knowledge reference centre will be established, offering data, information and reference materials on planted forests and related topics (reproductive materials, forest health, invasive species, etc.) for wide access by stakeholders. The materials will also be provided in hard copy and compact disc for those without access to the internet.

When available, the information will be posted on the FAO planted forest Web portal: www.fao.org/forestry/site/planted-forest/ [see http://www.fao.org/forestry/site/planted-forest/].

Source & © FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.24

Annex 3:
Box 2.2 FRA 2005 thematic study on mangroves

Mangroves are salt-tolerant forest ecosystems commonly found along sheltered coastlines, in deltas and along river banks in the tropics and subtropics. These trees and shrubs have developed morphological adaptations to tidal environments, such as aerial roots, salt excretion glands and, in some species, vivipary of seeds.

A large proportion of coastal populations in tropical regions depend on mangroves for their subsistence, either directly through the extraction of wood and non-wood forest products, such as fuelwood, charcoal, timber, food and medicines, or indirectly through the many aquatic and terrestrial species for which these ecosystems provide nutrients and a habitat. Mangroves serve as spawning grounds and nurseries for a variety of fish and shellfish, playing a significant role in the marine food system. When mangrove forests are destroyed, declines in local fish catches often result. These ecosystems also play an important role in preventing and reducing coastal erosion, providing nearby communities with protection against the effects of wind, waves and water current. This was demonstrated during the 2004 tsunami in Asia – in locations in which extensive areas of mangroves existed, coastal villages suffered less damage. Moreover, these unique coastal forests provide other important services: conservation of biological diversity and – by trapping sediment from upland erosion – protection of coral reefs, sea-grass beds and shipping lanes against siltation.

Despite their many important uses and benefits, high population pressure in coastal areas has frequently led to the conversion of mangrove areas to other uses, including fish and shrimp farming, agriculture, salt or rice production and urban development. Mangroves have also been fragmented and degraded due to overexploitation and pollution. Numerous case studies describe mangrove losses over time, but comprehensive information at the global level is scarce. Despite past attempts to estimate total mangrove area, recent reliable information on status and trends at the global level is limited. The past attempts include: FAO and UNEP, 1981a, b and c; Saenger, Hegerl and Davie, 1983; groombridge, 1992; Clough, 1993; Diop, 1993; fisher and Spalding, 1993; Lacerda, 1993; Spalding, Blasco and field, 1997; and Aizpuru, Achard and Blasco, 2000.

The FRA 2005 thematic study on mangroves was coordinated by FAO and cofunded by ITTO. it provides an overview of the current extent of mangroves, their species composition, uses and threats, and changes in the extent of mangroves over time for the 124 countries or areas in which they exist. The study aims to facilitate access to comprehensive, comparable information that may serve as a tool for policy- and decision-makers and mangrove managers worldwide. The initiative builds on FRA 1980 and on information provided for FRA 2000 and 2005, for which countries were asked to provide information on current forest area according to forest types, using their own classification systems. Since mangroves form a distinct and relatively easily defined forest type, most countries with mangroves provided specific information on their extent. An extensive literature search and inputs from national mangrove experts yielded additional information. Where recent national information was lacking, it was updated through interpretation of remote sensing data (an in-kind contribution from the UNEP World Conservation Monitoring Centre – WCMC). Local authorities and national experts played a key role in the process of gathering and reviewing the extensive country-level information collected. regression analyses yielded estimates for 1980, 1990, 2000 and 2005 for each country.

About 15.2 million hectares of mangroves currently exist worldwide, down from 18.8 million hectares in 1980, with the largest extent found in Asia, followed by Africa and South America. The area of mangroves present in each country varies from a few hectares to more than 3 million, with close to half the global area found in just five countries: Indonesia, Australia, Brazil, Nigeria and Mexico. Over the last 25 years, 3.6 million hectares of mangroves (or about 20 percent of the total extent found in 1980) have disappeared worldwide. Although alarming, the rate of net loss of mangroves is showing signs of slowing down. from about 185 000 ha lost annually in the 1980s (-1.03 percent per annum), it dropped to some 105 000 ha/year (-0.67 percent) during the 2000–2005 period. This reflects an increased awareness of the value of mangrove ecosystems, which has led, in turn, to the preparation of new legislation, better protection and management and, in some countries, to an expansion of mangrove areas through active planting or natural regeneration.

The detailed findings of the thematic study will constitute an important contribution to the revised World atlas of mangroves (www.fao.org/forestry/site/mangrove-atlas). The study report was being completed for release during 2006. further information on the study and the profiles for the 124 countries or areas in which mangroves occur can be found at www.fao.org/forestry/site/mangrove. The country profiles will also be compiled into five regional reports

Source & © FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.28

Annex 4:

Box 2.3 FRA 2005 thematic study on bamboo

Bamboo is an integral part of tropical and subtropical forests, and bamboo resources have increasing importance in poverty alleviation and sustainable development of the rural poor. These species continue to play a crucial role in Asia, while their use is rapidly growing in Africa and Latin America. Bamboo is moving out of the craft-industry phase and now provides raw material for preindustrial processing and for industry products (bamboo shoots, construction poles, panelling and flooring products, pulp, etc.), thus gaining significance as both an internationally traded commodity and a tool for livelihood and industrial development.

A first attempt at assessing the extent of bamboo resources at the global level was made by FAO and UNEP as part of FRA 1980, for which 13 countries provided estimates. The FRA 2005 thematic study on bamboo is a joint effort of FAO and the international Network for

Bamboo and rattan (INBAR). The inclusion of bamboo among the seven thematic studies under FRA 2005 seeks to raise awareness of the value, dynamics and importance of the bamboo sector – attracting investment and formulating and redesigning forest policies.

Following the general methodology of the FRA 2005 country reports, the specifically designed bamboo reports included information on the extent and characteristics of bamboo resources, ownership, growing stock, and amount and value of removals. The information provided by 22 country reports was analysed, reviewed and, where needed, complemented by additional information from a literature search and expert consultations. Two workshops were organized to discuss the design of the study and then the preliminary results. Additional information was obtained from the Production to consumption studies already carried out by INBAR in various countries. With the integration of existing information through a systematic data-collection procedure, the thematic study constitutes a focused investigation into the extent of bamboo resources on a global scale.

The quality and quantity of the information varied significantly among regions, with a richer contribution from Asian countries as compared with Africa and Latin America. This was hardly a surprise: it is in the Asian region that bamboo has had the longest tradition of use and where it has a fundamental role today for a significant portion of the population. However, Africa and Latin America are quickly developing greater interest in bamboo resources and their potential, and several country representatives of these regions highlighted the need for more systematic investigation and assessment.

Due to the scattered nature of the data provided and the ongoing analysis, only preliminary results can be offered here. Sixteen countries in Asia reported a total of roughly 25 million hectares of bamboo forest. Major contributors were India (9 million hectares) and China (5 million hectares), followed by Indonesia, Myanmar and Thailand. In this region, bamboo forests constitute approximately 4 percent of the total forest cover, with peaks of over 10 percent for India, Laos and Sri Lanka. Although the information gathered from Africa is still partial, six countries reported a total of approximately 3 million hectares of bamboo forest, with Ethiopia, Kenya and Nigeria showing the largest areas. In Latin America, at least ten countries have significant bamboo resources, although precise assessments have not yet been done. A total of 11 million hectares is considered a realistic estimate for the region, with Brazil, Chile, Colombia, Ecuador and Mexico among the richest in these resources. information on other characteristics of bamboo forests and the amount and value of removals will be presented in the thematic study, to be released during 2006.

Bamboo is often intermixed with other species or is cultivated outside forests, along village and farm boundaries, which presents a challenge to the study. for this reason, the ‘bamboo forest’ can have different definitions. in addition, most harvesting and trade occur locally among villages, with no official records. These combined factors explain why current bamboo resource statistics are inconsistent, fragmented and in need of upgrading. Nevertheless, steps to improve the availability of quantitative data have been made by several countries, in recognition of the importance of bamboo to poverty alleviation, forest conservation and economic and environmental development. The main value of this study is thus the development of a systematic methodology for the recording of bamboo forest characteristics and sector data

Source & © FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.29

Annex 5:

Box 7.1 FRA 2005 thematic study on forest ownership and resource tenure

With a view to assessing and understanding changes in forest ownership patterns, possible variations among continents and issues related to these trends, the FAO Forestry Department has begun a thematic study aimed at complementing the information collected through the FRA 2005 reporting table on forest ownership.

The study, to be released during 2006, was designed to collect, analyse and monitor data on forest ownership, resource tenure and related trends at the regional level in policy and law development.

This phase is a pilot exercise conducted in East and Southeast Asia. Similar studies are expected to be conducted in other regions. Its objective is to develop and test a methodology for collecting and monitoring forest ownership and tenure data at the global level that can be integrated into the FRA 2010 process. The exercise has been implemented on two levels:

Regional. A pilot survey was conducted in 17 countries,[1] aimed at collecting detailed data on forest areas for two variables: different types of ownership and different levels of control of and access to resources. The information was gathered through the use of a matrix designed for this purpose and was completed by country focal points (primarily government agencies).

National. Eleven country-specific case studies were conducted in nine countries [2] with the objective of expanding and strengthening the quantitative analysis done at the regional level and of complementing this with detailed qualitative information on types of forest tenure, particularly on resource ownership, management agreements and institutional arrangements. The case studies seek a better understanding of the relationship between forest resource tenure and forest management – and specifically of the implications for poverty alleviation.

