Ministry of Agriculture and Forestry

The State of Forestry in Finland 2000

Criteria and Indicators for Sustainable Forest Management in Finland

Publications 5a/ 2000

The State of Forestry in Finland 2000

Criteria and Indicators
for Sustainable Forest Management in Finland

MINISTRY OF AGRICULTURE AND FORESTRY
Publications 5a/2000

The State of Forestry in Finland 2000. Criteria and Indicators for Sustainable Forest Management in Finland.
The final report of the Working Group Steering the Further Development of Criteria and Indicators for Sustainable Forest Management
Ministry of Agriculture and Forestry, Publications 5a/2000, August 2001

Publisher
Ministry of Agriculture and Forestry

Editors
Heli Mikkelä, Susanna Sampo and Jaana Kaipainen

Expert Group
The Working Group Steering the Further Development of Criteria and Indicators for Sustainable Forest Management (Annex 8)

Translation
Tomi Snellman

Cover image
Erkki Oksanen

ISSN 1238-2531
ISBN 952-453-024-4

Printed by PrintLink Oy Ab, Helsinki 2001

To the Ministry of Agriculture and Forestry

On September 24, 1998, the Ministry of Agriculture and Forestry appointed a working group charged with steering the further development of the national criteria and indicators for sustainable forest management and promoting their use. The chair appointed to the group was **Taina Veltheim,** Senior Adviser with the Ministry of Agriculture and Forestry (MAF). The appointed members of the group were: **Jouni Suoheimo,** Senior Adviser, MAF; **Leena Karjalainen**, Counsellor, Ministry of the Environment (ME); **Paula Nybergh,** Industrial Counsellor, Ministry of Trade and Industry (MTI); **Kirsi-Marja Korhonen,** District Manager, Finnish Forest and Park Service; **Jari Parviainen**, Research Centre Director, Finnish Forest Research Institute (Metla); **Hannu Niemelä**, Head of Quality Control Systems, Forestry Development Centre Tapio; **Jukka-Pekka Jäppinen**, Senior Scientist, Finnish Environment Institute; **Kari Heliövaara**, Professor, University of Helsinki; **Timo Nyrhinen**, Assistant Manager, Central Union of Agricultural Producers and Forest Owners (MTK); **Suvi Raivio**, Biodiversity Specialist, Finnish Forest Industries Federation; **Kalevi Väisänen**, Secretary, Wood and Allied Workers' Union; **Anju Asunta**, Forest Manager, World Wildlife Fund (WWF) Finland; and **Janne Lampolahti**, Environmental Consultant, Finnish Nature Conservation Union. On July 1, 1999, the Ministry of Agriculture and Forestry granted leave to chair Taina Veltheim, and to Paula Nybergh and Kalevi Väisänen. Jouni Suoheimo was appointed as new chair of the group, and Jari Parviainen as deputy chair. New members appointed to the group were **Marjukka Mähönen,** Senior Adviser, MAF (on leave of absence from June 15, 2000), **Esa Hyvärinen**, Senior Adviser, and his deputy, **Reima Sutinen**, Project Manager, both from the MTI, and **Lauri Ainasto**, Secretary with the Wood and Allied Workers' Union. The secretaries of the working group were **Anne Vehviläinen**, Senior Adviser (September 24, 1998 to December 31, 1999) and **Jaana Kaipainen**, Senior Adviser (January 1 to May 31, 2000), both from the MAF. Researcher Heli Mikkelä and Research Assistant Susanna Sampo, both from the Finnish Forest Research Institute (Metla), were responsible for compiling the data and editing the report. Jaana Kaipainen, from the MAF, provided expert assistance in the preparation of the report.

The work of the group led to a reinforced and more clearly focused national consensus on the content of sustainable forest management and the factors with which the achievement of sustainability can be measured and monitored in practice. The majority of the indicators are based on scientific research, although some are designed to also measure social values related to forests and silviculture. The working group hereby cordially submits the report for the use of the Ministry of Agriculture and Forestry.

Jouni Suoheimo

Lauri Ainasto

Anju Asunta

Kari Heliövaara

Jukka-Pekka Jäppinen

Leena Karjalainen-Balk

Kirsi-Marja Korhonen

Janne Lampolahti

Hannu Niemelä

Timo Nyrhinen

Jari Parviainen

Suvi Raivio

Reima Sutinen

Jaana Kaipainen

Foreword

At the second Ministerial Conference on the Protection of Forests in Europe, held in Helsinki in 1993, the European countries and the European Union agreed to promote the implementation, on both the national and the international level, of the forest principles adopted by the UN Conference on Environment and Sustainable Development in Rio de Janeiro (UNCED 1992). The criteria and descriptive and quantitative indicators for sustainable forest management were drafted in the follow-up process of the resolutions of the Helsinki Conference (the Helsinki process, Geneva 1994 and Antalya 1995). The pan-European criteria and indicators for sustainable forest management, as well as the practical principles for their implementation, were adopted by the third Ministerial Conference in Lisbon in 1998. All signatory states were committed to continue the implementation, revision and further development of the criteria and indicators.

In Finland, work for the preparation of national criteria and indicators was launched in 1994, and the first report on the national criteria and indicators was completed and published in 1997. In August 1998, the Ministry of Agriculture and Forestry appointed a new working group to undertake the further development of the criteria and indicators. The new group had broad representation of interest groups in forestry. The target for the working group was the adaptation of the criteria and indicators especially to the monitoring of the national forest programme and regional forest programmes. The overall goal was also to maintain the globally recognised status and know-how of Finland in the development of the assessment and monitoring of sustainable forest management.

The national criteria and indicators were produced in the same spirit of open participation and cooperation as the National Forest Programme 2010 and the regional forest programmes. In the past two years, the working group met a total of 15 times, and all invited interest groups participated actively in its work.

As a result a reinforced and more clearly focused national consensus on the content of sustainable forest management was outlined and the factors with which the sustainability can be measured and monitored in practice. The majority of the indicators are based on scientific research, although some are designed to also measure social values related to forests and silviculture.

This report can be used in the outlining of Finnish national forest policy, the monitoring and revision of forest programmes, in forest certification, and in reporting on progress in the sustainable utilisation and management of forests. It also provides reliable information on the state and trends of sustainable forest management in Finland for all people interested in forests, both in Finland and abroad.

I wish to extend my most heartfelt thanks to all parties and persons involved in the work for their valuable contribution, and congratulate them on a job well done.

Kalevi Hemilä
Minister of Agriculture and Forestry

Contents

Forests and Forestry in Finland: In Short

Finland has more forests in relation to its area than any other European country: three fourths, or 23 million hectares, of the land area is covered by forests (forest land and low productive forest land).

General Characteristics of Finnish Forests

Most of Finland belongs to the boreal coniferous forest zone, which is characterised by a short growth period and a relatively limited range of tree species. However, owing to the warming effect of the Gulf Stream, conditions for growth are better in Finland than on corresponding latitudes elsewhere in the world. Because Finland extends over 1,100 kilometres from south to north, conditions for growth vary considerably between the northern and southern parts of the country. The growth period of trees in northern Finland is about three months (June to August), and at most five months (May to September) in the south. The arctic timber line in the north is several kilometres wide. A special Protective Forest Act was enacted in 1922 to preserve the timber line, but since 1997 provisions of the Protective Forest Act have been incorporated in the Forest Act.

There are four coniferous species native to Finland, and over 20 species of deciduous trees. The most common species, which are also economically most significant, are Scots pine (*Pinus sylvestris*), Norway spruce (*Picea abies*), and silver and downy birch (*Betula pendula* and *Betula pubescens*). Other naturally occurring conifers are juniper and yew, and deciduous trees aspen, grey and black alder, rowan, goat willow, European white elm and Scotch elm, linden, European ash, oak, bird cherry, maple and wild apple tree. The common tree species in Central-Europe, beech, does not occur naturally in Finland.

In this report, the term "forest" refers to forest land and low productive forest land as per the Finnish definition. The terms are explained in more detail on page 20 and in Annex 1.

Main Principles of Forests Management

Finnish forestry is based on the management of native tree species. The management of forests seeks to respect their natural growth and mimic the natural cycle of boreal forests. The objective is to secure the production of high-quality timber, and to preserve the biological diversity of forests as well as the preconditions for the multiple use of forests. Forest legislation (Annex 3) as well as various training and advisory services aim at ensuring that the sustainable management of forests is also implemented on the practical level.

Approximately 5.4 million hectares of Finnish forests (forest land and low productive forest land), or nearly 25%, is the result of reforestation with direct seeding or planting as the second rotation on the same forest land. Other forests have either been naturally regenerated or have grown naturally. Even in seeded or planted forests, 20–30% of the seedlings is natural stocking. Introduced species have been planted experimentally no more than 20,000 hectares.

Thinnings constitute an integral part of the management of commercial forests. They are carried out 2 to 3 times during the rotation period of stands. The biological diversity of forest ecosystems is taken into consideration whenever thinnings are carried out. Thinnings can improve the economic yield of forests by up to more than 50%. Trees are harvested using the Nordic cut-to-length system (CTL): logs are debranched and cut to appropriate length according to their use on site. Branches and crowns are normally left in the forest, but in some areas small roundwood and crowns may also be used as fuel. The CTL system is well applied to conditions in Finland, because the land is fairly level, thinnings are quite common and the tree dimensions are small.

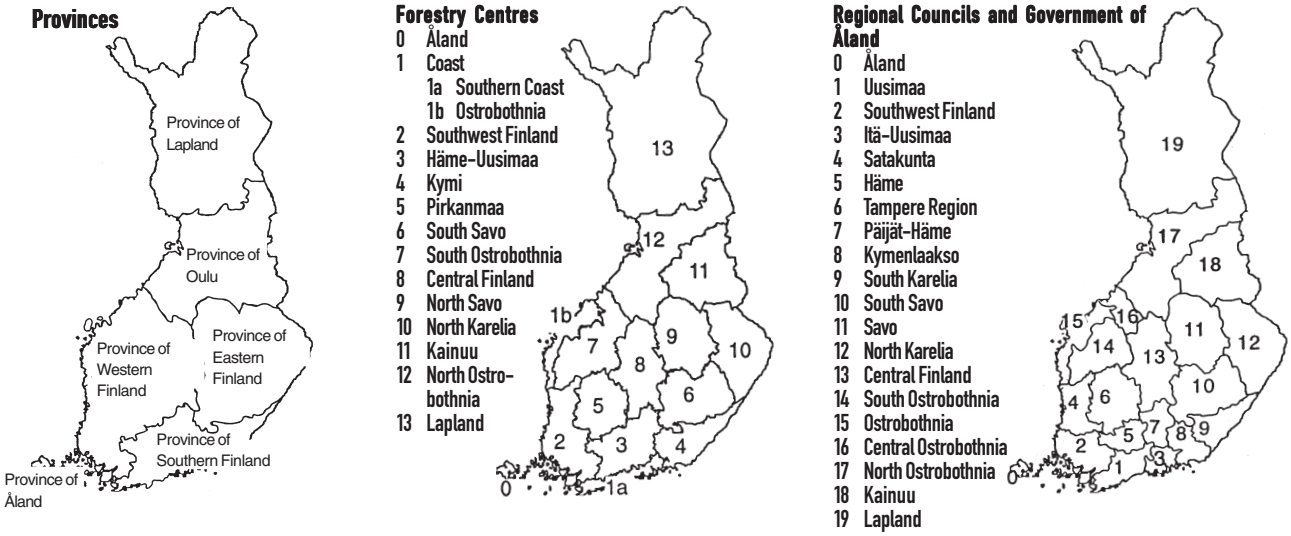


Figure 1. Provinces, Forestry Centres and Regional Councils in Finland.
Source: Finnish Statistical Yearbook of Forestry, Ministry of Internal Affairs

Family Forestry – The Basic Structure of Forest Ownership in Finland

As in the majority of Western European countries, non-industrial forest ownership dominates in Finland. Private persons – ordinary Finnish citizens – own about 62% of all forest land (Figure 2). The number of private forest holdings of at least one hectare is about 440,000. Some private forests are in joint ownership. The number of individual private forests owners in Finland is estimated at nearly 900,000, which means that one out of every five Finns is a forest owner. In Finland, **family forestry** refers to small-scale non-industrial forest management undertaken by families in their own forests.

Private forest holdings are relatively small: on the average, they cover 26 hectares of forest land (holdings of over one hectare). The importance of private forests for the private and national economy is considerable. In 1999, nearly 90% of domestic roundwood used by the forest industry came from private family forests. Annual stumpage earnings in 1999 were about EUR 1.35 billion.

The structure of forest ownership in changing due to the age structure of rural population, inheritance and the migration from rural areas. Middle-sized forest holdings (20–50 ha) have decreased in number, while the number of small and large holdings has increased. Furthermore, the number of forest owners is on the increase, as forest holdings are divided when estates are portioned

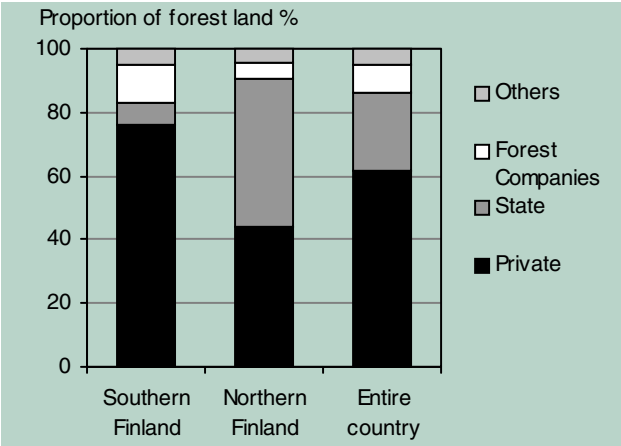


Figure 2. Structure of forest ownership in Finland, proportion of owner groups by forest land (total of 20 mill. ha) for southern Finland, northern Finland and the entire country.
Source: Finnish Statistical Yearbook of Forestry

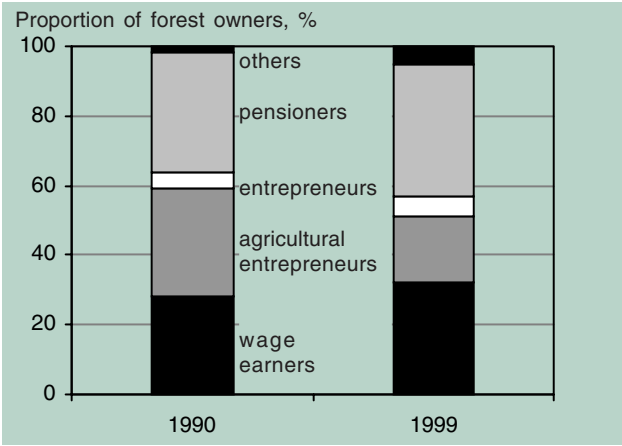


Figure 3. Private, non-industrial forest owners by socio-economic status, in 1990 and 1999.
Source: Finnish Forest Research Institute, Karppinen 2000

among heirs.

The proportion of farmer-forest owners to all private forest owners has decreased, with a corresponding growth in the number of forest owners whose principal source of income is other than agriculture (Figure 3). In the late 1990s, approximately 70% of forest owners lived in rural areas, about 10% in small towns (of less than 20,000 inhabitants), and 20% in larger cities. The proportion of women among forest owners, as well as of undivided estates, is on the increase.

Over the years, the objectives of forest owners regarding their forests and their utilisation have changed. For some, the forest is their primary source of employment and livelihood, others place an emphasis on the forest as a means of ensuring economic security, yet others use forests mainly for recreation. About one fourth of forest owners have several simultaneous, equally important objectives for their forests. For the moment, however, the economic behaviour of these groups has not differed very much from each other.

Everyman's Right

Access to and recreational use of forests is free for all in Finland. The *Everyman's Right* bestows on all people a free right to use land owned by others to travel on foot, skis, bicycle or horseback, provided that they do not cause any damage. The use of motor vehicles in forests, however, requires permission from the owner. Other activities freely permitted on other people's land are camping, provided that no damage is caused, as well as picking wild non-protected flowers, berries and mushrooms. However, the Everyman's Right also carries responsibilities: it may not be exercised in such a way as to cause any loss to the owner of the land or harm to nature. Making fire on other people's land always requires permission from the owner.

The Forest Cluster and the National Economy

The Proportion of the Forest Sector to the GNP and Exports

In 1999, forestry and the forest industry accounted for just under 8% of the gross national product (EUR 122 bill.; Figure 6.1, page 59). The proportion of the forest industry to the added value of all industry was around 20%.

In 1999, the total value of Finnish exports was EUR 39 billion, of which the products of the forest industry accounted for 29%, or EUR 11 billion. High-quality printing and writing paper accounted for over one half of the total export value of all forest industry products (Figure 4). Sawn timber and paperboard accounted for about 13% of the value of exports. In terms of money, the value of the exports of the forest industry has grown continuously, although the proportion of the forest industry to total exports has decreased. The proportion of the forest cluster (for definition, see Annex 1 and page 58) was 30–35% of the gross national export income.

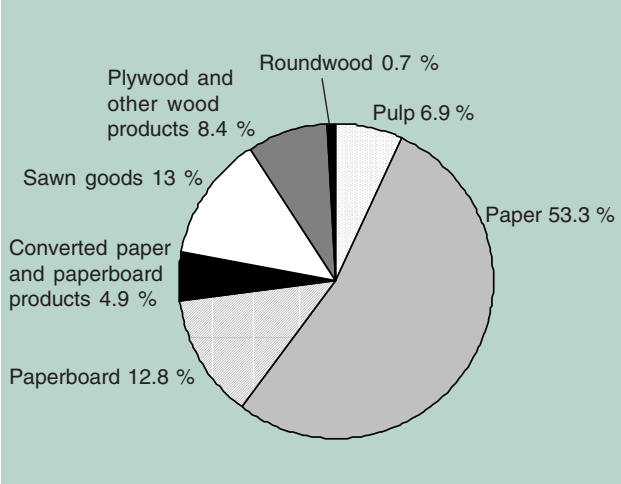


Figure 4. Exports of roundwood and forest industry products (total value EUR 11.2 bill.) by product group, in 1999.
Source: Board of Customs and Finnish Forest Research Institute

The most important market for the Finnish forest industry is the European Union. In 1999, exports to the EU accounted for 71% of total exports of the sector. The major export countries are Germany, Great-Britain, France and the Netherlands. The share of other European countries of forest industry exports was 9%, the rest of the world accounted for 20%.

Employment in Forestry

The number of people employed by forestry and the forest industries in 1999 was 95,000, which is slightly over 4% of the total workforce. Two thirds were employed by the forest industries. The total number of people employed by the forest cluster (forestry and forest related industry) is 140,000.

In the 1990s, the number of jobs in the forest sector decreased owing to the mechanisation of forestry and to the mergers of forest industry companies. The positive development of the national economy in 1999 was also reflected within the forest sector: unemployment in the sector fell from 15.2% in the previous year to 14.7%. Unemployment rate in the forest industry was 5.8%, and in the entire forest sector, 8.1%.

Income from timber sales and forestry supports jobs and livelihoods for the rural population, and often constitute an important source of income locally. The number of jobs in forestry has decreased. In the 1950s, up to 500,000 people worked part-time in forestry (timber

Table 1. Consumption of roundwood, 1999.

Use	*mill. m³*	
Industry, total	68.8	
Sawmilling		28.4
Wood-based panels industry		3.2
Other wood-products industry		0.3
Mechanical pulp industry		10.1
Chemical pulp industry		26.8
Fuelwood, household consumption	4.6	
Exports of roundwood and poles	1.0	
Consumption of roundwood, total	74.5	

Source: Finnish Forest Research Institute / Finnish Statistical Yearbook of Forestry

floating, forestry work, or work on private forest of one's own). At the moment, forestry provides permanent employment for approximately 20,000 persons, of whom about 3,000 are salaried forestry workers. The number of forestry machinery entrepreneurs and their employees is about the same.

Although the increase in the number of forest owners living on urban areas, caused by structural changes in forest ownership, decreases income flows in rural areas, it increases the demand for hired workers in forest management and creates opportunities for local inhabitants to get work in forest operations outside their own forests, and for forest entrepreneurship. The number of jobs can be increased by strengthening the mechanical processing of wood by medium and small sized industry, construction in timber, and the use of wood for energy, as well as by increasing the forest management operations in untreated forests and supporting small-scale forestry enterprise activities.

The Structure of the Utilisation of Wood

The volume of roundwood used in Finland in 1999 was 74.5 million cubic metres. The forest industry used a total of 68.8 million cubic metres of roundwood, of which 11.7 million cubic metres was imported (Table 1).

Forest Policy and National Forest Programmes

Forest Legislation in Finland

Since the first Forest Act of 1886, the basic principle of Finnish forest legislation has been the prevention of forest destruction. This objective still remains in legislation, although the aims of forest policy have changed and legislation has been many times reformed. The latest extensive reform of forest legislation made in the 1990s was put into motion by a Government decision-in-principle, made in 1994, on the sustainable management of forests, and by the National Environmental Programme for Forestry ratified the same year. The need for the reform stemmed from changes in the international and societal environment of forestry, pressures for reducing the costs of forestry operations, and the active public debate on the sustainability of forestry. Since the late 1980s, the maintenance of biodiversity, forest protection, the multiple use of forests, and the preservation of forest landscapes have also increased in importance as goals for the use of forests.

Finnish forest legislation and the status for forest organisations were extensively reformed in the 1990s. The Forest Act, the Nature Conservation Act, and the Act on the Financing of Sustainable Forestry were renewed in 1997. The Forest and Park Service Act entered into force in 1994, the Act on Forest Centres and the Forestry Development Centre Tapio in 1996, and the Forest Management Association Act in 1999. The reforms were carried out in harmony with the forest principles of the UN Conference on Environment and Development in Rio de Janeiro, and the general principles of the Helsinki Ministerial Conference on the Protection of Forests in Europe. The reform of Finnish forest and environmental legislation is also considered as being especially significant in terms of the implementation of international environmental agreements signed by Finland. Moreover, an amendment was made to the Finnish Constitution, whereby responsibility for the environment and the maintenance of biological diversity is a matter of common concern. The present Finnish forest and environmental legislation is presented in Annex 3.

Half a Century of Forest Programmes

Finland has a tradition of national forest programmes which dates back to the 1950s. Forest programmes are the key political instruments to promote forestry and involve the major stakeholders. The first proper forest programme (named HKLN after its designers, Heikurainen, Kuusela, Linnamies and Nyyssönen) was completed in 1961. This programme was followed by the so called Teho programmes (1962 and 1964), the

Mera programmes (1964, 1966 and 1969), the Forest 2000 Programme (1985) and its revised version (1992), and the Environmental Programme for Forestry (1994). The latest programme is the National Forest Programme 2010, completed in 1999.

One of the key results of the Mera programmes (1964-1969), which focused on wood production, was the doubling of investments in silviculture and improvement of wood production, which resulted in a marked increase in stock increment and thereby in opportunities for harvesting. The Forest 2000 Programme and its amendment shifted the main focus of forest policy from increasing the production of timber to enhancing the utilisation of forest resources and taking into account the multiple use of forests.

The Environmental Programme for Forestry

The reform of Finnish forest policy and forestry in the 1990s was largely governed by the **Environmental Programme for Forestry**. Ratified jointly by the Ministry of Agriculture and Forestry and the Ministry of the Environment in 1994, the programme outlines the strategy for sustainable forest management in Finland for the near future. The development of the programme was a joint effort by various organisations and bodies on the base of the forest principles adopted by the UNCED held in Rio de Janeiro and the general principles on the sustainable management of forests adopted by the Helsinki Ministerial Conference on the Protection of Forests in Europe. The Environmental Programme for Forestry describes the target status for forestry for the year 2005, as well as the measures and instruments to be used for the attainment of that target. The programme also addresses the conditions for the economic viability and international competitiveness of Finnish forestry.

National Forest Programme 2010

The aim of the National Forest Programme 2010 is to secure the sustainability of forest management in Finland. Its targets by the year 2010 are to:

- **Increase the forest industry's annual use of domestic roundwood by 5–10 million cubic metres**
- **Double the value of wood industry's exports to EUR 4.2 bill..**
- **Increase the annual use of wood for energy production by 5 million cubic metres.**
- **Further develop the ecological management of commercial forests.**
- **Improve the efficiency of research and extension activities.**
- **Establish an innovation forum to develop cooperation and interaction between parties involved in innovation in the forest sector**

The Ministry of Agriculture and Forestry appointed a broad-based working group of experts to monitor the implementation of the programme. In its reports, the group assessed that development was fairly rapid and estimated that possibilities for attaining the target by 2005 were good.

The National Forest Programme 2010 (NFP)

The purpose of the **National Forest Programme 2010** (NFP) adopted by the Government in 1999 is to outline trends in national and international forestry. The programme aims at developing the management, utilisation and protection of forests in a way which ensures that balance is maintained between the various functions and needs related to forests, including the opportunities for employment and livelihood provided by them, the vitality and biological diversity of forest ecosystems, as well as opportunities for spiritual renewal and physical recreation which only forests can offer.

The approach adopted in the NFP was more international and market-oriented than ever before. Factors affecting the preparation of the programme included changes in the globalisation of forestry issues, and international conventions. For instance, the significance of national forestry programmes was given an added emphasis in the work of the Intergovernmental Panel on Forests (IPF). According to the NFP, an economically profitable and competitive forest cluster is a necessary prerequisite for securing the biological diversity of forests and for taking social and cultural values into consideration.

The National Forest Programme was prepared in a broad-based participatory process, which placed a special emphasis on co-operation and transparency. The working groups charged with the preparation of the programme consulted a great number of experts. The national public forums were attended by nearly 3,000 citizens. An opportunity to participate in the preparation of the programme via the Internet was also made available. The NFP is based on Regional Forest Programmes (Regional Forestry Target Programmes), which the 13 Forest Centres in Finland are required, under the Forest Act, to produce for their jurisdictions. The regional programmes are used to govern regional developments, and they are prepared in an open process of co-operation with interest groups.

The National Forest Programme 2010 is a process that will be reoriented and revised. Citizens will also have an opportunity to participate in the process in the future, because in addition to the Forest Committee, its ad-hoc working groups and the Forest Innovation Forum, public forums will also take part in the programme's reorientation. Following the recommendations of the NFP, the issues addressed to date by the working groups

include summer harvesting, the protection needs for forests in southern Finland, and the environmental impacts of the proposals contained the NFP.

Public Participation in Forest Policy

In international agreements, the goal of social sustainability includes the requirement that interest groups and the public be given then opportunity to participate in decision making. The purpose of the requirement is to prevent conflicts by ensuring that the decision-making process is transparent and that interest groups have an opportunity to participate in the process right from the onset.

The preparation of large-scale forest projects in Finland generally takes place within working groups, in which the various interest groups are represented. Such interest groups include forest owners, the forest industry, forestry employee organisations, trade unions, hunters, the reindeer and tourist industries, environmental organisations, local people and public authorities.

In its planning activities for State forests, the Finnish Forest and Park Service has adopted the principle of public participation to ensure that citizens' views are heard in the process.

Forestry and Environmental Issues

The focusing on environmental issues in forestry in the 1990s is evident in the Environmental Programme for Forestry as well as in the reform of forest legislation. Environmental issues in forestry include the protection of forests and the maintenance of their biological diversity (Criterion 4), as well as the protective functions of forests in conjunction with forest management (Criterion 5).

Conservation Areas and Biological Diversity

In the last 25 years, the area of protected forests has increased owing to protection programmes and decisions. Protected areas established on State land by acts and decrees on the basis of protection programmes adopted by the Government include national parks, strict nature reserves, mire conservation areas, herb-rich forest areas, old natural forest areas, and other special conservation areas (Annex 1). The management of wilderness areas is governed by the Act on Wilderness Reserves. The new Nature Conservation Act also provides possibilities for temporary protection of forest sites. Under their own decisions, the Forest and Park Service and the Finnish Forest Research Institute have also established protected forest areas and recreational forests on State land under their management. Forests with harvesting restrictions in 1998 accounted for 10.6% of all forests (forest land and low productive forest land), and strictly protected forests for 7.6% of all forests (for definitions, see Table 4.3, page 50).

The Environmental Programme for Forestry and the management recommendations for private forests based on the programme, as well as the management recommendations for forests of the forest industry companies and State forests, also include instructions for the maintenance and promotion of biological diversity in commercial forests. The maintenance of forest biodiversity is one of the key principles of the Forest Act as well.

About one half of the 43,000 species in Finland live in forests. The status of endangered species is monitored regularly. According to the latest report, there are about 1,500 endangered species of flora or fauna in Finland, of which 38% live in forests (Criterion 4). The majority of Finnish forest species are able to survive in viable populations in commercial forests, but for some, natural habitats or special features of natural forests, such as decaying or burnt wood, are vital to their survival.

Forestry and Water Protection

Forestry has caused no large-scale environmental damages in Finland, but locally its effects may be significant. The main concern in Finland is directed to water management. Erosion or avalanches occur at present in Finnish conditions only in very special and rare cases. Water protection is governed by the new recommendations for forest management, the Forest Act, and the forest certification criteria.

The most important objectives for water protection in Finland were defined in the "Target Programme for Water Protection up until 2005" adopted by the Government in 1998. The needs for water protection are taken into account in the preparation of forest management plans both on the regional level and for individual forest holdings. In co-operation with various organisations, the forest and environmental authorities have prepared directives for water protection to be followed in practical management and harvesting.

Forest Research and Education in Finland

Forest Education

The academic and professional forest education in Finland was launched in 1862, when the first Forestry College was established in Evo. These days, forest education is provided at academic level in the universities of Helsinki and Joensuu, and at technical and vocational level in several institutes and colleges around the country. Training for private forest owners is provided by private forestry organisations, forest polytechnics and colleges, as well as different further training centres.

Forest Research

Forest research in Finland currently employs about 400 researchers with academic qualifications, over 200 of whom work at the Finnish Forest Research Institute (Metla). The Institute is in part financed by the State, and operates under the auspices of the Ministry of Agriculture and Forestry.

Forest related issues are researched also at the universities of Helsinki, Joensuu, Turku, Oulu, Kuopio and Jyväskylä, at the European Forest Institute (EFI), Oy Keskuslaboratorio Centrallaboratorium Ab (KCL), Metsäteho (a private research company owned by Finnish forest industry enterprises and the Forest and Park Service), the Finnish Environment Institute (Syke), the Technical Research Centre of Finland (VTT), the Finnish Game and Fisheries Research Institute (RKTL), and the TTS-Institute (Work Efficiency Institute). Forest industry companies also conduct their own research and development activities.

Basic research is conducted at universities and other institutes of academic education. Applied research is provided by various research organisations, which also carry out inventories of forests and forest resources, and provide information services. The research activities of forest companies focus on product development.

The Finnish Forest Research Institute (Metla) with its 9 research centres and stations, as well as the universities of Helsinki and Joensuu with their three field stations provide nation-wide coverage. In addition, the Finnish Forest Research Institute has 90,000 hectares of research forests with over 23,000 experimental plots covering a wide range of research topics.

Finland is an active participant in international research co-operation, especially with the neighbouring states, but also with other European countries. Since Finland's accession to the European Union, the share of pan-European research projects in Finnish associates has increased. Furthermore, the establishment of the European Forest Institute (EFI) in 1993 has increased international research cooperation on forests in Finland. EFI has at present over 130 member institutions covering the whole Europe.

Forest research is largely financed by the State. Part of State funding goes directly to research organisations, part is channelled to the research programmes of the Academy of Finland, or granted to individual researchers. Other bodies providing funding for research include various societies and funds, as well as commercial enterprises, the industry, and the European Union.

Finnish Forestry and the Forest Policy of the EU

The accession of Finland, Sweden and Austria to the European Union in 1995 doubled the forest resources of the Union. At the same time, it signified a change for Finnish forestry, as Finland became part of the internal common market for forest products. Finland's participation in the EMU will entail even closer ties with the general economic development in Europe.

Strictly speaking, forests do not fall within the jurisdiction of the European Union. Forest policy in the EU is developed on the basis of voluntary cooperation, and implemented within the policies of other sectors. However, EU legislation does contain several regulations which affect the forest sector either directly or indirectly and the EU's forest strategy sets goals for forestry and its development. The totality of regulations and other decisions and resolutions affecting the forest sector has been unofficially called the forest policy of the EU.

On the basis of articles pertaining to forests contained in the EU regulations on rural development (Agenda 2000), EU subsidies can be granted to projects for environmental protection and ecosystem management, for the afforestation of agricultural land, as well as for silvicultural operations, on the condition that the subsidy will promote positive development of the ecological, economic and social status of forestry in rural regions. Other examples of EU legislation which have a bearing on forests include regulations on the monitoring of the health of forests and the prevention of forest fires, as well as the directive on the marketing of forest reproductive material.

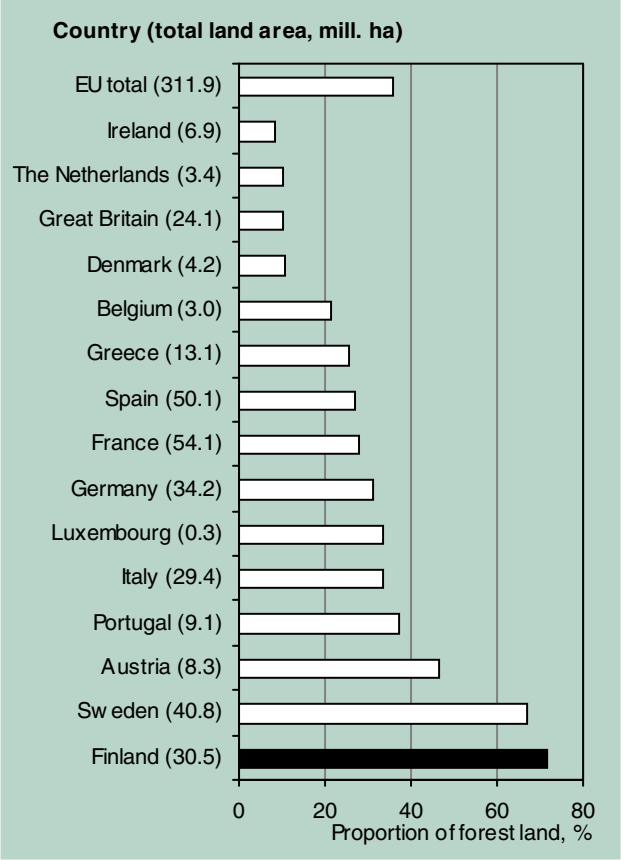


Figure 5. Proportion of forest land to land area in the EU countries.
Source: Finnish Statistical Yearbook of Forestry

Forest protection, and thereby also the maintenance of biodiversity, are regulated by the Natura 2000 directives. The Natura 2000 network of conservation areas is based on the directive of the European Council on the conservation of natural habitats and of wild fauna and flora (the Habitat Directive), and on the directive on the conservation of wild birds (the Bird Directive). The proposals of the national Natura 2000 Programme are processed by the European Commission, which also assesses whether the proposed areas are sufficient for ensuring the preservation of natural values.

A forest strategy for the Union was developed in autumn 1998. The strategy consists of two documents: a communication of the Commission issued in November 1998 and a resolution adopted in December 1998 by the European Council. The Commission's communication on the Forest Strategy of the EU is the response to the so called Thomas Report adopted by the European Parliament in January 1997. The Commission's communication describes the current status of forestry in the Union and forestry-related measures developed by the Union.

After the publication of the communication, the EU Council of Agricultural Ministers adopted a resolution in December 1998 on the Forest Strategy of the European Union. The resolution is not legally binding, but is more in the nature of a general document for development that can be used to promote or advance issues or themes considered important.

The EU Forest Strategy is based on the principle of subsidiarity: decisions must be made as close as possible to the people they affect. The Council resolution strongly proposes that current Community measures, such as regulations on protection of the forests against atmospheric pollution and forest fires, should be assessed and rendered more effective. The resolution also takes a position to the effect that forestry and commercial activities associated with forests must remain market-oriented, and that Community measures affecting forests must not distort competition. The resolution also proposes that cooperation within the Community in matters pertaining to forests should be improved.

Sustainability of Forestry, International Cooperation and International Agreements

Sustainable forest management means the stewardship and use of forests and forest land in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.
— Helsinki Ministerial Conference on the Protection of Forests in Europe, Resolution H1, Article D —

According to the World Commission for the Environment and Development (the Bruntland Commission, 1987), sustainable development means meeting the present needs of humankind without compromising the ability of future generations to meet their own needs. Sustainable development consists of ecological, economic, social and cultural sustainability. The interpretation of the concept of sustainable development is revised according to changes in the operating environment and the acquisition of new information.

The principles for sustainable development in the management, utilisation and protection of forests were first defined globally and on the level of the United Nations at the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992.

UN Conference on Environment and Development (UNCED) 1992

The following documents were adopted at the UN Conference on Environment and Development:

- The Rio Declaration on Environment and Development, which contains 27 principles.
- Agenda 21, an action programme on sustainable development, which defines the ways in which the principles of the Rio Declaration must be implemented.
- The Forest Principles regarding the utilisation, management and protection as well as sustainable development of forests. The principles form the basis for national and international forest cooperation.

Conventions on Climate Change and Biodiversity were also signed at the Rio Summit. It was also agreed to launch negotiations for an agreement on the prevention of desertification. All these agreements have relevancy to forest issues.