Results and main conclusions

- Forests remain public to a great extent (86 percent), with limited differences among countries, and mostly under the direct control of central governments (79 percent).
- Devolution of management responsibilities to local communities involves no more than 10 percent of forests (18 percent if small-scale forest holders are included). In general, rights are devolved for degraded forests.
- Short-term management agreements prevail over long-term ones.
- Despite the examples provided by some countries – known for their well-established traditions of community forestry, joint forest management and private forestry – the scale of these schemes remains limited. Forests and the forestry sector do not generally offer a more diversified and adapted system of tenurial arrangements than can be seen in the rural development context.
- Some emerging trends are the allocation of forests to private households (China and Viet Nam) and the interesting, but still limited and very recent granting of long-term agreements (100 years) to private companies (Malaysia).
- The forestry sector seems slow to adapt to current trends such as decentralization and greater stakeholder participation. Instead, it tends to react to shocks in extreme ways (e.g. logging bans), which further weaken tenure rights.
- In many countries, resource users and managers still have only a vague understanding of their roles, responsibilities and rights: poor management is often the result of limited knowledge and capacities.
-

Evidence emerging from the case studies demonstrates the linkage between clear and secure tenure arrangements and the contribution of forests to sustainable livelihoods and better management. While security of tenure is recognized as a founding block of effective forest management, it is not a sufficient condition. Secure forest tenure needs to be consolidated by effective capacity-building.

A strong recommendation emerging from the study is that awareness must be increased of the implications of forest ownership and tenure on forest management and poverty reduction. It is expected that FRA 2010 could contribute significantly to this goal.

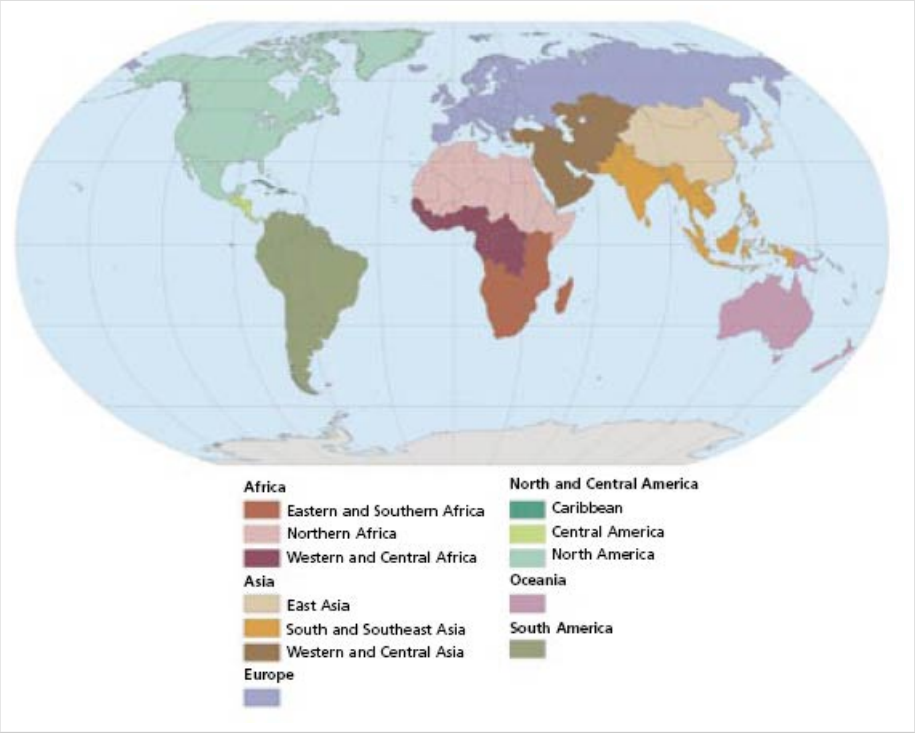
[1]Bangladesh, Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Republic of Korea, Thailand and Viet Nam.

[2]China, India, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Thailand and Viet Nam.

Source & © FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E08.pdf]
Chapter 7: Socio-economic functions, p.120

Annex 6:

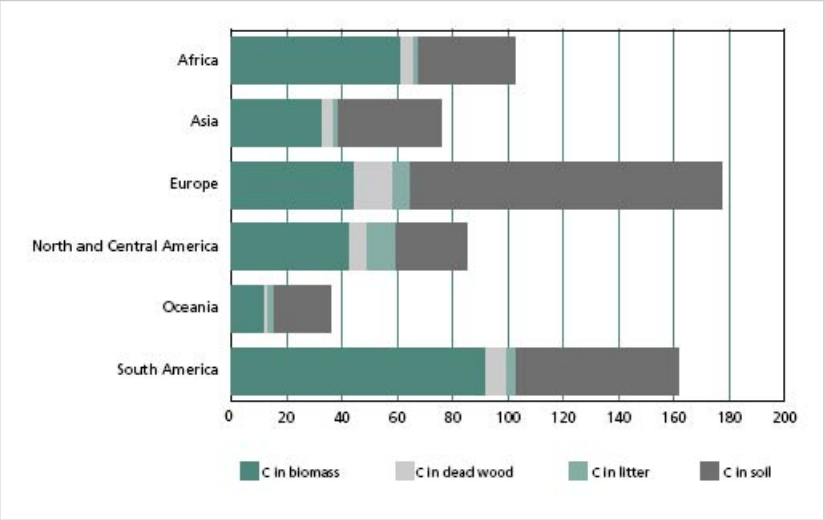
Figure 1.1: Regional and Subregional breakdown used in FRA 2005



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E02.pdf]
Chapter 1: Introduction, p.7

Annex 7:

Figure 2.12: Total Carbon Stock (C) in forests by region 2005

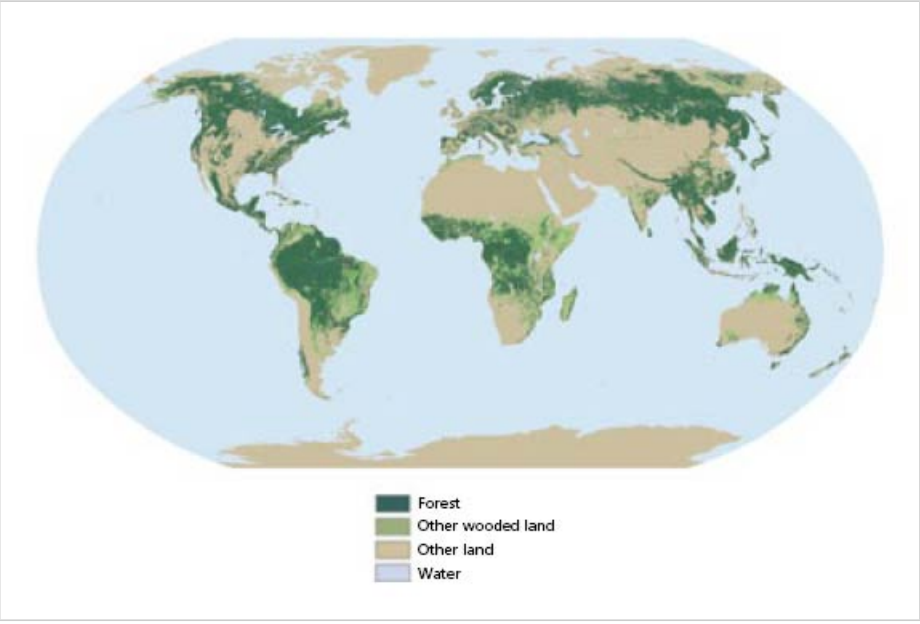


1 Giga tonne (Gt) = 1 000 000 000 tonnes (t)

Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.35

Annex 8:

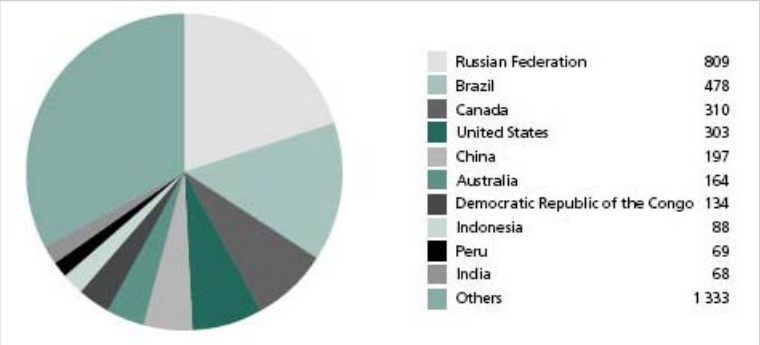
Figure 2.2: The world's forests



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.15

Annex 9:

Figure 2.3: Ten countries with largest forest ares 2005 (million ha)

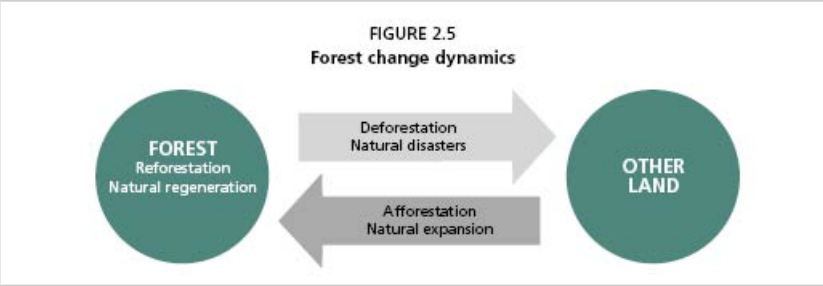


1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.16

Annex 10:

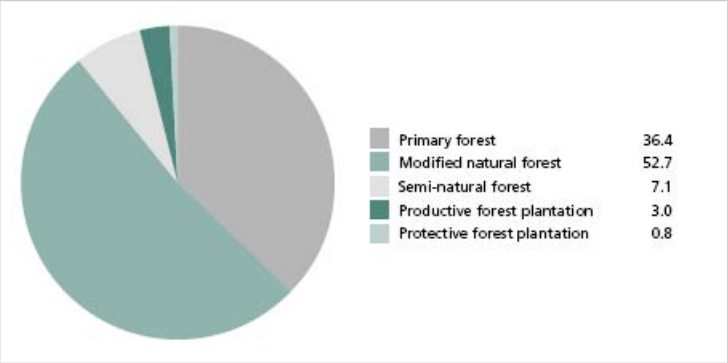
Figure 2.5: Forest Change Dynamics



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.18

Annex 11:

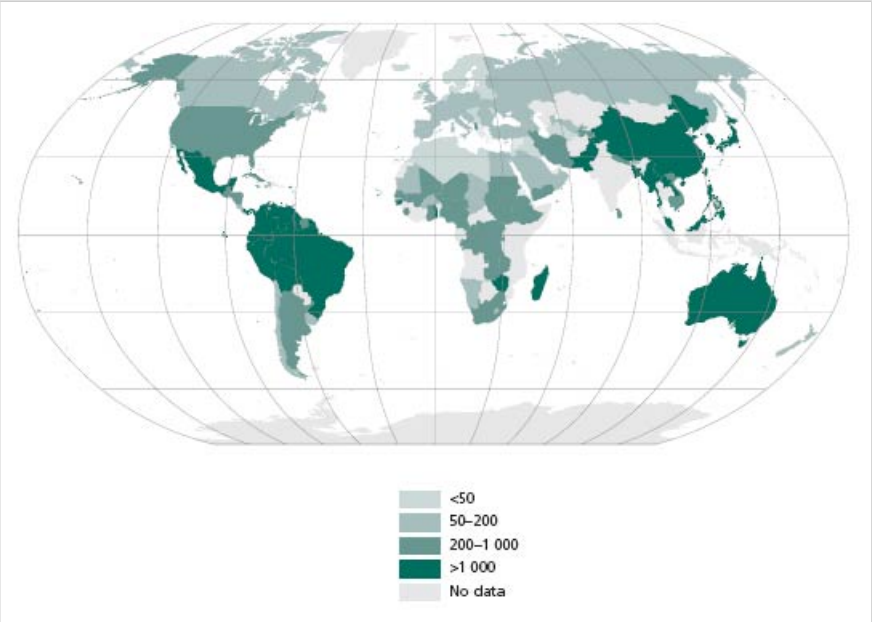
Figure 2.9: Forest characteristics 2005 (%)



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources, p.27

Annex 12:

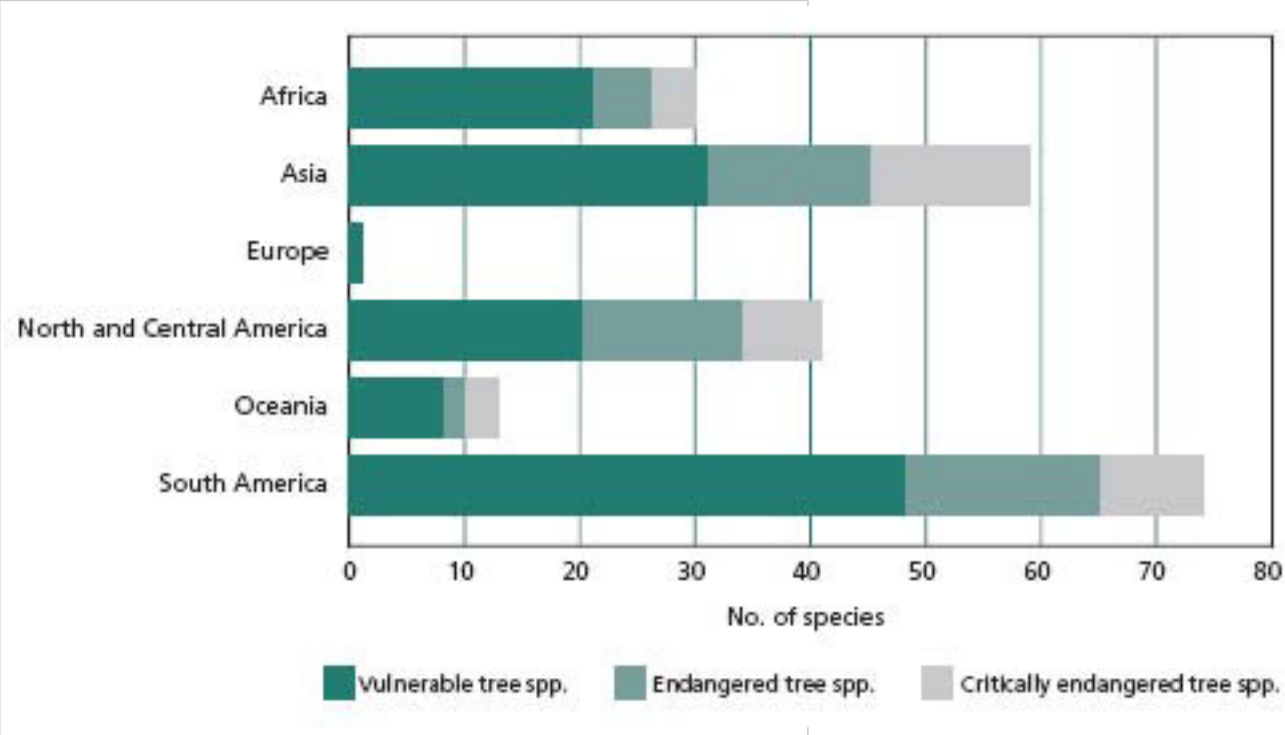
Figure 3.11: Number of native forest tree species



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E04.pdf]
Chapter 3: Biological diversity, p.52

Annex 13:

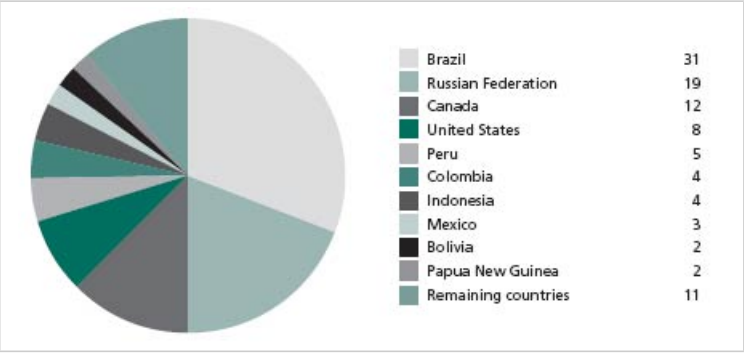
Figure 3.13: Average number of threatened tree species by region



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E04.pdf]
Chapter 3: Biological diversity, p.55

Annex 14:

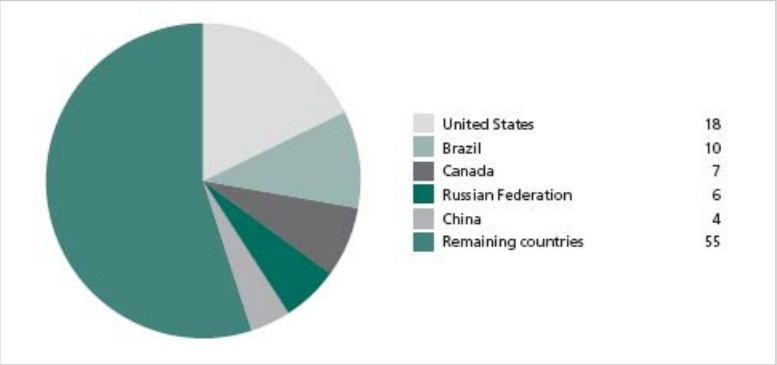
Figure 3.3: Ten countries with the largest area of primary forest 2005 (%)



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E04.pdf]
Chapter 3: Biological diversity, p.42

Annex 15:

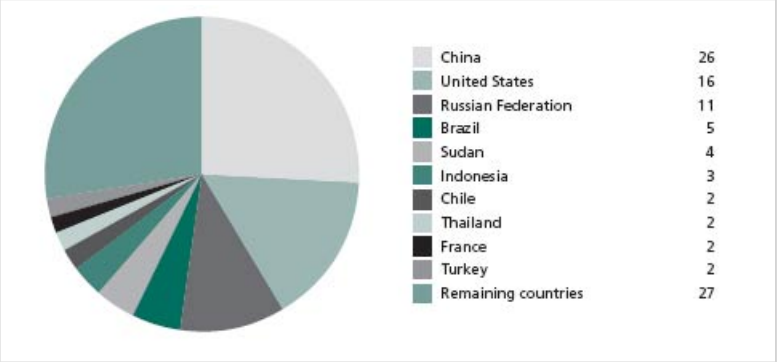
Figure 5.10: Five countries with largest volume of wood removal 2005 (%)



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5: Productive functions of forest resources, p.90

Annex 16:

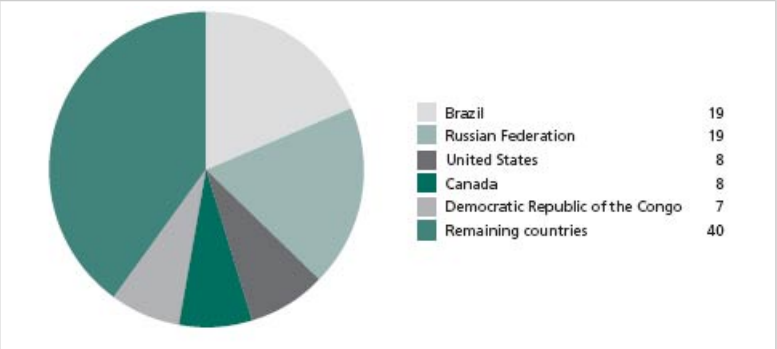
Figure 5.5: Ten countries with largest area of productive forest plantations 2005 (%)



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5: Productive functions of forest resources, p.82

Annex 17:

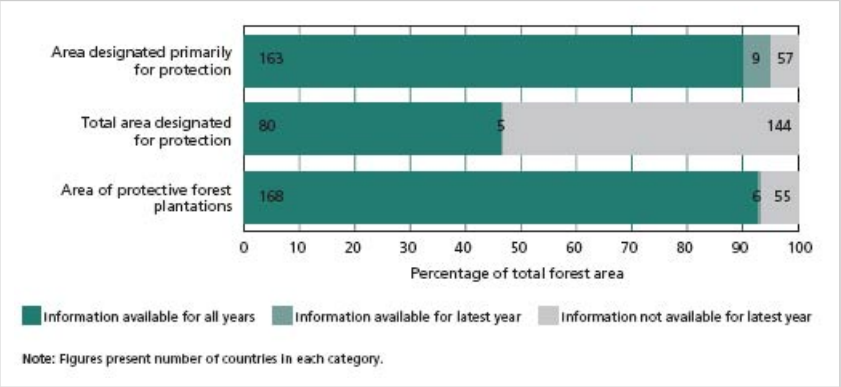
Figure 5.8: Five countries with greatest total growing stock 2005 (%)



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5: Productive functions of forest resources, p.86

Annex 18:

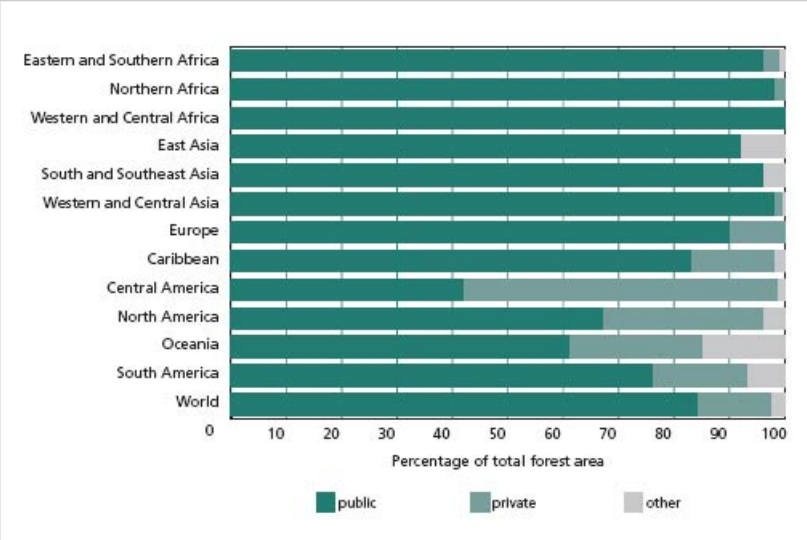
Figure 6.1: Information availability – protective functions of forest resources



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E07.pdf]
Chapter 6: Productive functions of forest resources, p.98

Annex 19:

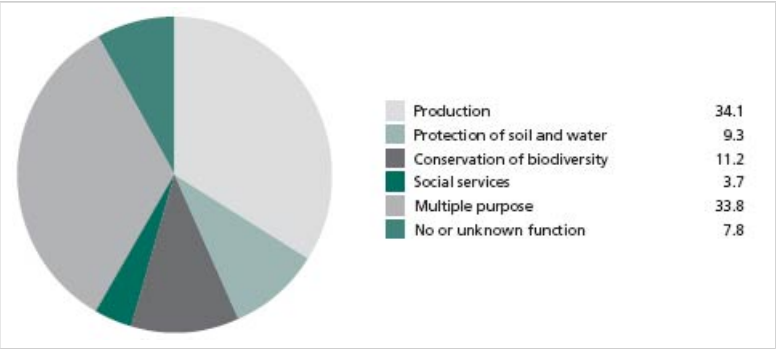
Figure 7.7: Ownership of forests by subregion 2000



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E08.pdf]
Chapter 7: Socio-economic functions, p.123

Annex 20:

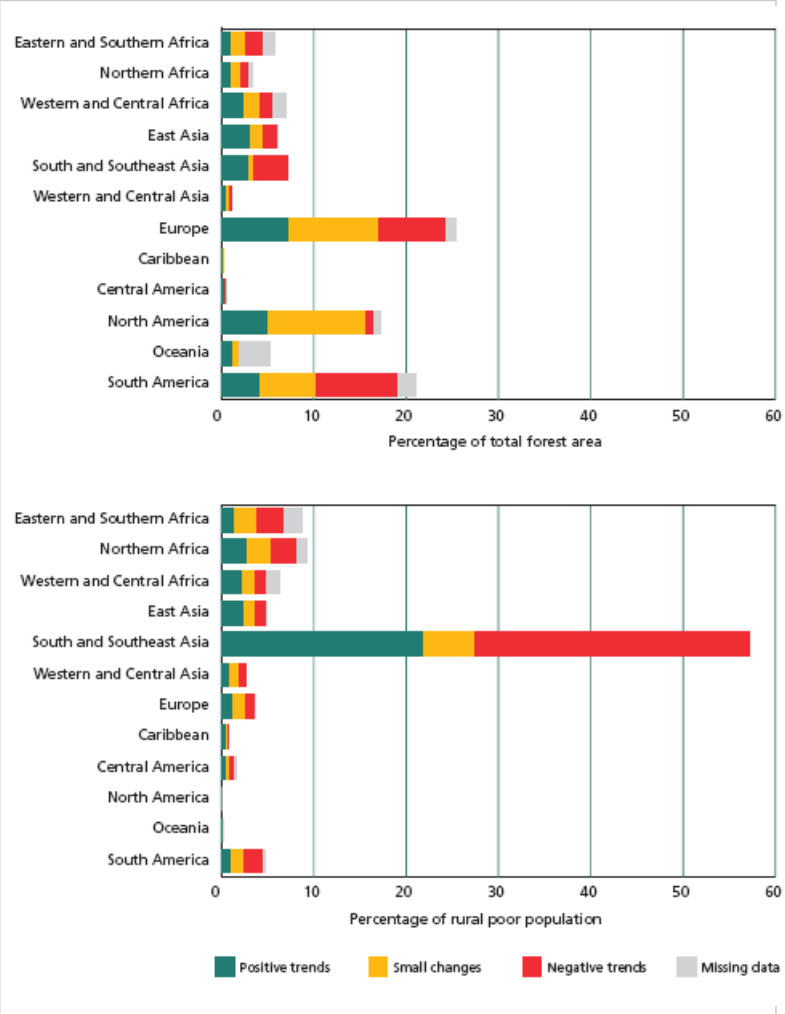
Figure 8.1: Designated functions of forests globally 2005 (%)



Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8: Progress towards sustainable forest management, p.129

Annex 21:

Figure 8.2 Distribution of subregional trends



[1]The number of observed trends for each subregion in Table 8.9 has been multiplied by forest area (top), and number of rural poor (bottom). The results have been scaled to show the proportion in percentages of observed changes in each case.

Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8: Progress towards sustainable forest management, p.129

Annex 22:

Forest cover by subregion 2005 and distribution

Region/subregion	Forest area (*1 000 ha*)	% of land area	% of global forest area
Eastern and Southern Africa	226 534	27.8	5.73
Northern Africa	131 048	8.6	3.32
Western and Central Africa	277 829	44.1	7.03
Total Africa	**635 412**	**21.4**	**16.08**
East Asia	244 862	21.3	6.20
South and Southeast Asia	283 127	33.4	7.16
Western and Central Asia	43 588	4.0	1.10
Total Asia	**571 577**	**18.5**	**14.46**
Total Europe	**1 001 394**	**44.3**	**25.34**
Caribbean	5 974	26.1	0.15
Central America	22 411	43.9	0.57
North America	677 464	32.7	17.14
Total North and Central America	**705 849**	**32.9**	**17.86**
Total Oceania	**206 254**	**24.3**	**5.22**
Total South America	**831 540**	**47.7**	**21.04**
WORLD	**3 952 025**	**30.3**	**100.00**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)			

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources. p.16

Annex 23:

Table 2.10: Trends in carbon stocks in forest biomass 1990–2005

Region/subregion	Carbon in living biomass (*Gt*)		
	1990	**2000**	**2005**
Eastern and Southern Africa	15.9	14.8	14.4
Northern Africa	3.8	3.5	3.4
Western and Central Africa	46.0	43.9	43.1
Total Africa	**65.8**	**62.2**	**60.8**
East Asia	7.2	8.4	9.1
South and Southeast Asia	32.3	25.5	21.8
Western and Central Asia	1.6	1.7	1.7
Total Asia	**41.1**	**35.6**	**32.6**
Total Europe	**42.0**	**43.1**	**43.9**
Caribbean	0.4	0.5	0.6
Central America	3.4	2.9	2.7
North America	37.2	38.5	39.2
Total North and Central America	**41.0**	**41.9**	**42.4**
Total Oceania	**11.6**	**11.4**	**11.4**
Total South America	**97.7**	**94.2**	**91.5**
WORLD	**299.2**	**288.6**	**282.7**
1 Giga tonne (Gt) = 1 000 000 000 tonnes (t)			

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources. p.36

Annex 24:

Table 2.8: Carbon stock per hectare 2005

Region/subregion	Carbon in living biomass	Carbon in dead wood	Carbon in litter	Carbon in soil	Total carbon
Eastern and Southern Africa	63.5	7.5	2.1		73.0
Northern Africa	26.0	3.3	2.1	33.5	64.9
Western and Central Africa	155.0	9.8	2.1	56.0	222.9
Total Africa	**95.8**	**7.6**	**2.1**	**55.3**	**160.8**
East Asia	37.0	5.0			41.9
South and Southeast Asia	77.0	9.0	2.7	68.4	157.1
Western and Central Asia	39.7	3.6	11.4	41.0	95.8
Total Asia	**57.0**	**6.9**	**2.9**	**66.1**	**132.9**
Total Europe	**43.9**	**14.0**	**6.1**	**112.9**	**176.9**
Caribbean	99.7	8.8	2.2	70.5	181.2
Central America	119.4	14.4	2.1	43.3	179.2
North America	57.8	8.8	15.4	35.8	117.8
Total North and Central America	**60.1**	**9.0**	**14.8**	**36.6**	**120.6**
Total Oceania	**55.0**	**7.4**	**9.5**	**101.2**	**173.1**
Total South America	**110.0**	**9.2**	**4.2**	**71.1**	**194.6**
WORLD	**71.5**	**9.7**	**6.3**	**73.5**	**161.1**

1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)
1 tonne/hectare (t/ha) = 100 tonnes/square kilometres (t/km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E03.pdf]
Chapter 2: Extent of forest resources. p.34

Annex 25:

Table 3.3: Area of forest designated primarily for conservation of biodiversity 2005

Region/subregion	Reporting countries			1 000 ha	%
	No. of countries	Forest area (*1 000 ha*)	% of total forest area		
Eastern and Southern Africa	16	211 181.24	93.22	20 158.45	9.5
Northern Africa	13	125 667.41	95.89	13 036.42	10.4
Western and Central Africa	15	118 280.32	42.57	41 389.96	35.0
Total Africa	**44**	**455 128.97**	**71.63**	**74 584.82**	**16.4**
East Asia	5	244 862.00	100.00	11 479.00	4.7
South and Southeast Asia	17	283 125.65	100.00	57 290.45	20.2
Western and Central Asia	23	43 617.06	99.98	2 784.10	6.4
Total Asia	**45**	**571 604.71**	**100.00**	**71 553.55**	**12.5**
Total Europe	**36**	**991 192.40**	**98.98**	**37 775.78**	**3.8**
Caribbean	9	3 489.14	58.40	704.02	20.2
Central America	7	22 411.00	100.00	8 482.00	37.8
North America	4	677 464.00	100.00	79 741.00	11.8
Total North and Central America	**20**	**703 364.14**	**99.65**	**88 927.02**	**12.6**
Total Oceania	**14**	**203 467.47**	**98.65**	**29 366.04**	**n.s.**
Total South America	**13**	**831 539.80**	**100.00**	**119 741.60**	**14.4**
WORLD	**172**	**3 756 297.48**	**95.05**	**421 948.82**	**11.2**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E04.pdf]
Chapter 3 Biological diversity. p.45

Annex 26:

Table 4.1: Average area of forest annually affected by fire 1998–2002

Region/subregion	Reporting countries			Area of forest affected by fire	
	No. of countries	Forest area (*1 000 ha*)	% of total forest area	1 000 ha	%
Eastern and Southern Africa	8	62 129	26.4	483	0.8
Northern Africa	5	21 076	15.5	6 176	29.3
Western and Central Africa	7	47 558	16.7	519	1.1
Total Africa	**20**	**130 763**	**19.9**	**7 177**	**5.5**
East Asia	5	225 663	100.0	523	0.2
South and Southeast Asia	12	272 087	91.5	11 029	4.1
Western and Central Asia	16	37 033	85.0	320	0.9
Total Asia	**33**	**534 783**	**94.4**	**11 872**	**2.2**
Total Europe	**37**	**997 658**	**100.0**	**1 597**	**0.2**
Caribbean	3	3 004	52.6	13	0.4
Central America	4	12 338	51.8	130	1.1
North America	3	677 968	100.0	4 333	0.6
Total North and Central America	**10**	**693 310**	**98.0**	**4 476**	**0.6**
Total Oceania	**2**	**8 244**	**4.0**	**0**	**n.s.**
Total South America	**10**	**896 529**	**95.1**	**2 719**	**0.3**
World	**112**	**3 261 287**	**80.0**	**27 843**	**0.9**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E05.pdf]
Chapter 4 Forest Health and Vitality. p.64

Annex 27:

Table 4.3: Average area of forest annually affected by insects 1998–2002

Region/subregion	Reporting countries			Area of forest affected by insects	
	No. of countries	Forest area (*1 000 ha*)	% of total forest area	1 000 ha	%
Eastern and Southern Africa	2	48	n.s.	0	0.0
Northern Africa	3	5 346	3.9	83	1.5
Western and Central Africa	0				
Total Africa	**5**	**5 394**	**0.8**	**83**	**1.5**
East Asia	4	218 842	97.0	9 329	4.3
South and Southeast Asia	7	179 498	60.4	1 010	0.6
Western and Central Asia	11	22 880	52.5	464	2.0
Total Asia	**22**	**421 220**	**74.3**	**10 803**	**2.6**
Total Europe	**28**	**930 556**	**93.2**	**6 354**	**0.7**
Caribbean	1	341	6.0	0	0.0
Central America	2	9 638	40.4	2	n.s.
North America	3	677 968	100.0	19 332	2.9
North and Central America	**6**	**687 947**	**97.2**	**19 334**	**2.8**
Total Oceania	**1**	**18**	**0.0**	**0**	**0.1**
Total South America	**4**	**621 932**	**66.0**	**561**	**0.1**
World	**66**	**2 667 067**	**65.4**	**37 134**	**1.4**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E05.pdf]
Chapter 4 Forest Health and Vitality. p.69

Annex 28:

Table 4.4: Average area of forest annually affected by diseases 1998–2002

Region/subregion	Reporting countries			Area of forest affected by diseases	
	No. of countries	Forest area (*1 000 ha*)	% of total forest area	1 000 ha	%
Eastern and Southern Africa	2	48	0.0	0	0.0
Northern Africa	2	2 203	1.6	130	5.9
Western and Central Africa	1	461	0.2	100	21.6
Total Africa	**5**	**2 712**	**0.4**	**229**	**8.5**
East Asia	2	201 877	89.5	883	0.4
South and Southeast Asia	8	183 398	61.7	8 471	4.6
Western and Central Asia	8	8 701	20.0	31	0.4
Total Asia	**18**	**393 976**	**69.5**	**9 386**	**2.4**
Total Europe	**24**	**936 300**	**93.8**	**3 135**	**0.3**
Caribbean	1	341	6.0	0	0.0
Central America	2	9 747	40.9	33	0.3
North America	2	367 834	54.3	17 382	4.7
North and Central America	**5**	**377 922**	**53.4**	**17 415**	**4.6**
Total Oceania	**1**	**18**	**0.0**	**0**	**0.0**
Total South America	**4**	**621 932**	**66.0**	**830**	**0.1**
World	**57**	**2 332 860**	**57.2**	**30 995**	**1.3**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E05.pdf]
Chapter 4 Forest Health and Vitality. p.69

Annex 29:

Table 4.7: Average area of forest annually affected by other disturbances 1998–2002

Region/subregion	Reporting countries			Area of forest affected by other disturbances	
	No. of countries	Forest area (*1 000 ha*)	% of total forest area	1 000 ha	%
Eastern and Southern Africa	3	8 079	3.4	4	n.s.
Northern Africa	2	5 287	3.9	3	n.s.
Western and Central Africa	0	-	-	-	-
Total Africa	**5**	**13 366**	**2.0**	**6**	**n.s.**
East Asia	2	201 877	89.5	847	0.4
South and Southeast Asia	4	107 885	36.3	3	n.s.
Western and Central Asia	3	3 121	7.2	4	0.1
Total Asia	**9**	**312 883**	**55.2**	**853**	**0.3**
Total Europe	**33**	**981 715**	**98.4**	**7 544**	**0.8**
Caribbean	1	341	6.0	0	0.0
Central America	0	-	-	-	-
North America	2	65 543	9.7	3	n.s.
North and Central America	**3**	**65 884**	**9.3**	**3**	**0.0**
Total Oceania	**3**	**8 270**	**4.0**	**11**	**0.1**
Total South America	**2**	**22 839**	**2.4**	**0**	**0.0**
World	**55**	**1 404 957**	**34.4**	**8 418**	**0.6**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E05.pdf]
Chapter 4 Forest Health and Vitality. p.69

Annex 30:

Table 5.10: Trends in commercial growing stock 1990–2005

Region/subregion	Commercial growing stock					
	million m^3			% of total growing stock		
1990	2000	2005	1990	2000	2005	
Eastern and Southern Africa	2 519	2 321	2 234	23	22	22
Northern Africa	754	762	767	27	29	30
Western and Central Africa	13 336	13 162	13 407	24	25	26
Total Africa	**16 609**	**16 245**	**16 408**	**24**	**25**	**25**
East Asia	14 013	15 976	17 065	88	87	86
South and Southeast Asia	12 705	9 717	8 160	39	36	34
Western and Central Asia	1 813	1 867	1 890	61	60	60
Total Asia	**28 531**	**27 561**	**27 115**	**55**	**56**	**58**
Total Europe	**66 063**	**60 648**	**61 245**	**65**	**58**	**57**
Caribbean	175	245	283	53	61	64
Central America	717	599	563	20	19	19
North America	64 816	66 376	66 968	89	89	89
Total North and Central America	**65 709**	**67 220**	**67 815**	**86**	**86**	**86**
Total Oceania	**3 849**	**3 777**	**3 751**	**51**	**51**	**51**
Total South America	**28 059**	**26 666**	**25 992**	**20**	**20**	**20**
World	**208 820**	**202 116**	**202 325**	**47**	**46**	**47**