International Agreements on Forests

The objective of the UN Framework Convention on Climate Change (UNFCCC) is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The Convention places industrial and transition countries under the obligation to reduce their emissions of greenhouse gases and to preserve and increase carbon sinks and pools in their area. The Kyoto Summit in 1997 set binding targets and limits for the reduction of emission by the industrialised countries for the years 2008-12. The Kyoto Protocol will enter into force when the required number of signatory countries have ratified it. The European Union aims at accomplishing the ratification during 2002. Because several issues remain open in the Kyoto Protocol, further revisions are made to it. Issues discussed at the follow-up conferences of the Kyoto Summit include the possibility of individual countries implementing the reductions on their own or in cooperation with other countries, and, especially, implementing arrangements which support the reduction of emissions by developing countries. Issues on carbon sinks involving forests and forest management have become one of the leading topics of the follow-up negotiations.

The Convention on Biological Diversity (CBD) lays down the principles for the conservation of biological

diversity and the sustainable use of its components as well as genetic resources, and the just and equitable distribution of the profits therefrom. The signatory states are required to draw up their own national programmes in compliance with the principle of sectoral accountability. The fourth Conference of the Parties to the Convention on Biological Diversity held at Bratislava in 1998 laid down a forest work programme for 1998-2007. Issues to be addressed during the first stage of the programme include for example the criteria and indicators for forest biodiversity. An ad-hoc group of technical experts on forest biodiversity was appointed in May 2000 in Nairobi. The purpose of the group is to promote the implementation of the forest work programme. The sixth Conference of the Parties, to be held in 2002 in the Hague, will be dedicated first and foremost to forest issues. In Europe, the principles of the CBD are implemented on the basis of resolutions adopted by the Ministerial Conferences on the Protection of Forests in Europe held in Helsinki (1993) and in Lisbon (1998). The Lisbon Conference and the "Environment for Europe" Environmental Ministers' Conference held in 1998 at Aarhus, Denmark, adopted an action programme for the protection of biodiversity and landscapes and their increase in forest ecosystems 1997-2000.

On the basis of a decision made in Rio, negotiations for a Convention on the Prevention of Desertification were launched. The Convention was signed in 1994 and entered into force in 1996. The purpose of the Convention is to prevent desertification and to mitigate the impacts of drought through national and regional programmes. The Convention seeks to unite environmental and development perspectives, because desertification and drought involve not only ecological considerations, but also broad social and economic issues. The Convention covers all countries suffering from desertification. It also places industrial countries under the obligation to support the implementation of the Convention, and many industrial nations do in fact follow its guidelines in their development cooperation activities.

The Convention concerning Indigenous and Tribal Peoples in Independent Countries of the UN International Labour Organisation (ILO) seeks to combat measures by nation states to assimilate indigenous and tribal peoples, and to promote the preservation of their culture and language. The Convention is designed to complement other conventions on human rights. It requires that nation states undertake measures to ensure that, among other things, the cultures, languages and environments of indigenous people are protected. Under the Finnish Constitution (731/1999), the Sami, as an indigenous people in Finland, have the right to maintain and develop their own language and culture, which also includes their traditional natural economy industries or livelihoods (reindeer husbandry, fishing and hunting) (Criterion 3).

The International Tropical Timber Agreement (ITTA) was made in conjunction with the UN Conference on Trade and Development (UNCTAD). The agreement aims at supporting cooperation between the producers and consumers of timber in a way that serves to promote and diversify international trade in tropical timber, and to improve forest management in countries producing tropical timber. The first ITTA entered into force in 1985, and the following year the International Tropical Timber Organisation (ITTO) overseeing the implementation of the agreement started its operations. The current ITTA has been in force since 1997.

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (the Washington Convention, or CITES) seeks to protect endangered species by regulating and restricting their trade as well as other related import and export activities. The CITES Convention was signed in Washington in 1973, and it was adopted by Finland in 1976. The list of species covered by the Convention is reviewed every three years by the Parties to the Convention; the last time was in Nairobi in 2000.

Species are classified into categories according to their degree of endangerment: species for which trade is completely forbidden (around 900 species), and species for which trade requires a permit (about 30,000 species). In addition, since 1997, the EU countries have adopted new, increasingly stringent legislation on the trade of endangered species, the Council Regulation on the Protection of Species of Wild Fauna and Flora by regulating trade therein (EU Wildlife Trade Regulation), which also includes new appendices listing endangered species.

The Intergovernmental Panel (IPF) and Forum on Forests (IFF)

The UN Commission for Sustainable Development (CSD) was established in 1993 to oversee the implementation and monitoring of decisions made at the Earth Summit in Rio (UNCED 1992). The forest-related resolutions of UNCED were for the first time addressed on a political level after Rio at the third meeting of the CSD in 1995. The Commission appointed an Intergovernmental Panel on Forests (IPF) for 1995–97,

which was open for all countries. In 1997, the Panel submitted its final report to the CSD, after which the report was discussed at the UN General Assembly Special Session (UNGASS) by the heads of state. IPF's Final Report contains close to 150 proposals for the management, utilisation, protection and sustainable development of forests. Some of the proposals also address the criteria and indicators. In 1996, Finland hosted an Intergovernmental Seminar on Criteria and Indicators for Sustainable Forest Management (ISCI) which supported the work of the IPF.

In 1997, the UNGASS made a decision to establish an Intergovernmental Forum on Forests (IFF) to work under the CSD in 1997-2000. The task of the IFF was to support and monitor the implementation of the action proposals of the IPF, and to supplement issues which remained open in the work of the IPF, as well as other questions that required further clarification. The IFF was also charged with developing international cooperation on forests, and to find out whether there was a need to create a legally binding forest convention. The IFF held its fourth and last meeting in February 2000, where it decided to propose that international forest issues be raised onto a higher political level than previously. The proposals submitted by the IFF to the CSD and further to ECOSOC and the UN General Assembly were as follows:

- The establishment of a permanent UN Forum on Forests (UNFF). The new forum was envisioned as an intergovernmental body, meeting on the ministerial level as necessary, and would coordinate all global forest issues.
- The various UN organisations and other important international and regional organisations, institutions and other relevant actors would be invited to establish a Collaborative Partnership on Forests (CPF) to support the work of the UNFF.
- The new system was envisioned as a dynamic one, with the necessary flexibility to adjust to changing circumstances. The efficiency of the system is to be reviewed periodically. At the end of the first five-year period at the latest, it will be determined whether there is need to negotiate an international forest convention applying to the forests of all parties.

Pan-European Criteria for Sustainable Forest Management

1. Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles
2. Maintenance of Forest Ecosystem Health and Vitality
3. Maintenance and Encouragement of Productive Functions of Forests (wood and non-wood)
4. Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems
5. Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (notably soil and water)
6. Maintenance of Other Socio-economic and Cultural Functions and Conditions

Initiatives and Processes Associated with the Criteria and Indicators for Sustainable Forestry

There are currently nine initiatives and processes that involve the criteria and indicators for sustainable forestry. The first to be launched was the ITTO initiative on criteria and indicators in 1992. In 1994, the pan European criteria and indicators for sustainable forest management were adopted on the expert level (the Helsinki process). The Montreal process was launched in 1993. At the moment, it covers 12 non-European countries in the boreal and temperate zones.

In 1995, eight countries in the Amazon region initiated the Tarapoto process. In the 1990s, three processes involving the criteria and indicators were launched with the support of the FAO and UNEP: The African Dry Zone process covering the sub-Saharan area (28 countries), the near East process (30 countries), and the Dry Zone Asia initiative (9 countries). In addition to these, the criteria and indicators are being developed in Central America in the Lepaterique process launched in 1997, and in Africa under the direction of the African Timber Organisation (ATO). Furthermore, the Center for International Forestry Research (CIFOR) has been active in the development of the criteria and indicators.

In accordance with the recommendations of the IPF, the processes and initiatives currently focus on the promotion and enhancement of the criteria and indicators on the international level. By the beginning of 2000, over a hundred countries are participating in ongoing initiatives and processes.

The Pan-European Ministerial Conferences

Three Ministerial Conferences on the Protection of Forests in Europe were organised in the 1990s. The growing concern over environmental problems, especially the impact of atmospheric pollutants on European forests, made France and Finland convene the first Ministerial

Forest Certification

The objective of forest certification is to inform the consumers of wood products that forests are used and managed in a sustainable way. Certification is used to monitor whether the management of forests meet the agreed set of requirements. Auditing must be carried out by a third, independent party, which issues certification to forests that meet the conditions.

A label, or logo, may be attached to wood products if, in addition to certification, the chain of custody of the raw material used in the product can be ascertained. Furthermore, the logo on wood products is designed to promote the marketing of renewable raw materials, and to reassure consumers of the environmental sustainability of wood products.

There is a close connection between the criteria and indicators for sustainable forest management and forest certification. The primary differences rest in the degree to which the procedures are binding and the thresholds of the criteria and indicators.

The criteria and indicators are incorporated in the resolutions of intergovernmental processes, which the signatory countries are committed to respect. Certification, on the other hand, represents voluntary activity between market actors. In intergovernmental agreements, goals are laid down for the criteria and indicators, with which sustainability can be measured and controlled. The development of the criteria and indicators into practical tools and guidelines for the monitoring of sustainability takes place within national applications, which may also contain minimum requirements for their implementation as adjusted to local conditions. Certification represents a continuation of this work, and is one way to put into practice the basic requirements that were determined jointly.

In spring 2001, there were over 30 national, regional or global certification systems in use. They covered a total of over 70 million hectares of forest.

• FSC, Forest Stewardship Council

The FSC is an international, independent organisation founded in 1993 by environmental and human rights organisations, wood producers and timber trade organisations from 25 countries. The highest decision-making organ of the FSC is the General Assembly, which is divided into an Economic, an Environmental and a Social Chamber. The FSC's ten general principles of good forest stewardship also incorporate the principles for the sustainable ecological, social and economic management of forests. The general principles of the FSC are adapted into national applications within the FSC working groups. The FSC working group in Finland was founded in autumn 2000 and it is expected, that the standards can be finalised in autumn 2001. There were then about 18 million hectares of FSC certified forests in 30 countries. Most of the certified forests covered by the FSC certification system consist of forests owned by forest industry companies, associations or states. However, FSC certification and group certification of private forests are on the increase.

• PEFC, Pan European Forest Certification

The aim of Pan-European Forest Certification is to create an international framework for the national and regional forest certification systems of the European countries, and to promote their mutual recognition. The preparation of the PEFC was launched on the initiative of forest owners of a number of European countries in 1998. The PEFC system lays down the basic requirements for forest certification. The highest organ of the PEFC is a General Assembly, which consists of representatives of the member countries. The PEFC Board of Directors has representatives of forest owners, the forest industry, forest organisations, timber trade, consumers and environmental organisations. Although the development of the PEFC has placed an emphasis on non-industrial, private forest owners of small scale forestry through group certification, the system is also applied by states, associations and the industry. In autumn 2000, 15 European states, as well as several European forest and timber organisations, had joined the PEFC. The area of forests covered by PEFC certification is over 25 million hectares.

• FFCS, Finnish Forest Certification System

FFCS is a national forest certification system developed for Finnish forests in 1996-99. The Finnish system can be linked to other forest certification systems when necessary. The FFCS covers all necessary dimensions of forest certification: the standards for the forest management, chain of custody certification, and the accreditation and quality of external auditing. In 1997, a broad-based working group for the standards of forest certification defined 37 criteria for a regional groups of forests in the area of Forest Centres or Forest Management Associations, and 23 criteria to be applied for one single private forest. The FFCS is based on regional group certification, and it exploits the pan-European criteria and indicators. Forest certification in Finland was launched in spring 1999, and in the beginning of 2001, over 95% of Finnish forests was certified. In spring 2000, the FFCS was approved by the PEFC, and since then forests certified under the FFSC have been able to use the PEFC logo. Several PEFC logos have been issued in Finland in 2000–2001 to forest industry companies and forestry organisations.

Conference in Strasbourg in 1990.

In cooperation with Portugal, Poland and France, Finland organised the second Ministerial Conference in Helsinki in 1993. The 37 signatory countries and the European Union made the commitment to implement the resolutions taken in Rio on the national level, as well as in international cooperation, by adopting resolutions H1 and H2 of the Conference. These resolutions contain the general principles for the sustainable management of European forests and the protection of their biodiversity (Annex 6). The Helsinki Conference was also the first time that the concept of sustainable management of forests was given a definition (Resolution H1, Article D).

For the purpose of monitoring the implementation of the Helsinki resolutions, the criteria and indicators for sustainable forest management were adopted on the expert level in 1994 (page 15 and Annex 6). They were ratified by the third Ministerial Conference in Lisbon in 1998 (L2) as a basis for international reporting and the development of national indicators. Furthermore, a resolution on the promotion of the socio-economic and cultural functions of forests (L1), which is closely linked with the development of Criterion 6 (Annex 7), was adopted at the same time. The Lisbon Conference also adopted the resolution on the development of the criterion involving socio-economic issues (Criterion 6).

The criteria present a broad view of the various dimensions of sustainability. The achievement of these dimensions is measured with indicators. Because the growth conditions of forests, their history of development and the operational conditions of forestry differ widely between countries, no common target values for the indicators, or standards, have been possible to laid down internationally. However, the foundation and purpose of the criteria and indicators are the same everywhere, and consequently they can be applied for reporting on and comparing the development of forestry both between individual countries and throughout Europe.

The criteria and indicators of the Helsinki process and the resolution of the Lisbon Ministerial Conference on the principles of implementation have since then been used e.g. for the development of the Pan-European Forest Certification system (PEFC; for Forest Certification, see page 16).

Pan-European Monitoring of Forests

Since 1985, the European countries have participated in the Pan-European Programme for the Health of Forests (ICP-Forests). The programme is based on the Convention on Long-Range Trans-Boundary Air Pollution (CLRTAP). In the European Union, monitoring of the health of forests is based on regulations ratified in 1986 and 1994, and their subsequent amendments. The follow-up programme also aims at the achievement of the targets expressed in the resolutions of the Ministerial Conferences on the Protection of Forests in Europe (Resolutions S1, H1 and L2).

The Programme for Sustainable Development in the Baltic Region

In 1998, the Council of the Baltic Sea States adopted the Baltic 21 Action Programme for Sustainable Development in the Baltic Sea Region. The programme is based on the principles laid down in Agenda 21 adopted by UNCED in Rio de Janeiro. The Baltic 21 programme also includes a Forest Action Programme that aims at supporting sustainable management and protection of forests in the Baltic Sea Region, as well as at promoting the use of wood and wood products. The implementation of the forest programme also involves indicators for sustainable forest management.

The Northern Dimension

Natural resources, forestry and the protection of biodiversity are important elements of the Northern Dimension Action Plan adopted by the Feira European Council in 2000. Geographically, the Northern Dimension covers a region extending from Iceland to north-western Russia, and from northern Norway to the south of the Baltic Sea.

The part of the forest programme of the Northern Dimension Action Plan that involves Russia is under preparation by the Forest Sector Task Force, which is supervised by the Working Group on Economic Co-operation of the Barents Euro Arctic Council (BEAC). The purpose of the programme is to safeguard the future of forestry in the region by promoting sustainable management and utilisation of forests whilst taking into account the special conditions in the area.

Criteria and Indicators for Sustainable Forest Management in Finland

The Finnish criteria and indicators for sustainable forest management are based on the pan-European criteria and indicators (page 15). The preparation of the national criteria and indicators was initiated in Finland in the spring of 1994, and was carried out within two broad-based expert groups under the supervision of a Advisory Board, appointed by the Ministry of Agriculture and Forestry, with representation by the various interest groups. The goal was to produce criteria and indicators for sustainable forest management for use on the national, regional and local levels.

The criteria and indicators were tested in a pilot project launched in 1995 under the title of "Implementation of the Development Strategy for Sustainable Forestry" (called the Pirkanmaa project). The goal of the project was to establish principles for the development of the regional forest strategy, and to create indicators and monitoring procedures for the assessment of the sustainability of forestry on the regional level.

The pan-European criteria were adapted for national use with minor adjustments, and the list of indicators was reformulated and complemented to reflect conditions in Finland. A total of 160 indicators were developed. Compilation of data for the indicators for sustainable forestry began in 1996, and the first report containing detailed indicator-specific data was published in 1997 under the title "Criteria and Indicators for Sustainable Forest Management in Finland".

In 1998, the Ministry of Agriculture and Forestry appointed a working group to bring the national criteria and indicators up to date (Annex 8). This publication includes the revised list of indicators with updated information on their content. All the criteria and indicators are presented in a table on page 19.

Similar projects for the creation of national criteria and indicators have been carried out in several European countries, as examples of France, Germany and the Czech Republic. The international EU/Life project "Methods to Monitor Sustainable Forestry" is a joint project carried out by five countries with EU funding. The goal of the project is to present and compare the monitoring procedures of the countries. The definition of regional indicators is one of the aims of the Finnish sub-project.

The Criteria and Indicators for Sustainable Forest Management

The fulfilment of the criteria for sustainable forest management is monitored with respective indicators. The indicators can be descriptive or quantitative, and relevant data for them can be obtained, for example, from research, surveys, inventories, statistics, monitoring systems and reports. Each descriptive indicator describes a specific phenomenon and its status. Quantitative indicators, on the other hand, represent numerically measurable parameters. Often some aspect includes both a descriptive and a quantitative indicator. Target (performance) levels for the indicators – standards – have not been set.

In sustainable forest management

- *Descriptive indicators* are those
  - *Regulatory instruments (acts, statues, directives etc.) – Forest Act, Nature Conservation Act, Building Act, Act on Reindeer Husbandry, etc.*
  - *Institutional arrangements – law compliance, forest policy measures and forest programmes, international agreements and organisations, etc.*
  - *Economic instruments – funding and subsidies, forest taxation, etc.*
  - *Informational instruments – systems for information gathering, training and consulting, guidelines, inter-organisational cooperation, etc.*

  which aim at ensuring the fulfilment of the criteria. Descriptive indicators also include other instruments, measures, agreements, etc. which affect the conditions for the fulfilment of sustainability, but which cannot be evaluated or measured numerically.
- *Quantitative indicators* are numerically quantifiable parameters.