Source: FAO Global Forest Resources Assessment 2005, Progress towards sustainable forest management, [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5: Productive functions of forest resources, p.88

Annex 31:

Table 5.13: Removals of four categories of Non-Wood Forest Products 2005 (tonnes)

Region	Food	Raw material for medicine and aromatic products	Exudates	Other plant products
Africa	88 823	20 400	12 757	11 175
Asia	3 562 991	90 181	1 495 663	606 782
Europe	272 418	6 530	2 216	231 765
North and Central America	6 443	2 867	38 733	149 231
Oceania	-	38	0	5 900
South America	348 259	1 490	17 315	291 966
World	**4 278 935**	**121 505**	**1 566 684**	**1 296 819**
NWFP = Non-Wood Forest Products				

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5 Productive functions of forest resources. p.93

Annex 32:

Table 5.1: Area of forest designated primarily for production 2005

Region/subregion	Reporting countries			1 000 ha	%
	No. of countries	Forest area (*1 000 ha*)	% of total forest area		
Eastern and Southern Africa	16	211 181	93.2	41 051	19
Northern Africa	13	125 667	95.9	44 185	35
Western and Central Africa	15	118 280	42.6	52 796	45
Total Africa	**44**	**455 129**	**71.6**	**138 032**	**30**
East Asia	5	244 862	100.0	125 488	51
South and Southeast Asia	17	283 126	100.0	120 098	42
Western and Central Asia	23	43 617	100.0	9 674	22
Total Asia	**45**	**571 605**	**100.0**	**255 260**	**45**
Total Europe	**36**	**991 192**	**99.0**	**724 308**	**73**
Caribbean	9	3 489	58.4	980	28
Central America	7	22 411	100.0	3 312	15
North America	4	677 464	100.0	40 499	6
Total North and Central America	**20**	**703 364**	**99.6**	**44 790**	**6**
Total Oceania	**14**	**203 467**	**98.6**	**22 449**	**11**
Total South America	**13**	**831 540**	**100.0**	**96 346**	**12**
World	**172**	**3 756 297**	**95.0**	**1 281 185**	**34**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5 Productive functions of forest resources. p.79

Annex 33:

Table 5.7: Forest area and growing stock 2005

Region/subregion	Forest area	Growing stock	
	1 000 ha	million m^3	m^3/ha
Eastern and Southern Africa	226 534	10 015	44
Northern Africa	131 048	2 523	19
Western and Central Africa	277 829	52 420	189
Total Africa	**635 412**	**64 957**	**102**
East Asia	244 862	19 743	81
South and Southeast Asia	283 127	24 202	85
Western and Central Asia	43 626	3 166	73
Total Asia	**571 615**	**47 111**	**82**
Total Europe	**1 001 394**	**107 264**	**107**
Caribbean	5 974	441	74
Central America	22 411	2 906	130
North America	677 464	75 235	111
Total North and Central America	**705 849**	**78 582**	**111**
Total Oceania	**206 254**	**7 361**	**36**
Total South America	**831 540**	**128 944**	**155**
World	**3 952 063**	**434 219**	**110**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)			

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5 Productive functions of forest resources. p.85

Annex 34:

Table 5.8: Commercial growing stock 2005

Region/subregion	% of total growing stock	million m^3
Eastern and Southern Africa	22	2 234
Northern Africa	30	767
Western and Central Africa	26	13 407
Total Africa	**25**	**16 408**
East Asia	86	17 065
South and Southeast Asia	34	8 160
Western and Central Asia	60	1 890
Total Asia	**58**	**27 115**
Total Europe	**57**	**61 245**
Caribbean	64	283
Central America	19	563
North America	89	66 968
Total North and Central America	**86**	**67 815**
Total Oceania	**51**	**3 751**
Total South America	**20**	**25 992**
World	**47**	**202 325**

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E06.pdf]
Chapter 5 Productive functions of forest resources. P.86

Annex 35:

Table 6.2: Area of forest designated primarily for protection 2005

Region/subregion	Reporting countries			1 000 ha	%
	No. of countries	Forest area (*1 000 ha*)	% of total forest area		
Eastern and Southern Africa	16	211 181	93.2	6 018	2.8
Northern Africa	13	125 667	95.9	12 567	10.0
Western and Central Africa	15	118 280	42.6	2 206	1.9
Total Africa	**44**	**455 129**	**71.6**	**20 791**	**4.6**
East Asia	5	244 862	100.0	66 992	27.4
South and Southeast Asia	17	283 126	100.0	59 097	20.9
Western and Central Asia	23	43 617	100.0	13 079	30.0
Total Asia	**45**	**571 605**	**100.0**	**139 168**	**24.3**
Total Europe	**36**	**991 192**	**99.0**	**90 488**	**9.1**
Caribbean	9	3 489	58.4	1 291	37.0
Central America	7	22 411	100.0	1 068	4.8
North America	4	677 464	100.0	986	0.1
Total North and Central America	**20**	**703 364**	**99.6**	**3 345**	**0.5**
Total Oceania	**14**	**203 467**	**98.6**	**502**	**0.2**
Total South America	**13**	**831 540**	**100.0**	**93 559**	**11.3**
World	**172**	**3 756 297**	**95.0**	**347 852**	**9.3**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E07.pdf]
Chapter 6 Protective functions of forest resources. p.101

Annex 36:

Table 6.3 Total area of forest designated for protection 2005

Region/subregion	Reporting countries			1 000 ha	%
	No. of countries	Forest area (*1 000 ha*)	% of total forest area		
Eastern and Southern Africa	2	77	0.0	30	39.0
Northern Africa	5	4 160	3.2	2 490	59.9
Western and Central Africa	5	48 595	17.5	1 516	3.1
Total Africa	**12**	**52 831**	**8.3**	**4 036**	**7.6**
East Asia	5	244 862	100.0	227 343	92.8
South and Southeast Asia	17	283 126	100.0	183 714	64.9
Western and Central Asia	13	14 214	32.6	13 624	95.8
Total Asia	**35**	**542 202**	**94.9**	**424 680**	**78.3**
Total Europe	**22**	**133 854**	**13.4**	**50 371**	**37.6**
Caribbean	3	524	8.8	200	38.2
Central America	1	4 294	19.2	3 133	73.0
North America	3	613 226	90.5	613 225	100.0
Total North and Central America	**7**	**618 044**	**87.6**	**616 558**	**99.8**
Total Oceania	**7**	**10 235**	**5.0**	**8 907**	**87.0**
Total South America	**2**	**485 761**	**58.4**	**85 204**	**17.5**
World	**85**	**1 842 928**	**46.6**	**1 189 756**	**64.6**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)					

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E07.pdf]
Chapter 6 Protective functions of forest resources. p.102

Annex 37:

Table 7.2: Value of wood removals 2005

Product/region	Value (*million US$*)		
	Industrial roundwood removals	Fuelwood removals	Industrial roundwood plus fuelwood removals
Africa	2 891	1 846	4 737
Asia	14 366	2 120	16 486
Europe	13 775	1 158	14 933
North and Central America	19 603	485	20 088
Oceania	1 839	0	1 839
South America	4 324	1 347	5 671
World	**56 798**	**6 955**	**63 753**
Source: based on Table T12 in national reports.			

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E08.pdf]
Chapter 7 Socio-economic functions. p.112

Annex 38:

Table 7.4: Value of Non-Wood Forest Products removals 2005

Region	Category of NWFP																Total
	Plant products and raw materials								Animal products and raw materials								
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	
Africa	6	72	0	0	1	0	42	0	20	0	16	1	0	0	5	0	162
Asia	818	54	30	8	87	0	316	279	0	1	19	0	0	0	119	2	1 731
Europe	381	1	71	11	26	344	1	139	7	23	128	757	0	0	55	0	1 943
North and Central America	34	0	2	1	0	0	15	18	0	0	0	0	0	0	0	1	72
Oceania	0	0	0	0	0	0	0	11	0	0	6	0	0	0	0	0	19
South America	96	0	1	1	61	0	2	32	0	0	0	4	0	0	0	0	197
World	**1 335**	**126**	**105**	**21**	**174**	**344**	**376**	**479**	**26**	**23**	**169**	**762**	**0**	**0**	**179**	**2**	**4 124**
Source: based on Table T14 in national reports. NWFP = Non-Wood Forest Products																	

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E08.pdf]
Chapter 7 Socio-economic functions. p.115

Annex 39:

Table 7.6: Number of people employed in forestry in 2000

Region	Numbers employed (*1 000*)			
	Primary production of goods	Provision of services	Unspecified	Total
Africa	465	305	100	870
Asia	4 426	3 007	875	8 308
Europe	409	66	470	944
North and Central America	385	50	135	570
Oceania	27	4	6	37
South America	216	20	9	245
World	**5 927**	**3 452**	**1 595**	**10 974**
Source: based on Table T15 in national reports.				