Finnish Criteria for Sustainable Forest Management (Pan-European Criteria for Sustainable Forest Management) and Indicators 2000

Criterion			Indicators (D=descriptive, Q=quantitative)
Criterion 1	D	1.1	Instruments to regulate the maintenance of forest resources
Maintenance and appropriate enhancement	D	1.2	Forest related rights
of forest resources and their contribution	D	1.3	Regulation of the forest resource management through land use
to global carbon cycles	Q	1.4	Forests and other wooded land and their proportion of total land area
• Forest resources , indicators 1.1–1.6	Q	1.5	Total volume of growing stock
• Carbon balance, indicators 1.7–1.9	Q	1.6	Age structure of forests
	D	1.7	Managing the carbon balance
	Q	1.8	Carbon balance
	Q	1.9	Use of wood-based energy
Criterion 2	D	2.1	Instruments to regulate the maintenance of forest ecosystem health and vitality
Maintenance of forest ecosystem	Q	2.2	Deposition of air pollutants
health and vitality	Q	2.3	Changes in the defoliation (UN/ECE and EU defoliation classification)
	Q	2.4	Damage caused by biotic or abiotic agents
Criterion 3	D	3.1	Instruments for safeguarding wood production
Maintenance and encouragement of productive	Q	3.2	Increment of growing stock
functions of forests (wood and non-wood)	Q	3.3	Total drain
• Wood products, indicators 3.1–3.8	Q	3.4	Coverage of forest training, guidance and consultative services
• Non-wood forest products, indicators 3.9–3.11	Q	3.5	Coverage of forest planning
	Q	3.6	Silviculture and forest improvement measures
	Q	3.7	Profitability of private forestry
	Q	3.8	Structure of round wood on the market
	D	3.9	Instruments to safeguard the management and use of non-wood forest products
	Q	3.10	Quantity and economic significance of non-wood forest products
	Q	3.11	Ecotourism
Criterion 4	D	4.1	Instruments to regulate the maintenance, conservation and appropriate enhancement of biodiversity in forest ecosystems
Maintenance, conservation and			
appropriate enhancement of	Q	4.2	Endangered and vulnerable species of flora and fauna
biological diversity in forest ecosystems	Q	4.3	Protected forests and forests with harvesting restrictions
	Q	4.4	Valuable forest habitats and their protection
	Q	4.5	Tree species composition
	Q	4.6	Pure and mixed forest stands
	Q	4.7	Decayed and wildlife trees in commercial forests and conservation areas
	Q	4.8	Gene reserve forests
Criterion 5	D	5.1	Instruments for the maintenance and appropriate enhancement of protective functions in forest management
Maintenance and appropriate enhancement			
of protective functions in forest	Q	5.2	Water protection in harvesting and site preparation
management (notably soil and water)	Q	5.3	Phosphor and nitrogen load on water systems caused by harvesting
	Q	5.4	Water protection plans in drainage projects
	Q	5.5	Area of forestry land in high-altitude protective forests
Criterion 6	D	6.1	Instruments for securing the operating conditions of the forest sector in the national and regional economy
Maintenance of other socio-economic			
and cultural functions and conditions	Q	6.2	The proportion of the forest sector of gross national product
• Forests in national and regional economy	Q	6.3	Domestic and foreign trade of the forest sector
and employment aspects of forestry,	Q	6.4	Labour and employment support in the forest sector
indicators 6.1–6.6	Q	6.5	Small- and medium-sized enterprises in the forest sector
• Public participation in decision making,	Q	6.6	Social factors of the forest workforce
indicators 6.7	D	6.7	Instruments for securing and maintaining equitable opportunities for the public to participate in decision making
• Cultural and multiple-use of forests			
(recreational values),	D	6.8	Instruments to maintain the multiple use and cultural values of forests
indicators 6.8–6.10	Q	6.9	Cultural values – archaeological monuments and landscape values
	Q	6.10	Recreational use of forests

CRITERION 1

Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles

Three fourths of the land area of Finland is covered by forests (forest land and low productive forest land). The area of forests and the total volume of growing stock increased in Finland throughout the 20th century. A considerable amount of carbon is sequestered in trees and soil, and this amount has increased along with the increased volume of growing stock. Changes made in forest and environmental legislation in the 1990s, and in regulatory control of forestry have contributed to the continued favourable development of Finnish forest resources.

FOREST RESOURCES

Factors affecting the maintenance of forest resources include changes in regulatory control of land use, the volume, structure and age distribution of growing stock, as well as the way in which forests are managed. The destruction of forests is a serious problem globally: the forest cover of the Earth decreases at an annual rate of 15 million hectares.

Indicator 1.1
Instruments to Regulate the Maintenance of Forest Resources

The Basic Principle of the Forest Act

The devastation of forests and their inappropriate management was prohibited already in the Forest Act of 1886. The main purpose of the newest Forest Act adopted in 1997 is to promote sustainable ecological, economic and social management of forests in such a way that the forests provide a sustainable satisfactory yield while their biological diversity is being maintained. In terms of wood production, the key principle of the Act is the obligation to secure the regeneration of forests: after regeneration cutting, the forest owner is required to ensure the establishment of a new generation of trees. Regeneration cuttings are only allowed when trees have reached a sufficient diameter or are sufficiently old, or if there are special reasons for regeneration. Thinnings are used to promote the growth of the remaining stock. The provisions of the Forest Act apply equally to all forest owners, including private owners as well as forest industry companies and the State. The preservation of protected areas and other special areas as forests is also covered in other legislation.

The regional Forest Centres monitor compliance to the Forest Act and promote adherence to its provisions by all forest owners. Prior to harvesting, forest owners are required to submit a Forest Use Declaration to the Forest Centre. The declaration must include information on the planned harvest, measures to be undertaken after regeneration cuttings, or the transfer of forest land to other uses. The number of declarations submitted annually is between 30,000 and 90,000. The Forest Centres inspect part of the stands *in situ*.

Forests and Forest Area

Definition of forest based on soil productivity

In Finland, forestry land is classified as either forest land, low productive forest land (scrub land) or other land area for forestry, based on soil productivity. The term other land area for forestry land encompasses waste land and other forestry land (forest roads, storage areas, etc.). The combined total area of forest and low productive forest land in Finland is about 23 million hectares.

Definition of forest based on crown density

The definition of forest used by the UN Food and Agriculture Organization (FAO) in international forest statistics is based on crown density. In FAO statistics, land area is classified as forest, land with a low forest cover (LFC), and other land. According to FAO's definition, there are over 22 million hectares of forests in Finland. The combined area of forests and land with LFC is about 23 million hectares.

In this report, the term "forest" refers to forest land and low productive forest land as per the Finnish definition.

Differences in the definitions are explained in detail in Annex 1.

In addition to the Forest Centres, the Forest Management Associations provide aid and support to forest owners in the planning and practical implementation of forest management. Courses in forest management are organised annually for forest owners, and individual and group advisory services are also provided (Indicator 3.4).

Regional and individual forest management plans outlining the future management and utilisation of the forests aim at fulfilling the requirement of sustainability. Forest management plans for private forest holdings are drawn up on the basis of the owner's objectives, and they cover the aims of the multiple-use of forests both regionally and for individual forest holding. Management plans for the forests owned by the forest industry companies aim also at fulfilling the sustainability requirement on a multipurpose base. Plans for State forests managed by the Finnish Forest and Park Service are drawn up as natural resources planning with public participation (Criterion 3).

Forest Programmes Aim at the Maintenance of Forest Land

The transfer of forest ecosystems to uses other than wood production is not prohibited under the Forest Act. However, the maintenance and enhancement of forest resources require that the area of forests in Finland does not decrease from the present state. The forest protection is one of the key objectives of regional forest programmes (regional forestry target programmes, page 34). Regional forest programmes provide the basis for the National Forest Programme 2010. For example, substantial increases in annual reconditioning of ditches in peatland suitable for silviculture are recommended to ensure that the area of commercial forests does not decrease, and to prevent decline in the tree growth on drained peatland areas (Criterion 3, Figure 3.6).

Financial Instruments and the Maintenance of Forest Resources

The management and maintenance of forest resources are supported by the State with subsidies and loans. Under the Act on the Financing of Sustainable Forestry, funding can be granted for activities which aim at securing the sustainability of timber production (Criterion 3), the management of forest ecosystems, and the protection of forest biodiversity (Criterion 4). The forest taxation system based on forest soil productivity has also supported the fulfilment of sustainability.

Forest Resources Data are Crucial

Knowledge of the development of forest resources and the effects of various silvicultural operations on them is essential for developing instruments promoting sustainability. In Finland forest resources and the area of forests have been monitored since the 1920s through the National Forest Inventories (Annex 4). The National Forest Inventories are developed continuously in response to changing informational needs, last, the 9th inventory will be completed in 2002. Promotion of the various dimensions of sustainability is also supported by several research projects under way in various research organisations.

Indicator 1.2
Forest Related Rights

The most important rights associated with forests are the ownership, hunting rights and the right of the forest owners to determine the use of their forests within the limits permitted by law. Forest owners have the right to make decisions on how they manage their forest, including whether to harvest or not.

When the forest owner's right to harvesting is transferred to another party in conjunction with timber sale contract, the other party is under the obligation to ensure that harvesting is carried out according to law. In the event of disputes, the legislation includes provisions on the procedure for settling them.

Indicator 1.3
Regulation of Forest Resource Management through Land Use

Changes in land use within commercial forests are not restricted in Finland. Forestry land may be transferred to other uses, and treeless areas may be afforested. The use of forestry land is subject to a variety of widely different and simultaneous aims, needs and wishes. Forests can be used for wood production, recreation, nature protection, tourism or landscape management. Other simultaneous aims include the use of forestry land for the construction of housing or roads, or as margin areas for settlement.

In practice, the coordination of the various aims of forest use on the regional and municipal level is car-

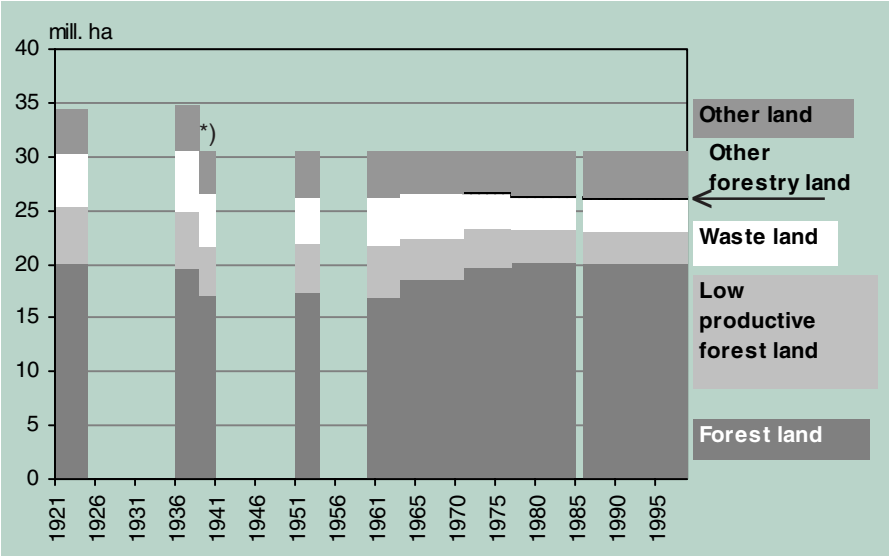


Figure 1.1 Land-use classes in 1921–98. Bar width indicates the time period of the inventory. Forest land (20.1 mill ha) and low productive forest land (scrub land; 2.9 mill ha) combined correspond roughly to forests according to the FAO definition. The figures include both commercial forests and protected areas. (Definitions, see Annex 1.)
* With the areas ceded after World War II, Finland lost 12.7 % of its land area. The results of the second National Forest Inventory have also been calculated for the area remaining after the war.
Source: Finnish Forest Research Institute / National Forest Inventory

ried out in land-use planning based on the Land Use and Building Act (general building and regional plans). Land-use plans determine the purpose and intensity of use for each area. The revised Land Use and Building Act which entered into force at the beginning of 2000 put increased emphasis on the possibilities of citizens to participate in planning. It also sets clear targets for land-use planning related to ecological sustainability, landscape and natural values, and the mitigation of environmental damage.

Afforestation of abandoned agricultural land and of areas no longer in peat production increase forest area and stock volume, thereby also enhancing the opportunities for wood production and harvesting. Since the 1970s, approximately 180,000 hectares of agricultural land have been afforested with State support. Cultural aspects are also taken into account in afforestation, and agricultural landscapes that represent valuable cultural heritage are not afforested. About 2,000 hectares of former peat utilisation area is afforested annually.

Indicator 1.4
Forests and Other Wooded Land and Their Proportion of Total Land Area

Approximately three fourths of the land area in Finland, or 23 million hectares, is forest (forest land and low productive forest land; Figure 1.1 and Annex 1). In addition, there are 3 million hectares of treeless or sparsely stocked waste land (open mires, rocky grounds, etc.), as well as 0.2 million hectares of other forestry land (e.g. roads, storage sites, etc.). In total, forestry land covers 86% of the land area of the country.

From the early 1950s onwards, the area of forests in Finland grew, primarily through the drainage of peatlands and the afforestation of agricultural land, but in the 1990s the area diminished somewhat, mostly due to the construction of communities. Previously low productive peatlands have been reclaimed for wood production through drainage. At present, new ditching is only carried out in special cases, but existing ditches must be cleared every 20 to 40 years to maintain tree growth. In the National Forest Programme 2010 it has been recommended that annual amount of reconditioning of ditches on the peatlands with profitable wood production capacity be increased considerably from the present (Indicator 3.6).

Indicator 1.5
Total Volume of Growing Stock

The total volume of growing stock in Finnish forests has increased since the 1960s. This is due to the creation of new productive forest land by drainage and by afforestation of agricultural land, to increase of forest

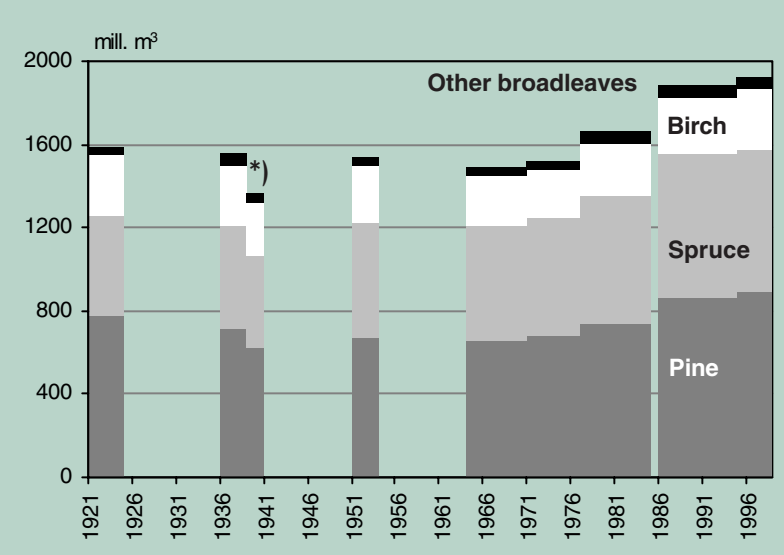


Figure 1.2 Growing stock volume 1921–98.
Bar width indicates the time period of the inventory. The figures include both commercial forests and protected areas.

* The cession of land after World War II reduced the stock volume by about 12.2%.

Source: Finnish Forest Research Institute / National Forest Inventory

growth, a decrease in the number of low-yield stands, changes in the age structure of forests, and to the fact that the increment exceeds harvesting drain (Figure 1.2). The increase in wood resources can also be seen in the strong change of the average stand volume (Figure 1.3).

In recent decades, several forest programmes have aimed at increasing forest resources (page 8). Main focus in the 1960's was in increase in the wood production, but in the 1980s and 1990s, non-wood values and uses of forests have emerged alongside with wood production as important guiding management principles.

Indicator 1.6
Age Structure of Forests

Age structure of Finnish forests is today more even than in the 1920s in both southern and northern Finland (Figure 1.5). Even in the early 20th century, the effects of slash-and-burn cultivation and selection logging, were still apparent in the age structure, which was also affected by the great proportion of unmanaged forests in Lapland. The current age structure is the result of consistent and purposeful forest management, as well as of

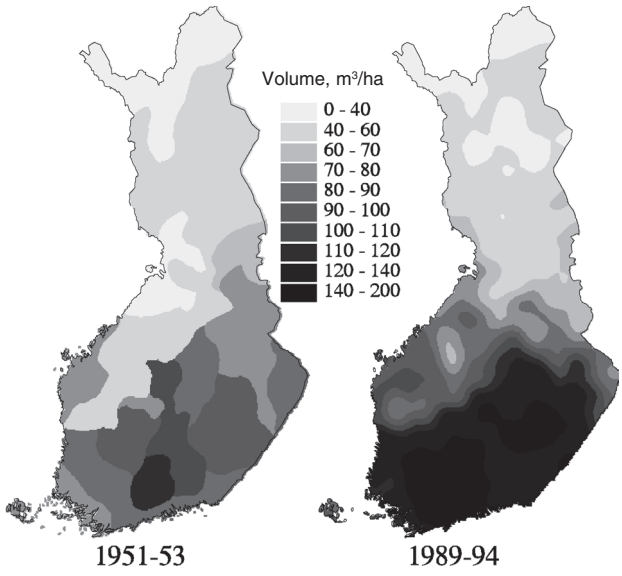


Figure 1.3. Average growing stock volume on forest and low productive forest land 1951–53 and 1989–94.

Source: Finnish Forest Research Institute / National Forest Inventory and Reinikainen et al. 2000

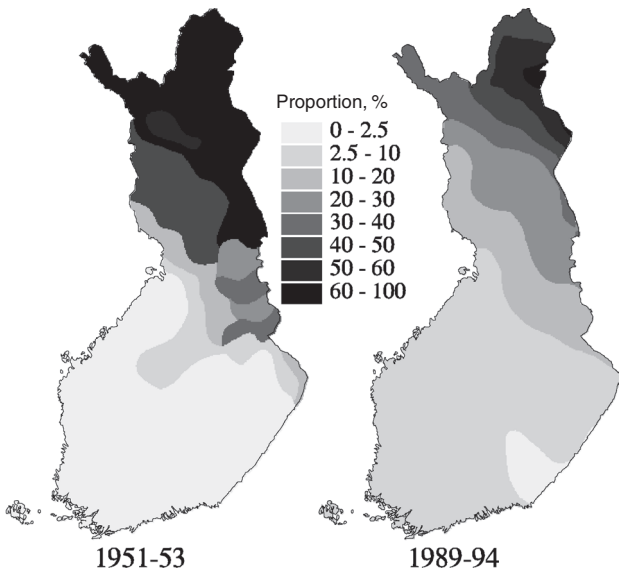


Figure 1.4. Proportion of forests older than 120 years on forest land 1951–53 and 1989–94.

Source: Finnish Forest Research Institute / National Forest Inventory and Reinikainen et al. 2000

changes in silviculture and harvesting in the last century. The increase in the proportion of young stands in southern Finland as compared to the beginning of last century is the result of the regeneration of old forests. Recently, however, the proportion of mature forests has grown, and their area is now greater than at the beginning of the 20th century (Figures 1.4 and 1.5). In northern Finland, harvesting was quite intense, especially after World War II to finance war reparations, causing a consequent decrease in the number of old forests.

Management plans for commercial forests seek to steer harvesting in a way that will result a balanced, even age structure.