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E08.pdf]
Chapter 7 Socio-economic functions. p.118

Annex 40:

Table 7.8: Ownership of forest area 2000

Region/ subregion	No. of countries	Forest area (*1 000*)	% of total forest area	Private ownership		Public ownership		Other ownership	
				1 000 ha	%	1 000 ha	%	1 000 ha	%
Eastern and Southern Africa	14	203 816	86.7	7 057	3.5	193 751	95.1	3 008	1.5
Northern Africa	12	126 452	93.0	2 124	1.7	124 209	98.2	119	0.1
Western and Central Africa	12	222 058	78.0	771	0.4	221 288	99.7	0	0.0
Total Africa	**38**	**552 326**	**84.3**	**9 951**	**1.8**	**539 248**	**97.6**	**3 127**	**0.6**
East Asia	5	225 663	100.0	18 875	8.4	206 788	91.6	0	0.0
South and Southeast Asia	17	297 379	100.0	8 835	3.0	285 478	96.0	3 066	1.0
Western and Central Asia	22	43 385	99.6	619	1.4	42 617	98.2	148	0.3
Total Asia	**44**	**566 427**	**100.0**	**28 329**	**5.0**	**534 884**	**94.4**	**3 214**	**0.6**
Total Europe	**39**	**998 071**	**100.0**	**99 631**	**10.0**	**897 059**	**89.9**	**1 380**	**0.1**
Caribbean	9	3 669	64.3	536	14.6	3 061	83.4	72	2.0
Central America	5	16 645	69.8	9 343	56.1	7 073	42.5	230	1.4
North America	4	677 971	100.0	198 645	29.3	452 343	66.7	26 982	4.0
Total North and Central America	**18**	**698 285**	**98.7**	**208 525**	**29.9**	**462 477**	**66.2**	**27 284**	**3.9**
Total Oceania	**11**	**204 933**	**98.5**	**48 575**	**23.7**	**125 527**	**61.3**	**30 831**	**15.0**
Total South America	**7**	**136 240**	**16.0**	**23 528**	**17.3**	**103 379**	**75.9**	**9 333**	**6.9**
World	**157**	**3 156 281**	**79.1**	**418 538**	**13.3**	**2 662 573**	**84.4**	**75 170**	**2.4**
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)									

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E08.pdf]
Chapter 7 Socio-economic functions. p.122.

Annex 41:

Table 8.2: Trends towards sustainable forest management at the global level

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990 –2005 Annual change rate *(%)*	1990 –2005 Annual change	Unit
Extent of forest resources	Area of forest	High	-0.21	-8 351	1 000 ha
	Area of other wooded land	Medium	-0.35	-3 299	1 000 ha
	Growing stock of forests	High	-0.15	-570	million m^3
	Carbon stock *per hectare* in forest biomass	-	-0.02	-0.15	tonnes/ha
Biological diversity	Area of primary forest	High	-0.52	-5 848	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	High	1.87	6 391	1 000 ha
	Total forest area excluding area of productive forest plantations	High	-0.26	-9 397	1 000 ha
Forest health and vitality	Area of forest affected by fire	Medium	-0.49	-125	1 000 ha
	Area of forest affected by insects, disease and other disturbances	Medium	1.84	1 101	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	High	-0.35	-4 552	1 000 ha
	Area of productive forest plantations	High	2.38	2 165	1 000 ha
	Commercial growing stock	High	-0.19	-321	million m^3
	Total wood removals	High	-0.11	-3 199	1 000 m^3
	Total NWFP removals	Medium	-3.36	-702 313	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	High	1.06	3 375	1 000 ha
	Area of protective forest plantations	High	1.41	380	1 000 ha
Socio-economic functions	Value of total wood removals	Low	0.67	377	million US$
	Value of total NWFP removals	Medium	0.80	33	million US$
	Total employment	Medium	-0.97	-102	1 000 pers. yrs
	Area of forest under private ownership	Medium	0.76	2 737	1 000 ha
	Area of forest designated primarily for social services	High	8.63	6 646	1 000 ha
High (reporting countries represent 75–100% of total forest area)			Positive change (greater than 0.50%)		
Medium (reporting countries represent 50–75% of total forest area)			No major change (between -0.50 and 0.50%)		
Low (reporting countries represent 25–50% of total forest area)			Negative change (less than -0.50%)		

FRA = Forest Resources Assessment
NWFP = Non-Wood Forest Products
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.132

Annex 42:

Table 8.3 Trends towards sustainable forest management in Africa

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990–2005 Annual change rate *(%)*	1990–2005 Annual change	Unit
Extent of forest resources	Area of forest	High	-0.64	-4 263	1 000 ha
	Area of other wooded land	Medium	-0.52	-2 193	1 000 ha
	Growing stock of forests	High	-0.41	-275	million m^3
	Carbon stock *per hectare* in forest biomass	High	0.01	0.1	tonnes/ha
Biological diversity	Area of primary forest	Medium	-0.68	-270	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	Medium	0.27	182	1 000 ha
	Total forest area excluding area of productive forest plantations	Medium	-0.75	-3 361	1 000 ha
Forest health and vitality	Area of forest affected by fire	-	-	-	1 000 ha
	Area of forest affected by insects, disease and other disturbances	-	-	-	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	Medium	-0.64	-911	1 000 ha
	Area of productive forest plantations	Medium	0.41	42	1 000 ha
	Commercial growing stock	Medium	-0.39	-22	million m^3
	Total wood removals	High	1.89	10 767	1 000 m^3
	Total NWFP removals	-	-	-	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	Medium	-0.25	-52	1 000 ha
	Area of protective forest plantations	Medium	1.22	26	1 000 ha
Socio-economic functions	Value of total wood removals	-	-	-	million US$
	Value of total NWFP removals	-	-	-	million US$
	Total employment	Low	3.44	12	1 000 pers. yrs
	Area of forest under private ownership	High	-0.48	-49	1 000 ha
	Area of forest designated primarily for social services	Medium	-0.04	-0.2	1 000 ha

High (reporting countries represent 75–100% of total forest area)		Positive change (greater than 0.50%)
Medium (reporting countries represent 50–75% of total forest area)		No major change (between -0.50 and 0.50%)
Low (reporting countries represent 25–50% of total forest area)		Negative change (less than -0.50%)
		Insufficient data to determine trend

FRA = Forest Resources Assessment
NWFP = Non-Wood Forest Products
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.134

Annex 43:

Table 8.4: Trends towards sustainable forest management in Asia

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990–2005 Annual change rate (%)	1990–2005 Annual change	Unit
Extent of forest resources	Area of forest	High	-0.03	-194	1 000 ha
	Area of other wooded land	Medium	-0.36	-697	1 000 ha
	Growing stock of forests	High	-0.58	-286	million m^3
	Carbon stock *per hectare* in forest biomass	High	-0.15	-1	tonnes/ha
Biological diversity	Area of primary forest	High	-1.52	-1 510	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	High	1.31	848	1 000 ha
	Total forest area excluding area of productive forest plantations	High	-0.23	-1 224	1 000 ha
Forest health and vitality	Area of forest affected by fire	High	1.15	127	1 000 ha
	Area of forest affected by insects, disease and other disturbances	Medium	0.30	35	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	High	-0.30	-774	1 000 ha
	Area of productive forest plantations	High	2.90	1 033	1 000 ha
	Commercial growing stock	Medium	0.51	95	million m^3
	Total wood removals	High	-1.49	-6 116	1 000 m^3
	Total NWFP removals	Medium	-3.89	-695 574	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	High	1.94	2 325	1 000 ha
	Area of protective forest plantations	High	0.99	187	1 000 ha
Socio-economic functions	Value of total wood removals	High	-2.27	-452	million US$
	Value of total NWFP removals	Low	1.40	191	million US$
	Total employment	High	-1.15	-100	1 000 pers. yrs
	Area of forest under private ownership	High	0.66	179	1 000 ha
	Area of forest designated primarily for social services	High	1.18	39	1 000 ha

High (reporting countries represent 75–100% of total forest area)		Positive change (greater than 0.50%)
Medium (reporting countries represent 50–75% of total forest area)		No major change (between -0.50 and 0.50%)
Low (reporting countries represent 25–50% of total forest area)		Negative change (less than -0.50%)
		Insufficient data to determine trend

FRA = Forest Resources Assessment
NWFP = Non-Wood Forest Products
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.136

Annex 44:

Table 8.5: Trends towards sustainable forest management in Europe

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990–2005 Annual change rate (%)	1990–2005 Annual change	Unit
Extent of forest resources	Area of forest	High	0.08	805	1 000 ha
	Area of other wooded land	High	-0.28	-286	1 000 ha
	Growing stock of forests	High	0.33	340	million m^3
	Carbon stock per hectare in forest biomass	High	0.02	0.1	tonne/ha
Biological diversity	Area of primary forest	High	0.37	956	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	High	4.72	1 224	1 000 ha
	Total forest area excluding area of productive forest plantations	High	0.03	332	1 000 ha
Forest health and vitality	Area of forest affected by fire	High	4.27	54	1 000 ha
	Area of forest affected by insects, disease and other disturbances	High	6.27	729	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	High	-0.44	-3 277	1 000 ha
	Area of productive forest plantations	High	1.71	322	1 000 ha
	Commercial growing stock	High	-0.52	-322	million m^3
	Total wood removals	High	-0.67	-4 783	1 000 m^3
	Total NWFP removals	High	2.15	17 898	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	High	0.99	826	1 000 ha
	Area of protective forest plantations	High	1.86	97	1 000 ha
Socio-economic functions	Value of total wood removals	-			million US$
	Value of total NWFP removals	High	1.46	22	million US$
	Total employment	High	-2.61	-23	1 000 pers. yrs
	Area of forest under private ownership	High	1.36	1 257	1 000 ha
	Area of forest designated primarily for social services	High	-1.89	-496	1 000 ha
High (reporting countries represent 75–100% of total forest area)			Positive change (greater than 0.50%)		
Medium (reporting countries represent 50–75% of total forest area)			No major change (between -0.50 and 0.50%)		
Low (reporting countries represent 25–50% of total forest area)			Negative change (less than -0.50%)		
			Insufficient data to determine trend		