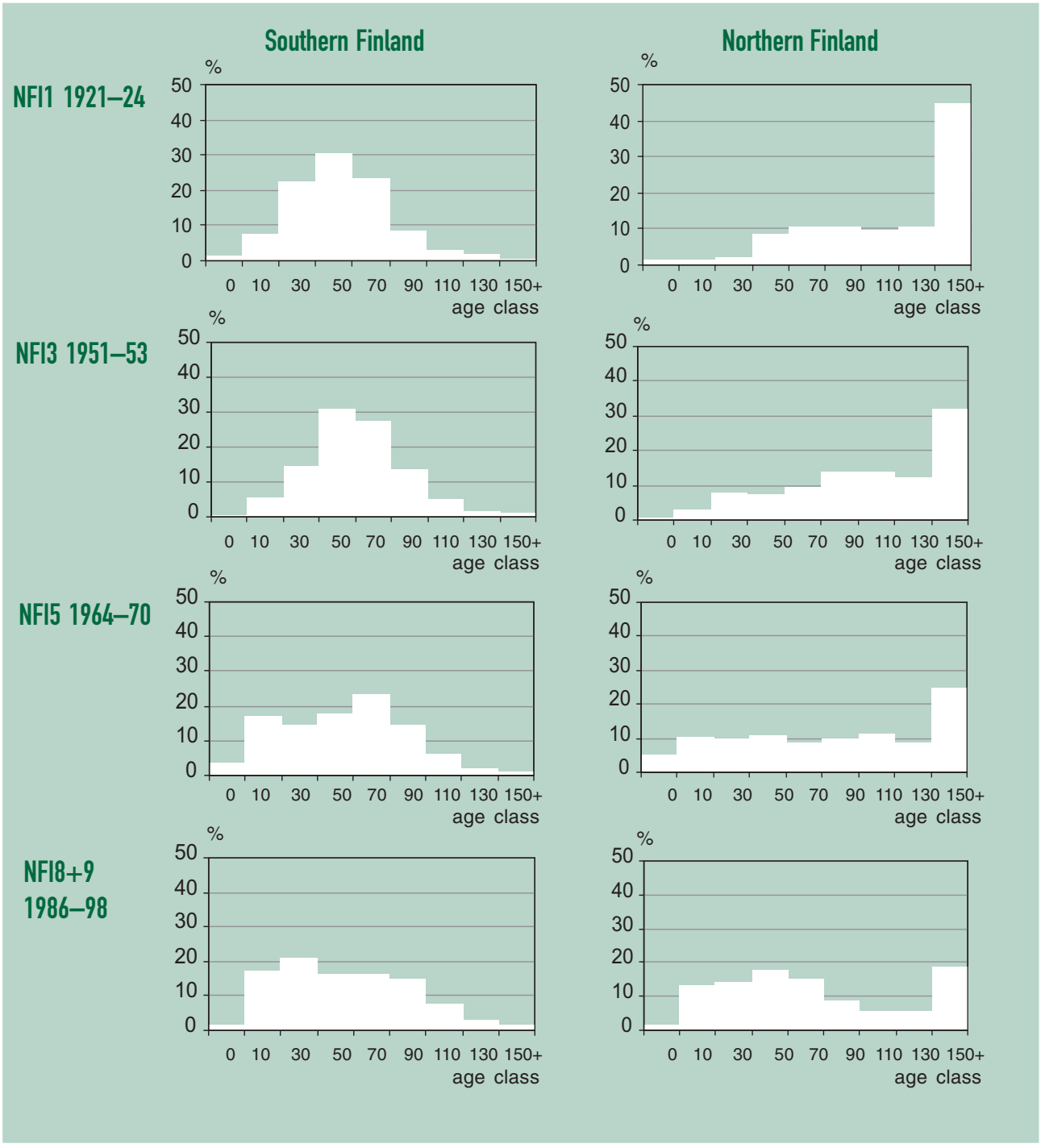


Figure 1.5. The age structure of forests in 1921–1998. The figures include both commercial forests and protected areas.
Source: Finnish Forest Research Institute / National Forest Inventory

Indicator 1.7
Managing the Carbon Balance

Terrestrial ecosystems sequestrate a considerable amount of the carbon, which is released into the atmosphere by industrial activity, energy production and traffic in the form of carbon dioxide and other greenhouse gases. The most significant anthropogenic greenhouse gas is carbon dioxide (CO_2), which is released by the burning of coal and oil, for example, and in conjunction with the clearing of forest land for agriculture. Other significant greenhouse gases are nitrous oxide (N_2O) and methane (CH_4), which are produced e.g. in landfills. In the 20th century, the amount of atmospheric CO_2 increased by 20%, and that of methane by 70%. Global climate warming is caused by the increase of greenhouse gases.

International Cooperation

At the UN Conference on Environment and Development (Rio de Janeiro 1992), a Climate Convention was signed which obligates industrialised and transition countries to reduce their greenhouse gas emissions, and to protect and increase the carbon pools and sinks in their area. Finland ratified the Convention in 1994.

Binding targets for emission reductions for the industrialised countries were agreed upon at the Kyoto Climate Conference (1997), and the obligations for reducing and limiting emissions were laid down for the period 2008–12. According to the internal burden sharing within European Union countries set forth in 1998, Finland is required to reduce its emissions to a level which existed in 1990.

The United Nations established the Intergovernmental Panel on Climate Change (IPCC) in 1988. Made up of experts in climate-related sciences, the purpose of the panel is to assist the UN in its decision making. The IPCC was charged with assessing the results of climate research and transmitting those results to decision makers. International agreements pertaining to climate change are presented on page 13.

Carbon Balance and the Forest Sector

The forest sector can slow down the carbon emission into the atmosphere by protecting and increasing the forested area and the volume of stock, by securing the capacity of the soil to sequester carbon, and by replacing non-renewable raw materials and sources of energy with renewable biomass.

The effect of forests on the carbon balance on the macro level – also globally – depends on a number of factors, including the destruction of forests, either naturally or as the result of human activity, the proportion of logging areas that is reforested, and the area of entirely new forest which is created either naturally or artificially. The afforestation of treeless areas, such as agricultural land and peatland, increases the carbon pool sequerested in forests. The carbon pool also increases when the annual increment of stock exceeds the drain. In such cases, the forest acts as a carbon sink.

However, possibilities to exploit the capacity of forests to sequerest carbon in order to regulate atmospheric carbon content are limited. In Finland forests account for less than two percent of the volume of stock in Europe. Similarly, the share of Finnish forests of the global volume of stock is only 0.5%.

Finland is seeking to increase the use of renewable sources of energy through a number of activities. These include the National Forest Programme 2010, a technology programme for the use of wood energy coordinated by the National Technology Agency (TEKES), and the development programme for renewable energy sources conducted by the Ministry of Trade and Industry (Indicator 1.9). The use of wood for energy is also promoted by economic instruments, for example by subsidising the harvesting of energy wood.

Table 1.1. Carbon sequestered in soil and the amount of carbon corresponding to stock increment and drain.

Carbon sequestered in the soil, mill. tons (est.)		Year	Carbon sequestered in trees	Change in carbon sequestered in trees, mill tons per year		
Mineral soil	Peatland		mill. tons (est.)	Carbon sink owing to increment	Carbon pool corresponding to drain	Net carbon sink
		1990	1774	26.2	19.7	6.5
		1995	–	26.7	22.7	4.0
1040	5500	1996	–	26.7	21.0	5.7
		1997	–	26.9	23.4	3.4
		1998	1982	27.3	24.7	2.6

Sources: Finnish Forest Research Institute / National Forest Inventory and Minkkinen 1999

Also efforts to increase the use of wood and other renewable materials in construction aims at improving the carbon balance. For that purpose several programmes and campaigns have been launched.

Information as the Base for Decision-Making

Research results are needed to support political decision-making, and also to serve as background material for the development of instruments and recommendations designed to improve the carbon balance. The Finnish Research Programme on Climate Change (SILMU) conducted in 1990–95 encompassed over 80 separate research projects. The programme also included the preparation of three scenarios for possible climate change for Finland that extended to the year 2100. There are at present several research projects which study the carbon balance and the relevant carbon budget in forest and forestry products. One of the most important of these is the Finnish Global Change Research Programme (FIGARE), conducted by the Academy of Finland.

Indicator 1.8
Carbon Balance

The greatest carbon pool in Finland is in the soil (Table 1.1). The amount of carbon sequerested in the soil is estimated to be about 7,000 million tonnes, of which one third is sequerested in peatland and two thirds in mineral land. Approximately 3.4 million tonnes of carbon is sequerested annually in peatlands, whereas practically no additional carbon is sequerested in mineral soils.

The forests in Finland are estimated to contain nearly 2,000 million tonnes of carbon. The annual increment of stock has exceeded the drain since the 1970s (Figure 1.3), which means that more carbon is sequerested in the forests than is released in harvesting.

Indicator 1.9
Use of Wood-Based Energy

The use of wood-based energy accounts for about 20% of the total energy consumption in Finland (Figures 1.6 and 1.7). The proportion is one of the highest in Europe. Most of the wood-based energy comes from industrial waste water and wood and is used by the industry itself. The National Forest Programme 2010 aims at increasing the use of wood, mostly solid wood such as chips and firewood, for energy by five million cubic metres by 2010, which represents an increase of one third from the level of 1999.

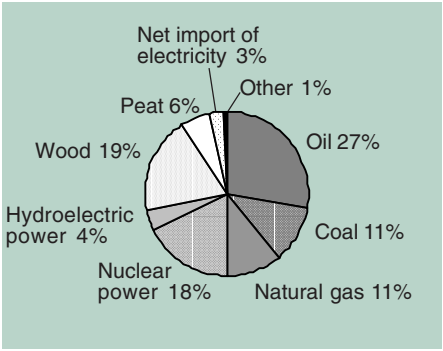


Figure 1.6. Distribution of total energy consumption (1.3 million TJ), 1998.
Source: Statistics Finland

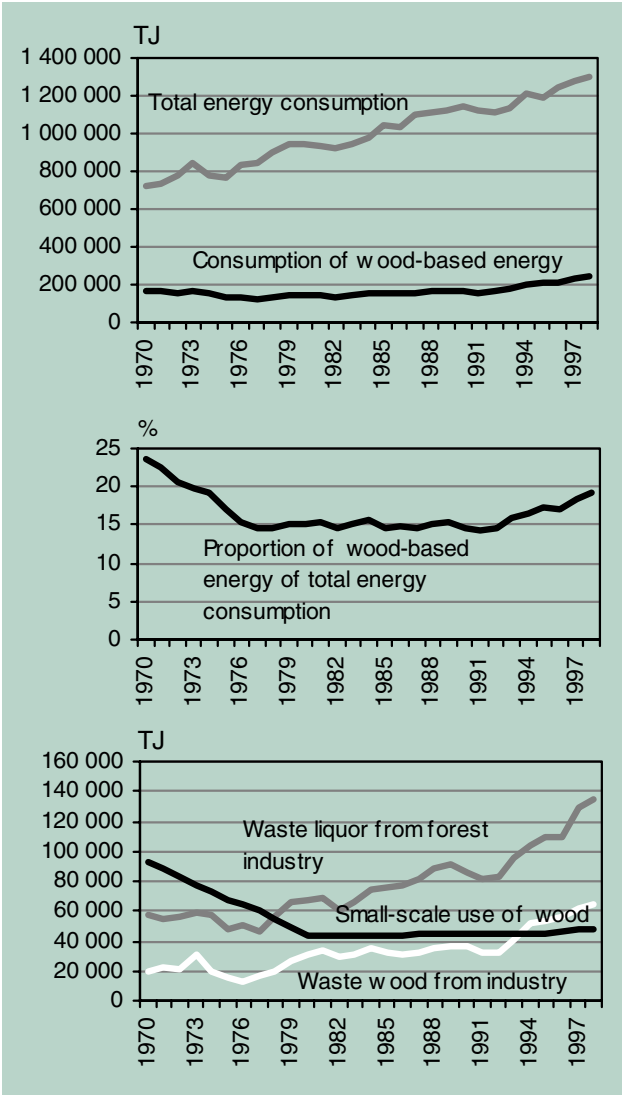


Figure 1.7. Total energy consumption in Finland in 1970–98 including the proportion and structure of wood-based energy.
Source: Statistics Finland

CRITERION 2

Maintenance of Forest Ecosystem Health and Vitality

The vitality of forests is affected by the impact of man, the laws of nature, and external factors, such as air pollution and other environmental changes.

The health of Finnish forests is satisfactory, and there seems to be no immediate danger in the near future of deterioration caused by air pollutants. The greatest economic losses in forests are caused by fungus diseases and climatic factors, such as storms. Periodic epidemics of insects have caused considerable damage regionally and locally.

The vitality of forests is maintained by regulating environmental loads from industry, traffic and energy production, and by managing forests in a way which ensures that their vitality is not jeopardised. Reduction of air pollution cannot be accomplished without international cooperation, since pollutants drift across national borders. The pollutant depositions in Finland originates for the most part abroad.

Indicator 2.1
Instruments to Regulate the Maintenance of Forest Ecosystem Health and Vitality

International Treaties

Air pollutants impair the vitality of forests globally by affecting trees and other organisms both directly and indirectly, e.g. through soil. Emissions are a global problem, because pollutants are carried far and wide across national boundaries. From the start, Finland has taken an active role in the negotiation of international treaties for limiting air pollution and emissions. The first Convention on Long-Range Trans-Boundary Air Pollution signed in 1979 in Geneva entered into force in 1983. The measures agreed upon have succeeded in limiting the emissions of sulphur, nitrogen oxides and volatile organic compounds (VOC).

At the United Nations Climate Change Conference (UNCCC) held in Kyoto in 1997, an agreement was reached on limiting greenhouse gas emissions (Indicator 1.7). Climate and air quality are also addressed by the UN Intergovernmental Panel on Climate Change (IPCC).

Acid Deposition and the Acidification of Forest Land

Reduction of national emissions of sulphur and nitrogen oxide has a relatively slight mitigating effect on acid deposition on the national level, since, for example, only 12% of sulphur and 20% of nitrogen deposition originate from Finland.

According to the report of the Finnish Acidification Committee (1998), Finland does not need to reduce its emissions of sulphur and nitrogen oxide from the current level to meet the requirements of international conventions. The Air Pollution Control Act and other environmental regulations that preceded the new Environmental Protection Act, which entered into force in 2000, promoted favourable development, and acid deposition from Finland has been reduced considerably. However, further reduction of acid emissions still remains necessary, as it may reduce regional or local deposition significantly.

There is as yet no information on the long-term cumulative impacts of acid emissions on soils, and the capacity of forest soils to neutralise acid is not completely known.

Instruments for Mitigating Forest Damage and Maintaining the Vitality of Forests

Finnish legislation contains three acts that address forest damage and its prevention. **The Forest Insect and Fungi Damage Prevention Act** limits the storage of coniferous timber in forests and in other permanent open air storage areas in the summer. The Act also requires that damaged coniferous trees be removed from the forest whenever their amount exceeds the determined minimum, and it provides for the possibility to control damage caused by insects and fungi in conjunction with fellings and the tending of seedling stands. Furthermore, the Act places forest owners under the obligation to comply with the orders and instructions issued by the authorities for the prevention of large-scale damage by insects or fungi. The State compensates forest owners for the cost of such measures. The Forest Centres are responsible for monitoring compliance with the Act with respect to damage prevention.

On the basis of **the Act on the Financing of Sustainable Forestry**, State subsidies can be granted for fertilisation of forests where nutritional imbalance threatens the healthy growth of trees. Subsidies may also be awarded for regeneration when stands established after the preceding regeneration have been extensively damaged for reasons beyond the control of the owner, or when damage due to natural causes such as storms or heavy snow load make artificial regeneration necessary. In order to prevent the spreading of root-rot fungus, forest owners are compensated for the entire cost of fungicides in areas deemed at risk for the spreading of the fungus.

The Act on Trade in Forest Reproductive Material aims to ensure successful regeneration and the creation of healthy and vigorous seedling stands. The Act contains provisions on the production, sale, import and export of seedlings. Seeds and seedlings must be suited to the site in terms of their species and provenance, and must be free of diseases and viable. Also the Forest Act aims at promoting the establishment of site adapted forests by emphasising the use of species native to Finland after regeneration fellings in plantings and direct seeding.

Relevant risk to the health of forests is pest organisms carried to Finland with imported unbarked softwood, sawn timber or packaging materials. The pest most feared in Finland is the pine wood nematode (*Bursaphelenchus xylophilus*). EU directives, also, seek to prevent the spread of the nematode within the Union.

Environmental Monitoring and Research as Information Source for Forest Health

The long-term changes of air quality is monitored by the Finnish Meteorological Institute, which has over 20 observing stations across the country. The stations are linked with both national and international networks. The Finnish Environment Institute also monitors the quality of precipitation on about 30 stations. Since 1995, the Finnish Forest Research Institute (Metla) has also been monitoring the quantity and quality of precipitation on 16 coniferous stands throughout Finland.

Since 1985, Finland has been participating in the International Cooperative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests), which is based on the Convention on Long-Range Transboundary Air Pollution (CLRTAP). In the EU Member States, the monitoring of forest health is based on regulations adopted in 1986 and 1994 and their amendments. The monitoring programme also aims at the achievement of targets put forth in the resolutions of the Ministerial Conferences on the Protection of Forests (Resolutions S1, H1 and L2; Annex 6 and Annex 7).

In Finland, the European Programme on the Monitoring of Air Pollution Effects on Forests is implemented by the Finnish Forest Research Institute (Metla). The health and vitality of forests are assessed annually on 460 permanent sample plots. The relationships between the condition of forests and atmospheric pollutants as well as other stress factors is monitored on 31 forest stands in various parts of the country.

Since 1987, Finland has also been a participant in the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems. Changes in forest ecosystems are monitored at four catchment areas. The programme is one of the most intensive international ecological cooperation projects ever undertaken in Finland. The international office for information and assessment is located at the Finnish Environment Institute.

The health of forests is also monitored in conjunction with the National Forest Inventories, which are carried out in the same areas every 5–8 years. On the sample plots, forest damage and its effects on the health of trees are assessed. With the aid of the various forestry organisations, the Finnish Forest Research Institute also compiles annually a report on the forest damage that has occurred.

Predictions of pest damage with respect to certain noxious insects that can cause extensive economic losses belong also to the monitoring the vitality of forests, as well as variations in vole populations. The predictions are used to devise pre-emptive measures to avoid extensive damage to forests. The Finnish Forest Research In-

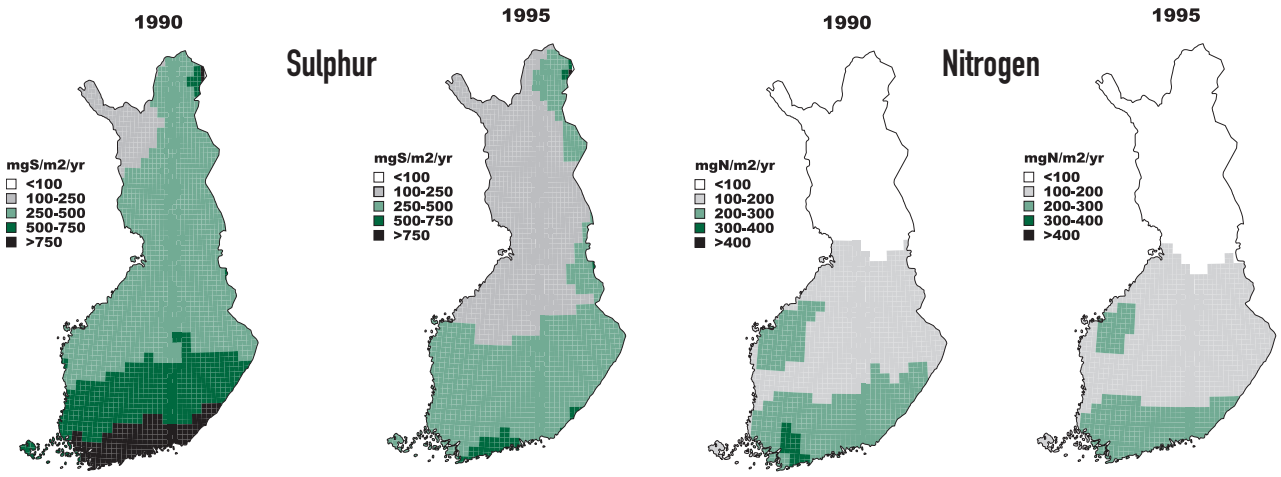


Figure 2.1. Total deposition of sulphur and nitrogen (nitrate and ammonium compounds) in 1990 and 1995.
Source: Finnish Environment Institute

stitute (Metla) also inspects all pesticides to be used in silviculture. The Institute provides expert services on forest damages by studying samples, field surveys, providing consultation services involving pest control, and by distributing pest-related information in publications, bulletins and on the Internet.

The Finnish Acidification Programme HAPRO (1985–89) created the base for the continuous monitoring of the condition of forests. In 1990–95, the Finnish Research Programme on Climate Change (SILMU) was carried out under the auspices of the Academy of Finland. According to the results of the Health Condition of Forests (1992–96) research programme coordinated by the Finnish Forest Research Institute, the health of Finnish forests is satisfactory and there is no foreseeable immediate danger of deterioration, at least not due to pollutants of domestic origin. To date, the harmful effects of air pollution on forests have been slight, except for some local forest damage in the vicinity of industrial plants.

In addition to national research programmes, several local and regional research projects have also been carried out. For example, the Lapland Forest Damage Project (1990–95) investigated the effects of emissions from the smelting plants in the Kola Peninsula in Russia on the vitality of forests in Lapland.

Indicator 2.2
Deposition of Air Pollutants

Acid emissions – notably of nitrogen and sulphur – have decreased in the past 20 years owing to anti-air pollution measures. Sulphur emissions in Finland had dropped by more than 80% in 1995 from 1980; the corresponding figure for nitrogen was 10% (Figure 2.1). The reduction of nitrogen emissions was achieved by structural changes in industrial production, reduction of emissions from energy production, cuts in the use of industrial fuel oil, the shift towards the use of nuclear power, and improved production methods in the pulp and paper, metal and chemical industries. The reduction targets for sulphur emissions were achieved effectively. The targeted 30% reduction in nitrogen oxide emissions is likely to be reached in 2004.

Indicator 2.3
Changes in the Defoliation (UN/ECE and EU Defoliation Classification)

Defoliation, or the relative loss of needles or leaves, is used as an indicator in European monitoring of forest vitality (UN/ECE and EU Defoliation Classification). Trees are classified as damaged by defoliation when the amount of needles or leaves has decreased by over 25% as compared to a full crown. Factors causing defoliation include atmospheric pollutants, the health of the trees, weather, and the development stage of trees. Observation of sample stands shows that no major changes in the defoliation of Finnish forests has taken place during the monitoring period 1986-1998 (Figures 2.2 and 2.3). In general, defoliation in Finland can be attributed mostly to the ageing of trees and adverse climatic and weather factors. However, air pollution has probably increased defoliation in southern Finland, and local emissions may increase local defoliation considerably.

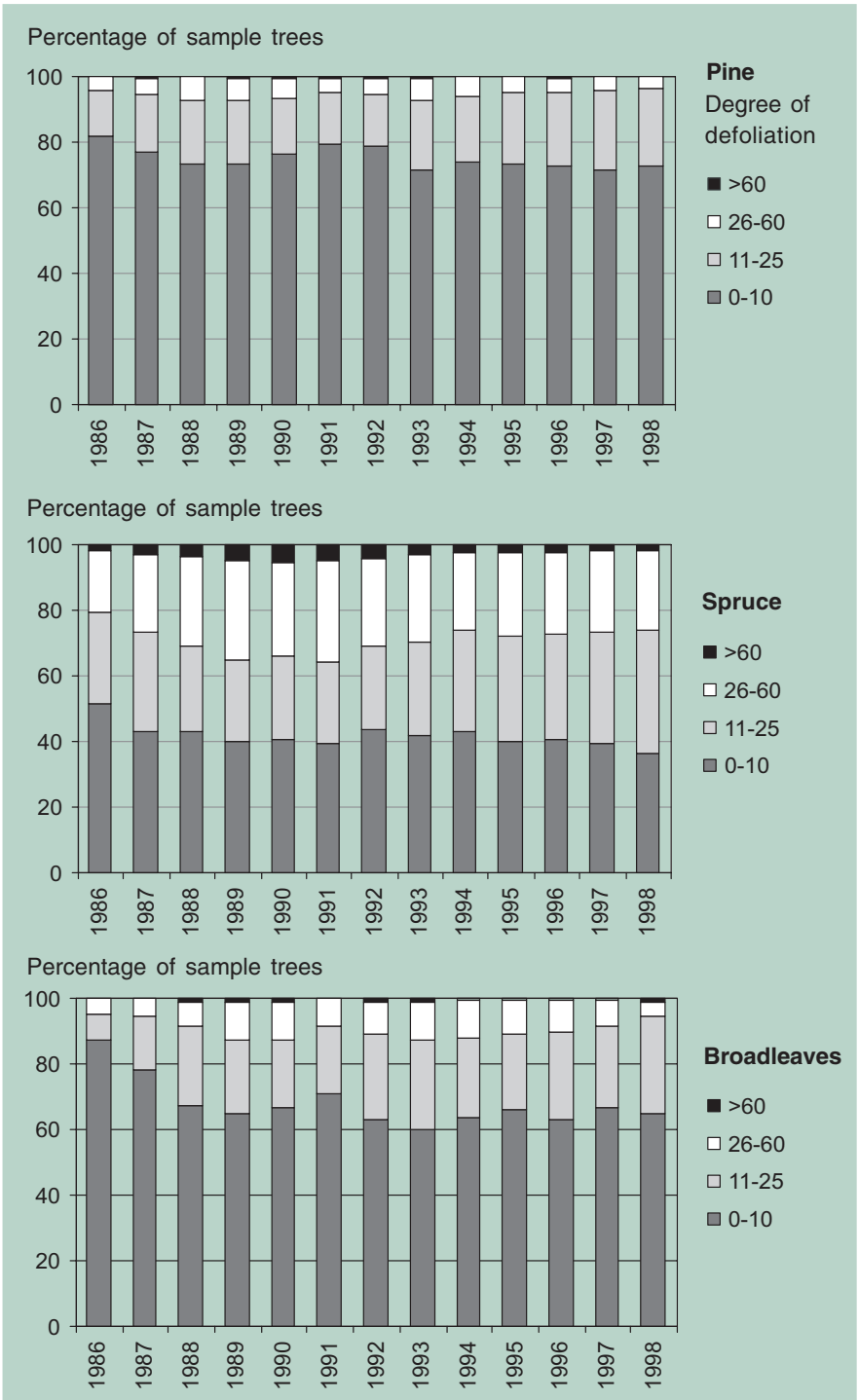
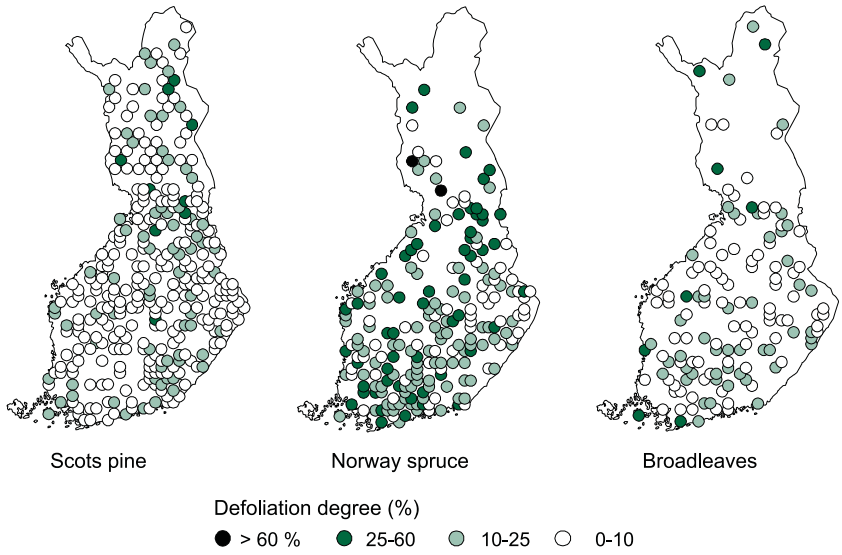


Figure 2.2. Defoliation of pine, spruce and broadleaved trees in 1986–98. The data is based on observations made in about 490 plots. The sample trees include 4,500 pines, 2,800 spruces and 1,350 birches.

Source: Finnish Forest Research Institute Research Paper 743

Figure 2.3. Percentage of defoliation (by UN/ECE and EU defoliation classification).
Source: Finnish Forest Research Institute Research Paper 743



Indicator 2.4
Damage Caused by Biotic or Abiotic Agents

The extent of forest damage and its economic impacts vary a great deal annually, because epidemics and weather damage are random phenomena, and pest populations (e.g. voles and moose) also fluctuate considerably. Economic losses incurred through decline in stock increment caused by forest damage is estimated to be EUR 50–135 million annually. Serious, economically significant epidemics occur locally once every few years.

Some information on the occurrence of forest damage is available from the annual damage reports of the Finnish Forest Research Institute and from sample plots monitored by the European Programme for Monitoring of Forest Ecosystems. Reliable, comprehensive data on the annual occurrence, location or consequences of forest damage is still not available, nor are all estimates made using the same criteria. A new monitoring registry for forest damage in private forests was established in 2000.

Occurrence of Damage estimated by the NFIs

Estimates on forest damage are mainly based on observations made in the 8th and 9th National Forest Inventories (NFI8 and NFI9, 1986–98). In the inventories, the damage as well as its cause, extent and effects on silviculture are estimated for each sample plot.

Damage that decreases the quality of stands was observed on 22% of forest land (Figure 2.4). Total devastation that had led to the death of the whole stand was observed on less than 0.2 percent of forest land.

Fungus diseases were the most common of all identified causes of damage. The most serious fungus diseases were scleroderris canker (*Gremmeniella abietina*), which was observed in various parts of the country, and root-rot fungus (*Heterobasidion annosum*), which was observed mainly in spruce stands in southern Finland. Up to 30% of the spruce dominated forests in the coastal areas was infected with root-rot. Elsewhere in southern and western Finland, the disease had caused a loss of 8-18% of the stock volume in spruce stands. In pine, the

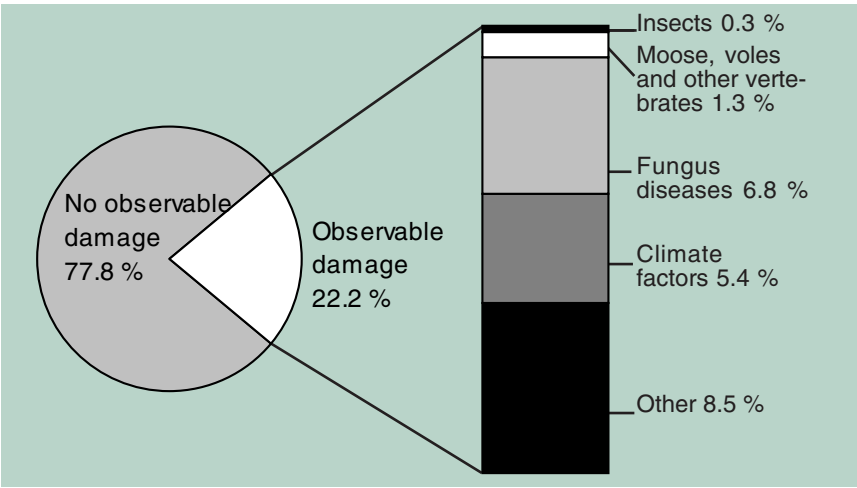


Figure 2.4. Damage lowering the quality of stands were observed on 22% of forest land (8th and 9th NFIs 1986–98). The figures include damages leading to the death of the stands (less than 0.2% of forest land), severe damages (4.1% of forest land), and other damages that decreases forest quality but does not endanger the development of the stands and cause only a temporary deterioration of the health and vitality of the stands (17.8% of forest land).
Source: Finnish Forest Research Institute/National Forest Inventory and Forest Statistics Information Service

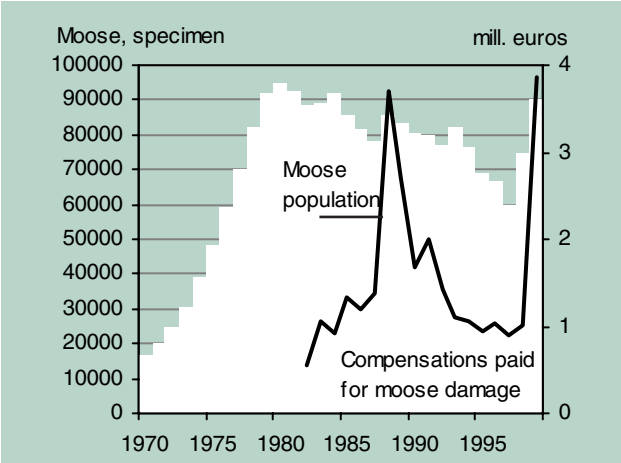


Figure 2.5. Winter population of moose (estimate) and compensations paid for moose damages in 1970–98.

Sources: Finnish Game and Fisheries Research Institute (RKTL), Hunters' Central Organisation, and A. Uotila and V. Kankaanhuhta, 1999.

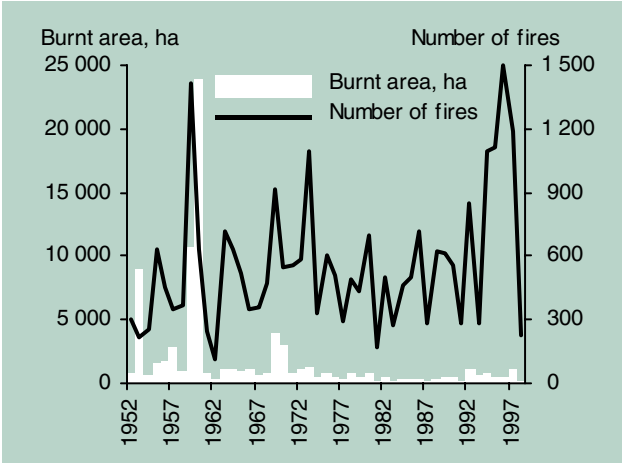


Figure 2.6. Forest fires in 1970–98.

Source: Ministry of Internal Affairs

same fungus causes the Annosus root-rot, which is common especially in eastern and south-eastern Finland. The root-rot fungus is estimated to cause a loss of about EUR 34 million per year in stumpage earnings. Also, needle cast fungi (*Lophodermella, Lophodermium, Lirula*), snow blight (*Phacidium infestans, Herpotrichia juniperi*) and rust fungi (several species such as *Coleosporium, Chrysomyxa, Melampsora*) cause extensive damage periodically.

Insect damages were observed on 0.3% of forest land (Figure 2.4). The greatest damage to trees is caused by the sawfly (*Neodiprion, Diprion*), the pine shot beetle (*Tomicus* spp.), certain bark beetles infecting spruce (*Scolytidae*), and the large pine weevil (*Hylobius abietis*). Pest damage is most common in southern Finland, and can occasionally occur in serious epidemics. Sawflies (the fox-coloured sawfly, *Neodiprion sertifer* and the large pine sawfly, *Diprion pini*) cause needle damage on several thousands of hectares annually. In 1999 in eastern and central Finland, followed by two previous extreme warm summers, the pine sawfly (*Diprion pini*) caused the worst pest damage to forests in the history of Finland, destroying needles in pine forests over a total of 0.5 million hectares. In the 1970s, there were several outbreaks of pine sawfly in Finland, but no epidemics have occurred since the early 1980s.

Damages caused by vertebrates are caused mostly by voles in young seedling stands and by moose in older stands. In the 8th National Forest Inventory, moose damage was observed on 1.3% of forest land. The risk of moose damage restricts regeneration and forest management, since moose feed especially on young pine, birch and other deciduous species, and in young forests generally. Moose damage to seedling stands is estimated to be EUR 8–10 million euros annually, of which EUR 5–7 million is in private forests. Obviously, not all moose damage is reported, the amount of compensation paid to forest owners in 1998 was only EUR 1.3 million. Since 1977, moose populations have been regulated by granting hunting permits in accordance with regional game management target programmes (Figure 2.5). At the moment, the moose population is estimated in some areas to exceed 10 moose/1000 hectares. The Ministry of Agriculture and Forestry has set a target of 2–5 moose/1,000 hectares (0.5–3 moose/1,000 hectares in upper Lapland). This goal is to be achieved through the management plans for the extensive moose management districts. In northern Finland, reindeer are especially harmful to the regeneration of forests.

Damage caused by climatic factors are most prevalent in northern Finland. The greatest causes of forest damage are snow (snow damage was observed on 2.4% of forest land) and storm (1.1% of forest land). According to the statistics of Finnish insurance companies, up to over 80% of all indemnities paid for forest damage in recent decades has been to cover damage caused by storms. Severe storms can be the cause of the destruction of up to 2–3 million cubic metres of wood, incurring economic losses of up to EUR 17 million.

Forest fires have been relatively small, especially in recent decades, owing to efficient fire control, the humid climate, and the relatively small amounts of dead wood in forests (Figure 2.6). In the most recent extensive forest fire, which occurred in 1960 in the municipality of Salla in the Tuntsa area, a total of 20,000 hectares of forest was lost.

CRITERION 3

Maintenance and Encouragement of the Productive Functions of Forests (Wood and Non-Wood)

Roundwood production in Finland has been sustainable for a long time. In the last 40 years, the annual increment of growing stock has exceeded drain by 20–30%. Consistent efforts have been made to ensure the sustainability of timber production. Both public measures and the activities of private forest owners have promoted sustainability.

In recent years, there has been a growing interest in uses and values of forests other than wood production. The reformed forest and environmental legislation places an added emphasis on such non-wood functions of forests as well as on the sustainable utilisation of forests. The major non-wood forest products that also have an economic value are game, berries, mushrooms and lichen, as well as ecotourism.

WOOD PRODUCTION

Indicator 3.1
Instruments for Safeguarding Wood Production

In Finland, wood production is promoted by the Forest Act, the Act on the Financing of Sustainable Forestry, and the Forest Reproductive Material Trade Act. The key aim of the Forest Act is to promote sustainable economic, ecological and social management and utilisation of forests in a way which ensures a good, sustainable yield while maintaining the biodiversity of forests (Criterion 1 and Annex 3). The Forest Reproductive Material Trade Act aims at ensuring that reproductive material used in silviculture guarantee successful forest regeneration results (Indicator 2.1 and Annex 3).