FRA = Forest Resources Assessment
NWFP = Non-Wood Forest Products
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.137

Annex 45:

Table 8.6: Trends towards sustainable forest management in North and Central America

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990–2005 Annual change rate *(%)*	1990–2005 Annual change	Unit
Extent of forest resources	Area of forest	High	-0.05	-329	1 000 ha
	Area of other wooded land	Medium	0.01	16	1 000 ha
	Growing stock of forests	High	0.23	159	million m^3
	Carbon stock *per hectare* in forest biomass	Low	0.05	0.3	tonnes/ha
Biological diversity	Area of primary forest	High	-0.17	-545	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	High	0.86	712	1 000 ha
	Total forest area excluding area of productive forest plantations	High	-0.12	-800	1 000 ha
Forest health and vitality	Area of forest affected by fire	High	-0.14	-6	1 000 ha
	Area of forest affected by insects, disease and other disturbances	High	0.88	307	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	High	-0.05	-21	1 000 ha
	Area of productive forest plantations	High	3.46	471	1 000 ha
	Commercial growing stock	High	0.27	160	million m^3
	Total wood removals	High	-0.14	-1 201	1 000 m^3
	Total NWFP removals	-	-	-	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	High	2.85	77	1 000 ha
	Area of protective forest plantations	High	13.14	67	1 000 ha
Socio-economic functions	Value of total wood removals	Medium	4.19	617	million US$
	Value of total NWFP removals	Medium	2.66	1.6	million US$
	Total employment	High	0.98	4.8	1 000 pers. yrs
	Area of forest under private ownership	High	0.06	129	1 000 ha
	Area of forest designated primarily for social services	High	0	0	1 000 ha

High (reporting countries represent 75–100% of total forest area)		Positive change (greater than 0.50%)
Medium (reporting countries represent 50–75% of total forest area)		No major change (between -0.50 and 0.50%)
Low (reporting countries represent 25–50% of total forest area)		Negative change (less than -0.50%)
		Insufficient data to determine trend

FRA = Forest Resources Assessment
NWFP = Non-Wood Forest Products
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.139

Annex 46:

Table 8.7: Trends towards sustainable forest management in Oceania

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990–2005 Annual change rate (%)	1990–2005 Annual change	Unit
Extent of forest resources	Area of forest	High	-0.20	-417	1 000 ha
	Area of other wooded land	-	-	-	1 000 ha
	Growing stock of forests	-	-	-	million m^3
	Carbon stock *per hectare* in forest biomass	-	-	-	tonnes/ha
Biological diversity	Area of primary forest	High	0.24	82	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	-	-	-	1 000 ha
	Total forest area excluding area of productive forest plantations	High	-0.23	-471	1 000 ha
Forest health and vitality	Area of forest affected by fire	-	-	-	1 000 ha
	Area of forest affected by insects, disease and other disturbances	-	-	-	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	-	-	-	1 000 ha
	Area of productive forest plantations	High	3.00	91	1 000 ha
	Commercial growing stock	-	-	-	million m^3
	Total wood removals	High	2.56	1 348	1 000 m^3
	Total NWFP removals	-	-	-	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	-	-	-	1 000 ha
	Area of protective forest plantations	High	28.34	1.4	1 000 ha
Socio-economic functions	Value of total wood removals	-	-	-	million US$
	Value of total NWFP removals	-	-	-	million US$
	Total employment	High	0.79	0.3	1 000 pers. yrs
	Area of forest under private ownership	-	-	-	1 000 ha
	Area of forest designated primarily for social services	-	-	-	1 000 ha

High (reporting countries represent 75–100% of total forest area)		Positive change (greater than 0.50%)
Medium (reporting countries represent 50–75% of total forest area)		No major change (between -0.50 and 0.50%)
Low (reporting countries represent 25–50% of total forest area)		Negative change (less than -0.50%)
		Insufficient data to determine trend

FRA = Forest Resources Assessment
NWFP = Non-Wood Forest Products
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.141

Annex 47:

Table 8.8: Trends towards sustainable forest management in South America

Thematic element	Trends in FRA 2005 variables or derivatives	Data availability	1990–2005 Annual change rate *(%)*	1990–2005 Annual change	Unit
Extent of forest resources	Area of forest	High	-0.46	-3 952	1 000 ha
	Area of other wooded land	Low	-0.13	-138	1 000 ha
	Growing stock of forests	Medium	-0.51	-503	million m^3
	Carbon stock *per hectare* in forest biomass	High	0	0	tonnes/ha
Biological diversity	Area of primary forest	High	-0.53	-3 297	1 000 ha
	Area of forest designated primarily for conservation of biological diversity	High	3.69	3 342	1 000 ha
	Total forest area excluding area of productive forest plantations	High	-0.49	-3 872	1 000 ha
Forest health and vitality	Area of forest affected by fire	High	1.00	1	1 000 ha
	Area of forest affected by insects, disease and other disturbances	Medium	4.13	46	1 000 ha
Productive functions of forest resources	Area of forest designated primarily for production	High	0.21	190	1 000 ha
	Area of productive forest plantations	High	2.16	207	1 000 ha
	Commercial growing stock	Medium	-0.97	-229	million m^3
	Total wood removals	High	-0.76	-3 214	1 000 m^3
	Total NWFP removals	Medium	-1.56	-13 940	tonnes
Protective functions of forest resources	Area of forest designated primarily for protection	High	0.21	195	1 000 ha
	Area of protective forest plantations	High	7.48	1	1 000 ha
Socio-economic functions	Value of total wood removals	High	-1.23	-760	million US$
	Value of total NWFP removals	Medium	-5.10	-15	million US$
	Total employment	-	-	-	1 000 pers. yrs
	Area of forest under private ownership	-	-	-	1 000 ha
	Area of forest designated primarily for social services	High	20.33	7 102	1 000 ha

High (reporting countries represent 75–100% of total forest area)		Positive change (greater than 0.50%)
Medium (reporting countries represent 50–75% of total forest area)		No major change (between -0.50 and 0.50%)
Low (reporting countries represent 25–50% of total forest area)		Negative change (less than -0.50%)
		Insufficient data to determine trend

FRA = Forest Resources Assessment
NWFP = Non-Wood Forest Products
1 hectare (ha) = 10 000 square meters (m^2) = 0.01 square kilometres (km^2)

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.134

Annex 48:

Table 8.9: Trends towards sustainable forest management by subregion

Themes and variables	Africa			Asia			Europe	North and Central America			Oceania	S. Amer.
	East & South	North	West & Central	East	South & South East	West & Central		Carib.	Central	North		
Extent of forest resources												
Area of forest	High	High	High	High	High	High	High	High	High	High	High	High
Area of other wooded land	Medium	Low	High	High	Medium	High	High	High	High	Medium	-	Low
Growing stock of forests	High	High	High	High	High	High	High	High	High	High	-	Medium
Carbon stock *per hectare* in forest biomass	High	High	High	High	High	High	High	High	High	Low	-	High
Biological diversity												
Area of primary forest	High	High	Low	High	High	High	High	Medium	High	High	High	High
Area of forest designated primarily for conservation of biological diversity	High	High	Low	High	High	High	High	Medium	High	High	-	High
Total forest area excluding area of productive forest plantations	High	High	Low	High	High	High	High	Medium	High	High	High	High
Forest health and vitality												
Area of forest affected by fire	-	-	-	High	High	High	High	Medium	-	High	-	High
Area of forest affected by insects, disease and other disturbances	-	-	-	High	Low	Medium	High	-	-	High	-	Medium
Productive functions of forest resources												
Area of forest designated primarily for production	High	High	Low	High	High	High	High	Medium	High	High	-	High
Area of productive forest plantations	High	High	Low	High	High	High	High	Medium	High	High	High	High
Commercial growing stock	High	Low	Low	High	Medium	High	High	Medium	Medium	High	-	Medium
Total wood removals	High	High	High	High	High	High	High	High	High	High	High	High
Total NWFP removals	-	Medium	-	High	Low	Medium	High	Low	-	-	-	Medium
Protective functions of forest resources												
Area of forest designated primarily for protection	High	High	Low	High	High	High	High	Medium	High	High	-	High
Area of protective forest plantations	High	High	Low	High	High	High	High	Medium	High	High	High	High
Socio-economic functions												
Value of total wood removals	-	Low	-	High	High	High	-	Low	High	Medium	-	High
Value of total NWFP removals	-	Medium	-	-	Low	Medium	High	Low	-	Medium	-	Medium
Total employment	Low	Medium	Low	High	Medium	High	High	High	Medium	High	High	-
Area of forest under private ownership	High	High	High	High	High	High	High	Medium	Medium	High	-	-
Area of forest designated primarily for social services	High	High	Low	High	High	High	High	Medium	High	High	-	High

High (reporting countries represent 75–100% of total forest area)		Positive change (greater than 0.50%)
Medium (reporting countries represent 50–75% of total forest area)		No major change (between -0.50 and 0.50%)
Low (reporting countries represent 25–50% of total forest area)		Negative change (less than -0.50%)
	-	Insufficient data to determine trend

NWFP = Non-Wood Forest Products

Source: WHO Global Forest Resources Assessment 2005,
Progress towards sustainable forest management [see ftp://ftp.fao.org/docrep/fao/008/A0400E/A0400E09.pdf]
Chapter 8 Progress towards sustainable forest management. p.144-145

Partner for this publication

The Levels 1 & 2 are summaries written by GreenFacts with financial support from the **Food and Agricultural Organization of the United Nations** (FAO) and from the **Swiss Agency for Development and Cooperation** (SDC).