The Act on the Financing of Sustainable Forestry aim at encouraging private forest owners to invest in the management of their forests. Under the Act, forest owners are granted loans or other financial support, for which funds are allocated annually in the State budget. Supported measures are directed to maintain the sustainability in timber production, the maintenance of the biological diversity of the forests, as well as to forest ecosystem management undertakings. Measures include prescribed burnings, tending of young stands, harvesting of energy wood, forest remedial fertilisation, ditch cleaning and supplementary drainage, construction and improvement of forest roads, prevention of root-rot fungus, and the forest regeneration in certain areas.

Forest legislation applies to all forest owners. The authorities supervising the enforcement of the law are the 13 Regional Forest Centres. The Forest Centres and the Forestry Development Centre Tapio also have other statutory responsibilities regarding the promotion of silviculture (Indicator 1.1 and Annex 2).

Until the reform of forest taxation in 1993, the forest tax was determined by the productive capacity of forest soil, the mean price of timber, and average expenditure. During the transition period, which extends to 2005, forest owners may choose whether to pay tax according to the old system, or according to the net forest income from their forests. After the transition period, all owners will pay tax according to net forest income.

The maintenance of wood production is ensured by the national forest programmes and strategies, monitoring systems for the preconditions of wood production, and the various organisations charged with enforcing forest legislation. National forest programmes have been in use in Finland since the 1950s (page 8). Forest planning seeks to ensure the maintenance of the sustainability of forestry on the national, regional and local levels, as well as in individual forest holdings (page 34).

Forest Planning

• Forest Management Plans

are used to manage the private forest holdings. Individual forest management plans are always prepared on the basis of the forest owner's own objectives and the characteristics of the forests in question. Individual plans take into account the goals related to wood production as well as the multiple-use and forest protection. The plans are usually prepared for a period of 10 to 20 years, and they are updated every time any kind of management activities are carried out in the forest. The individual forest management plans include data on the current status of the forest, opportunities for harvesting, silvicultural needs and their economic effects, as well as forecasts on the development of the stock, and comprehensive maps. About 70% of the area of private forestry land is covered by forest management plans. The plans are usually accompanied with a separate implementation plan for the activities.

The forests owned by forest industry companies are covered by a planning procedure that corresponds closely to individual forest management plans.

• Regional Forest Plans

are prepared for uniform areas of 2,000-5,000 hectares, for example for forests within the area of a rural village. Comprehensive data are gathered covering the individual stands. In conjunction with the regional forest plan, individual forest management plans are also prepared for forest owners who wish to have one for their forest. Regional forest plans are usually prepared by the Forest Centres.

Regional plans contain cumulative information on individual forest management plans and intermediate areas, but they do not include data on individual forest holdings. The goal of regional forest plans is to harmonise and regulate the activities and economic planning of the Forest Centres and Forest Management Associations, to direct forest holding and project-specific planning and decision making of forest owners and forest professionals, and to produce data for the monitoring and planning of the forest resources of the regional council in question. Data contained in the regional forest plans are used to monitor the forest resources in the area, and to prepare various calculations and maps on a variety of aspects of the forests.

• Regional Forest Programmes

(regional forestry target programmes) are used to compile data on forests and determine their development needs on the level of the Forest Centres. The goals of regional forest programmes are defined in the Forest Act. The programmes are prepared by the Forest Centres in cooperation with forestry organisations and other interest groups. The programmes set the objectives for the sustainable management, utilisation and development of forests in the region. The first regional forest programmes were prepared in 1997-98, and they were revised in 2000. The data in regional forest plans and regional forest programmes are used e.g. to assess the preconditions for operation of the forest industry in the provinces. Regional forest programmes provided the basis for the preparation of the National Forest Programme 2010.

• Natural Resources and Landscape Ecological Plans

are prepared by the Forest and Park Service for the management and use of State lands. The plans are prepared in broad-based collaboration with participation by all interest groups. The needs and wishes of the inhabitants in the region are taken into account in as far as possible. Natural resources and landscape ecological plans cover all State commercial forests managed by the Finnish Forest and Park Service.

Natural resources plans are comprehensive plans which cover an extensive area (0.5–2.5 mill. ha). The plans incorporate all significant land-use decisions and the scaling of silvicultural activities.

Landscape ecological plans aim at ensuring the maintenance of native species in the area, and at safeguarding the possibilities for their propagation in conjunction with silvicultural activities. Areas of exceptional biological diversity are defined as natural sites which are excluded from commercial use. Whenever possible, such sites are connected by ecological corridors and stepping stones. Landscape ecological plans also take social and cultural values into consideration. The plans typically cover an fragmented area of between 20,000 and 100,000 hectares. There are currently well over 100 completed landscape ecological plans.

• National and Regional Forecasts for the Development of Forest Resources

are based on assessments of the current state of forests produced in the National Forest Inventories and on alternative scenarios on how forest resources, the increment and the possibilities for wood production may develop given various options in the management of forests and its intensity, as well as protection programmes. Scenarios on the development of national forest resources have been calculated with Mela software (developed by the Finnish Forest Research Institute), e.g. in conjunction with the preparation of the National Forest Programme 2010. Regional development forecasts for forest resources are generally drawn up every 5 to 8 years, as the regional results of the new National Forest Inventories become available.

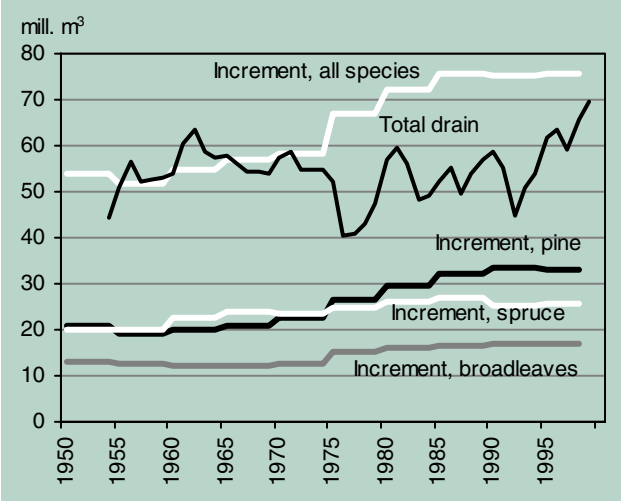


Figure 3.1. Increment of the growing stock by tree species and total drain 1950–98.

Sources: Finnish Forest Research Institute / National Forest Inventories and Forest Statistics Information Service

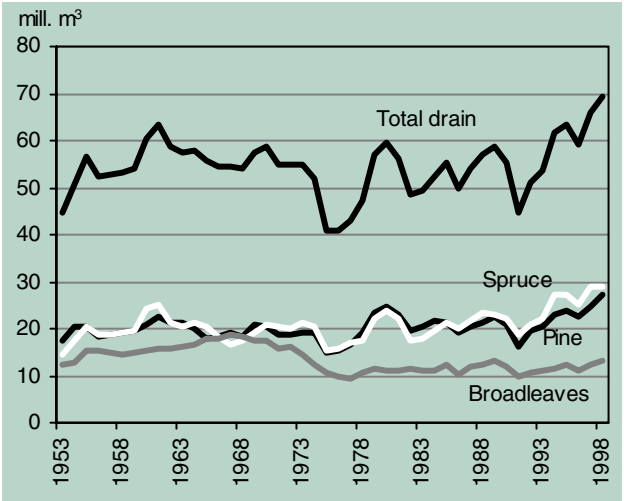


Figure 3.2. Annual total drain (losses in growing stock due to harvesting, silvicultural measures and natural mortality) by tree species 1953–98. The figures are based on statistics on the utilisation of wood (–1984) and harvesting statistics (1985–). The figure for natural mortality is an estimate.

Sources: Finnish Forest Research Institute / National Forest Inventories and Forest Statistics Information Service

Information Systems and Services in Support of Wood Production

In order to maintain the sustainable silviculture in a country such as Finland, where forestry is largely based on private forests, it is vital that forest owners receive sufficient information on methods and procedures that ensure sustainability. In recent years, forestry organisations, including the Forest Management Associations, forest industry companies and Forest Centres as well as research institutes, have increased their efforts to provide advisory services and information for private forest owners (Indicator 3.4).

Various environmental and quality systems are used to improve the quality of silvicultural measures and to reduce their harmful effects on the environment. Forest industry corporations and the Finnish Forest and Park Service have adopted a certified environmental management system based on the international ISO 14001 standard. The strength of the system is its objectivity: assessment of how well the criteria and norms are met is always carried out by an impartial third party. Forest certification systems also promote sustainable forest management (page 6).

The National Forest Inventory and the Forest Statistics Information Service of the Finnish Forest Research Institute (Annex 4) compile national and regional statistics on forests, which include data on the volume, increment and health of trees. The Finnish Forest Research Institute publishes an annual Statistical Yearbook of Forestry based on information provided by the various organisations in the forest and environmental sectors.

Wood production are studied by several research organisations. The timely topics include for example the development of silvicultural and harvesting methods in various stand structures, growth and yield, the environmental impacts of forestry, forecasts of wood production capacity, tree quality and breeding, regeneration and nursery production.

Indicators 3.2 and 3.3 Increment of Growing Stock and Total Drain

Since the late 1960s, the increment in Finnish forests has exceeded the drain. Between 1986 and 1995, the annual increment exceeded total drain by an average of 20 million cubic metres, which mean 20-30% of increment (Figure 3.1). The increment of forests suitable for roundwood production was about 17 million cubic metres in excess of the total drain.

The total drain includes both harvesting and natural mortality (dead trees, trees felled by storms, etc.). The annual variation of the volume and structure of drain is considerable, mostly because of shifts in the needs of the forest industry (Figure 3.2). The natural mortality means about 2–4 million cubic metres, or 3-5% of the total drain.

Indicator 3.4
Coverage of Forest Training, Guidance and Consultative Services

Training, consultative and information services help forest owners in their decision-making as they seek to manage their forests in a way that ensures that the various aspects of sustainability are taken into account. There are about 440,000 private forest holdings in Finland, and nearly 900,000 individual citizens own forests. The nation-wide network of Forest Management Associations ensure on statutory basis forest advisory services for all forest owners. Consultative and training services for forest owners are also provided by the Forest Centres and several other organisations, including the Finnish Forest Research Institute, forest polytechnics and schools, and forest industry companies.

Training and information services are provided in the forms of publications, newspaper articles and other printed material, personal consultation, and constantly developed by introducing new forms and procedures, such as Internet services designed for forest owners. Information on forestry is also distributed through consultation and service offices established in cities and built-up areas, as well as in conjunction with courses and other training events.

The Forest Management Associations provide individual consultation for over 70,000 forest owners every year. The Forest Centres also provide personal consultation funded with State grants for over 30,000 owners annually, and organise about 700 seminars every year, with participation by over 30,000 forest owners. In accordance with the target of the National Forest Programme 2010, the amount of State funding used for advisory services for forest owners has been doubled, and in 2001 will reach EUR 7.9 million.

Indicator 3.5
Coverage of Forest Planning

The coverage of forest management plans varies from one owner group to another. Forests owned by the State, companies and communities are nearly all covered by forest plans. In commercial forests administered by the Forest and Park Service and those owned by companies, traditional forest management plans are supplemented with landscape ecological planning (page 34).

Existing regional forest plans cover 72% of the Finnish forests. There are over 140,000 individual forest management plans for private forests, covering about 7.2 million hectares of forestry land (Figure 3.3). Forest management plans are logically more common in large forest holdings than in smaller ones.

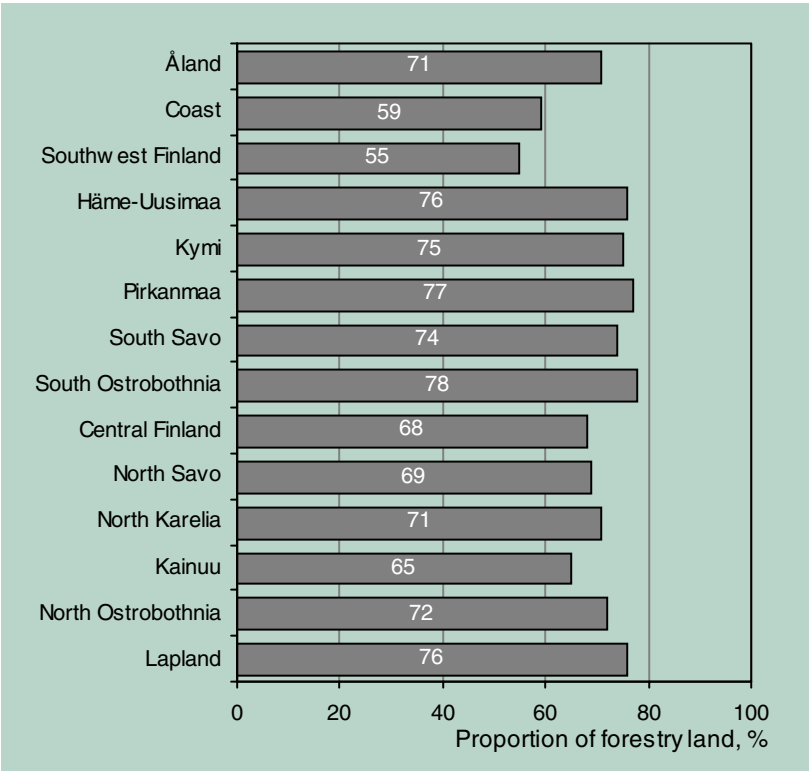


Figure 3.3. Coverage of forest planning (existing forest management plans) on private land 1998 by Forest Centres. (Forest Centres, see map on page 6.)
Source: Forestry Development Centre Tapio

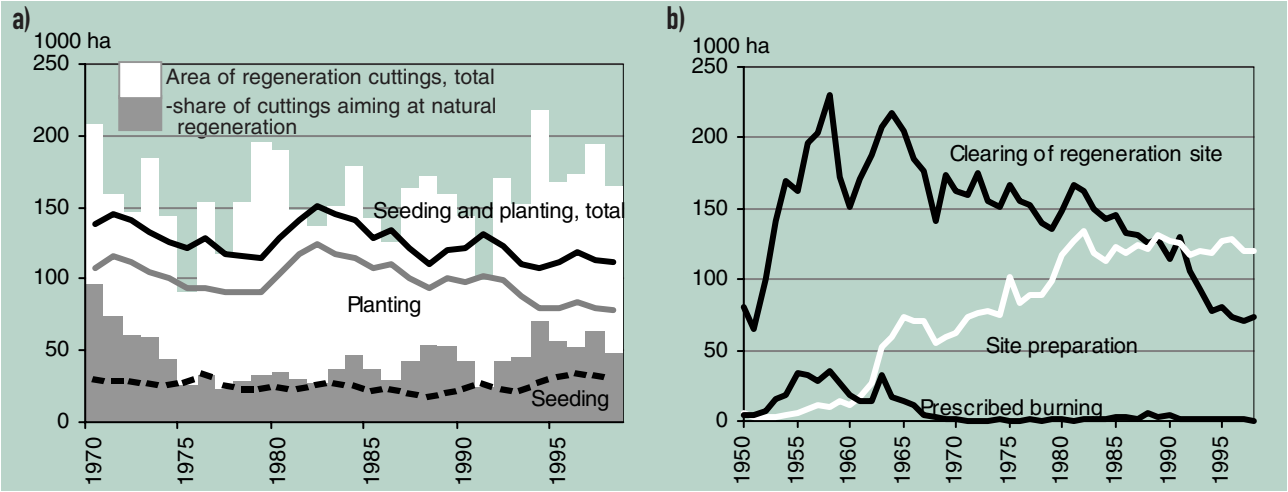


Figure 3.4. Forest regeneration a) regeneration cuttings and areas of direct seeding and planting 1970–98, and b) preparations for regeneration 1950–98.
Source: Finnish Forest Research Institute / Forest Statistics Information Service

Indicator 3.6
Silvicultural and Forest Improvement Measures

Activities which aim at promoting wood production and ensuring the economic sustainability of silviculture are eligible for public funding under the Act on the Financing of Sustainable Forestry.

3.6a Forest Regeneration

From the 1970s to the 1990s, the annual area of reforestation in Finland varied between 100,000 and 200,000 hectares. About one third of regeneration cuttings aimed at natural regeneration. The use of natural regeneration has increased somewhat in recent years (Figure 3.4a). After small scale regeneration cutting, the opening is reforested either by direct seeding or planting. Only native tree species are used for normal reforestation (page 5 and Indicator 4.5).

The harvesting programmes included in the National Forest Programme 2010 will stabilise the area of regeneration cuttings to 135,000–150,000 hectares annually. The extent of natural regeneration will remain on the previous level of about 60,000 hectares p.a.

Successful regeneration is ensured by site clearing, site preparation, and prescribed burning (Figure 3.4b). Site preparation spread rapidly in the 1960s, in step with the mechanisation of forestry. Today, site preparation is carried out in nearly all areas to be reforested, except for certain naturally regenerating marshland areas. Site preparation is required in boreal forests for removal of humus layer in order to ensure germination of seeds and hinder the ground vegetation competition. Light site preparation methods, such as scarification or spot scarification, are used.

Reforestation often requires clearing of the felling area. Over the past few years, the total area cleared annually has diminished. Clearing is usually carried out mechanically; chemical control is allowed only in special cases. Acceptable understory may be left on site to supplement planted seedlings, to maintain the genetic pool of the site, and to increase biodiversity and landscape values. Today special care will be paid for key biotopes which are to be left untouched or regeneration area without any cleaning.

Prescribed burning is recommended as ecologically beneficial method. In practise it has been used relatively seldom in recent years owing to the uncertainty of weather conditions, and the risk of the fire getting get out of hand. Also the expenses are high due to the labour costs.

3.6b Silvicultural Measures

Methods used to improve the growth of forest stands and the quality of trees include the tending of seedling stands, pruning and secondary thinnings. Measures especially important for wood production are timely management of seedling stands and first and intermediate thinnings.

The amount of the tending of seedling stands reached a peak in the 1970s. In the 1990s, the area decreased from 180,000 hectares to about 110,000 hectares per year (Figure 3.5a). Due to the "Tending of Young Forests" Campaign launched in 1998, the extent of silvicultural measures in young forests has been on the increase. In 1999, silvicultural measures in young stands covered about 150,000 hectares in private forests, and 27,000 hectares in forests managed by the Forest and Park Service. The need for young forest management is nevertheless considerably greater than the implemented activities. The target of the National

Forest Programme 2010 is to increase annual seedling stand management to 250,000 hectares.

Thinnings are carried out 2 to 3 times during the rotation period. Depending on the tree species and site, the rotation period varies between 60 and 130 years. The area covered annually by first thinnings especially has lagged behind the target (Figure 3.5b). The goal of the National Forest Programme 2010 is to increase the area of thinnings to about 450,000 hectares annually.

Pruning is used to produce valuable, knot-free butt logs. However, pruning is relatively rare in Finland (Figure 3.5c). It is most common young stands of pine and birch.

Chemical control is used on extreme difficult reforestation areas to supplement mechanical grass and brush control and by raising the seedlings in nurseries. The use of chemicals was quite common as late as in the 1970s, but it has decreased radically, especially in recent years (Figure 3.5d). In the 1980s, chemicals were used mainly to control weeds. The principal reasons for the reduced use of chemicals include increasingly stringent standards for occupational safety in forestry, and environmental considerations. Aerial spraying has been completely eliminated.

3.6c Measures to Improve Wood Production

Drainage of peatlands, construction of forest roads, and fertilisation were most prevalent in the 1960s and 1970s when forest management aimed at an intense increase of wood production. These measures have become less prevalent with the introduction of the multiple use of forests, increased awareness of environmental issues, and also because of the reduction in the number of sites where improvement measures would be worth the effort.

Drainage was used especially in the 1960s and 1970s to increase wood production on peatland (Figure 3.6a). It is estimated that about one third of the increase of the total volume of Finnish forests (Figure 1.2) has been due to drainage. New ditchings are no longer carried out, but the maintenance of production capacity on peatlands suitable for wood production requires ditch cleaning and supplementary drainage every 20-40 years. The goal of the National Forest Programme 2010 is to increase the annual rate of ditch cleaning and supplementary drainage from the current 75,000 hectares to 110,000 hectares.

The construction of forest roads increased considerably in the 1960s (Figure 3.6b). In the 1990s, about 2,000 kilometres of new forest roads were constructed

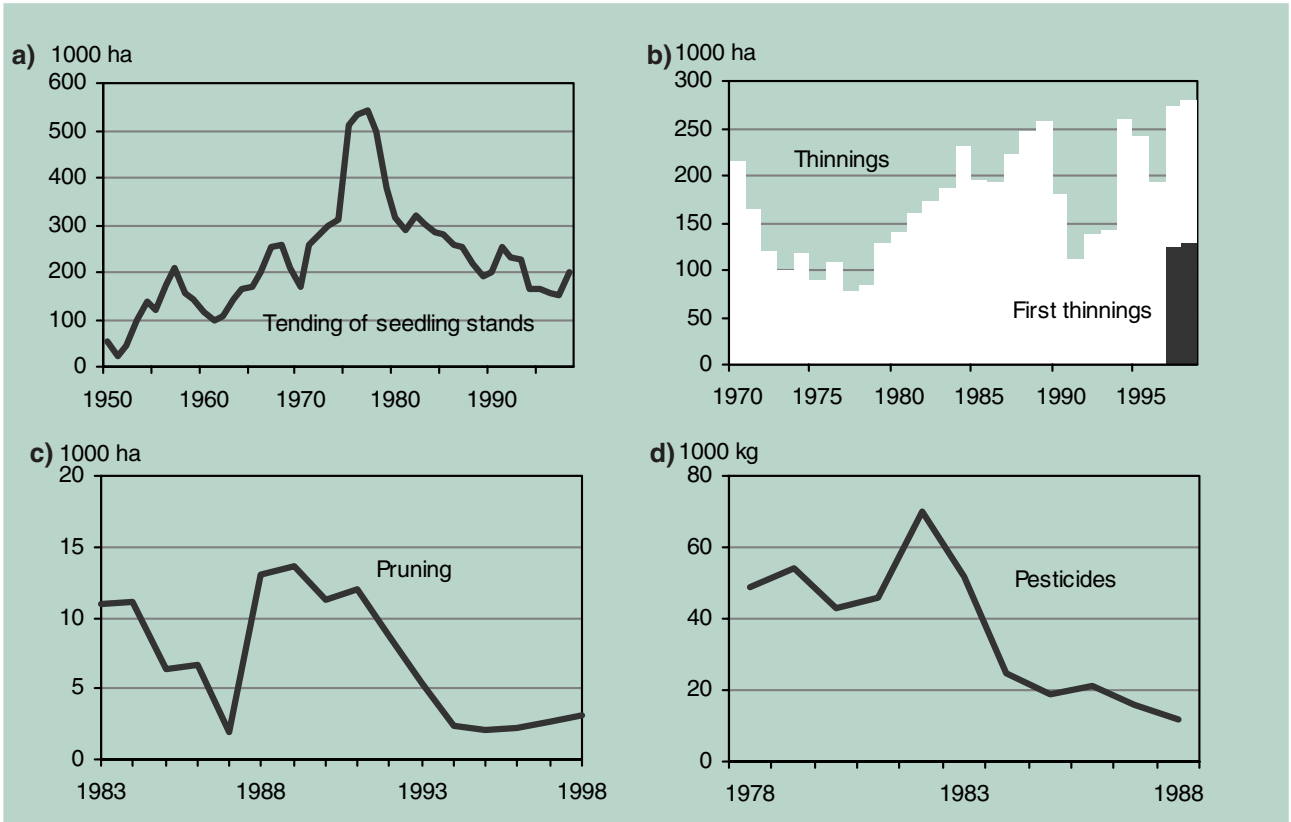
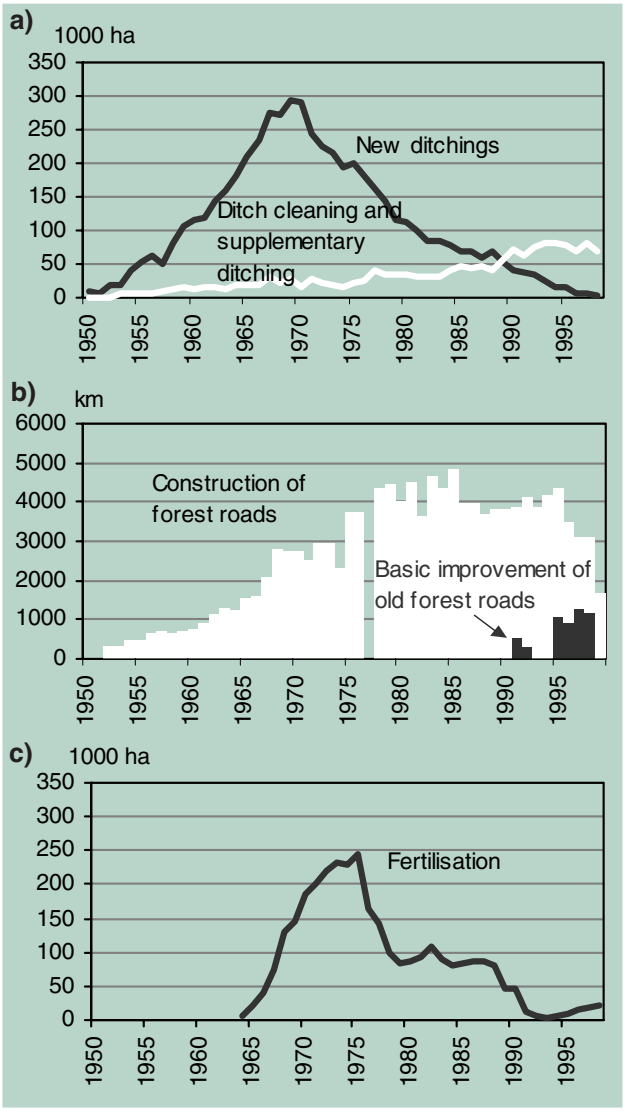


Figure 3.5. Silvicultural measures a) area of tending the seedling stands (1950–98), b) thinnings (1970–98), c) pruning (1983–98), and d) pesticides used in forestry converted to active ingredients (1988–98).

Sources: Plant Production Inspection Centre and Finnish Forest Research Institute / Forest Statistics Information Service

Figure 3.6. Measures for improvement of wood production 1950–98.
a) Forest drainage. Ditch cleaning and supplementary ditching are carried out on about 70,000–80,000 hectares annually. New ditching is no longer performed.
b) Construction of forest roads. The statistics show separate figures for basic improvement of forest roads for 1991–92 and 1995–95. For other years, basic improvement is partly included in the figure for the construction of new roads. Main haul roads constructed by the Forest and Park Service are included in the figures from 1977 onwards.
c) Fertilisation.
Source: Finnish Forest Research Institute / Forest Statistics Information Service



annually, and about 1,000 kilometres of old roads were improved every year. Over 70,000 kilometres of forest roads have been built in private forests with forest improvement funds.

At the end of the 1990s, the area covered by fertilisation was only about one tenth of the area in the 1970s (Figure 3.6c). The goal of the National Forest Programme 2010 is to increase the amount of remedial fertilisation designed to improve the nutritional balance of forest soil from the current 2,000 hectares to 10,000 hectares annually. Under the Act on the Financing of Sustainable Forestry, State support for fertilisation can be granted when growth remains declining in spite of management due to the nutrient imbalances in the soil, and fertilisation can be expected to revive the forest. The fertilisation is mainly directed to peatlands.

Indicator 3.7
Profitability of Private Forestry

The profitability of wood production can be described using either the stumpage price index or the net income of private forests. Assessed with these indicators, the profitability of private forests varies both regionally and temporally.

3.7a Net Return by Hectare in Private Forests

The profitability of private forestry can be described using the annual net income by hectare and its variation (Figure 3.7). The net income of wood production is calculated by subtracting the gross expenditure of wood production from the combined total amount of gross stumpage price earnings and State support paid to the forest owner. In 1997, the annual net income of private forests for Finland as a whole was EUR 97.5 / ha, or nearly 32% in excess of the figure for 1996. In eastern Finland, the net income of wood production was clearly higher than elsewhere. In northern Finland, the net income was only one third of the average figure for the whole country. The variation in the net income depends on the number of cuttings.

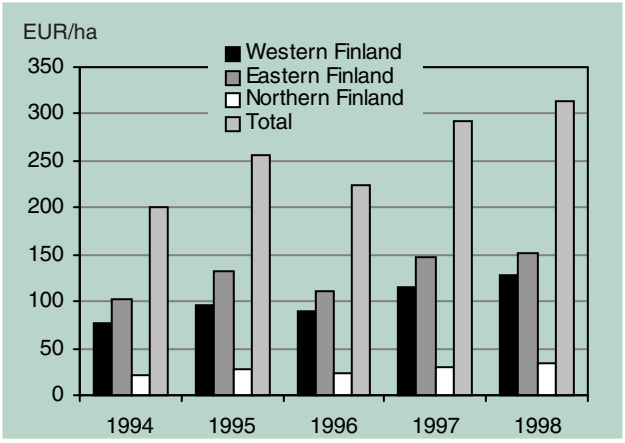


Figure 3.7. Net income from private forests per hectare on forest land (gross stumpage earnings – total cost of wood production + State subsidies) by geographic area.
Sources: Forestry Development Centre Tapio and Finnish Forest Research Institute / Forest Statistics Information Service

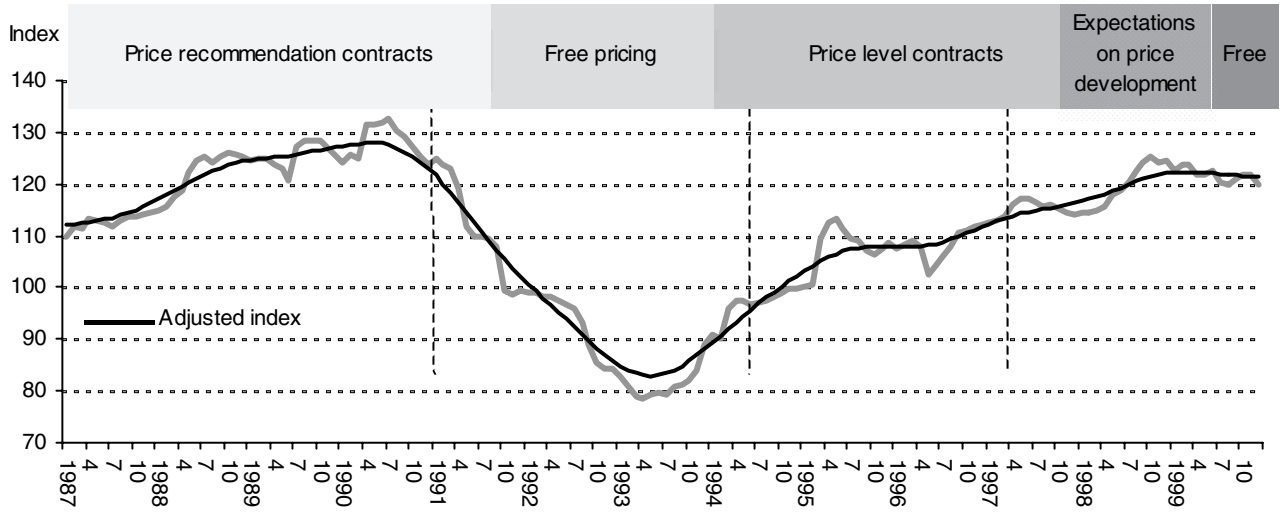


Figure 3.8. Stumpage price index in 1987–98. Since the seasonal variation of prices may be considerable, the index has been adjusted by long-term moving average.

Source: Finnish Forest Research Institute

3.7b Stumpage Price Index

The stumpage price index indicates the average monthly level of the real value of stumpage prices on the roundwood market, thus reflecting the development of the purchasing power of stumpage earnings. Calculation of the stumpage price index takes into account relative changes in stumpage prices and the proportion of different timber assortments to the value of the standing sales of roundwood (Figure 3.8). The highest stumpage prices were paid within regions covered by the Forest Centres in Kymi, Pirkanmaa and Keski-Suomi (see map, page 6), which have a concentration of forest industry.

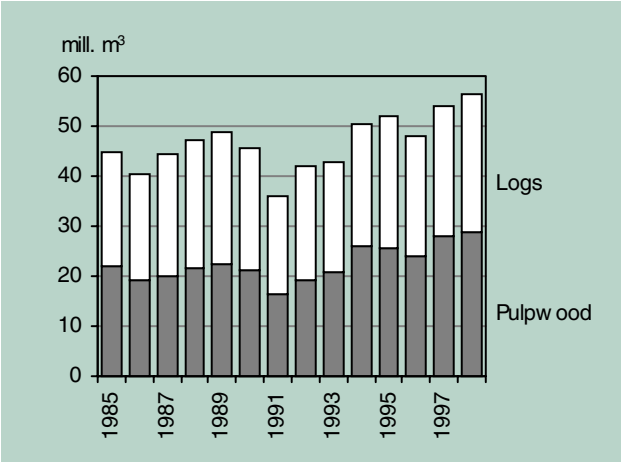


Figure 3.9. Structure of roundwood on the market 1985–99.

Source: Finnish Forest Research Institute / Forest Statistics Information Service

Indicator 3.8
Structure of Roundwood on the Market

The age and tree species structure of forests and the proportion between regeneration cuttings and thinnings affect the structure of roundwood to be delivered on the market, and thereby also the earnings of forest owners and the structure of the raw material available to the wood processing industries. In the past few years, about half of the annual purchased roundwood has consisted of sawnwood logs, the other half of pulpwood (Figure 3.9). If the goal of increasing thinnings of stands (Indicator 3.6b) is achieved, roundwood will increasingly be undertaken from young stands, and the proportion of pulpwood in roundwood production will increase.

The goal of the National Forest Programme 2010 is to increase the quantity of industrial roundwood to 63-68 million cubic metres annually, which is approximately 10 million cubic metres more than in the past few years. In harvesting programmes proposed in the National Forest Programme 2010, the proportion of pulpwood remains at least one half of the total roundwood on the market.

Non-wood forest products include in Finnish conditions berries, mushrooms, game, reindeer and other various natural products, such as lichen and herbs. Forests offer also floor for ecotourism. The material and immaterial non-timber products offered by forests are either in public use by virtue of the Everyman's Right, or require permission from the forest owner.

Indicator 3.9
Instruments to Safeguard the Management and Use of Non-Wood Forest Products

Non-Wood Forest Products and Measures to Safeguard Their Accessibility

The multiple use of forests and non-wood forest products are taken into account in Finnish forest legislation. The legislation seeks to safeguard the multiple uses of forests, and places an emphasis on their importance for the development of the local economy. Under the Forest Act, forests which are valuable in terms of landscape, multiple use or forest research, may be managed in a way that is in harmony with their special character. The multiple uses of forests are coordinated by land development planning under the Land Use and Building Act, within the landscape ecological plans of the Finnish Forest and Park Service, the regional forest plans of the Forest Centres, and in individual forest management plans (page 34).

The non-wood use of forests is studied in a number of research projects. The Finnish Forest Research Institute's research programme "Coordination of the Various Uses of Forests" (1995–99) addressed in particular the recreational use of forests and their immaterial values, non-timber forest products, and the importance and utilisation of wilderness areas. The Finnish Forest Research Institute also produces annual forecasts on regional crops of wild berries and mushroom.

The utilisation of non-wood forest products is promoted by organising open training events and courses, and by producing a variety of observational and educational material. Courses on the non-timber uses of forests are organised by educational institutes for natural resource management, the Hunters' Central Organisation, the Finnish 4-H Federation and its districts, the scout movement, NGOs, game management districts and associations, and the Martha organisations.

Game And Game Management

The opening and closing of hunting seasons and the procedures for granting hunting licences are laid down in the Hunting Act. When the Act was amended in 1993, the management of endangered species was transferred to the Nature Conservation Act. With the amendment, conditions for hunting large predators were tightened, as well as the provisions regarding the import of exotic game animals to Finland.

Under the Hunting Act, the landowner have hunting rights for his or her land. All hunters are required to pass a hunting examination. Age limits required for taking the examination vary according to the game. Inhabitants in the Lapland province and in some municipalities in the Oulu province have a free hunting right on State land within their municipality of residence.

The sustainable use of game resources and game management are under the jurisdiction of the Ministry of Agriculture and Forestry. Other public bodies and organisations with statutory duties related to game management are the Hunters' Central Organisation, the Game Management Districts and the Game Management Associations. Matters pertaining to hunting and game management are also handled by hunting associations and national hunting organisations, membership in which is voluntary. In addition, provincial governments and the Forest and Park Service grant hunting licences and monitor hunting. The Finnish Game and Fisheries Research Institute and the Finnish Museum of Natural History conduct research on game management, compile national statistics on game stands, and assess the development of game populations together with the Hunters' Central Organisation.

The number of hunting licences granted for large predators is based on estimates of the populations of bears, wolves, lynx and wolverines, and the damages caused by them. Populations are monitored using data from game surveys, data from carrion, killing and damage statistics. Hunting licences can also be granted in exceptional cases to kill rogue individuals.

The Hunting Act stipulates that the moose population in Finland must be kept in bounds to ensure that damage caused by moose remain on a moderate level. Compensation paid for damage to agriculture, traffic and forestry is covered in part by fees paid for game management and hunting licences. Part of the damage caused by large predators to reindeer and cattle is paid to the owners from State funds.

Individual forest management plans may also in-

Table 3.1. Value of non-wood forest products in 1998.

Product	Value, mill. euros[1)]	
Lichen (export income)	1.3	
Reindeer (slaughter income)	11.8	regional economic significance about EUR 34 mill.
Game (calculatory value)	36.1	
Wild berries (sales to retailers)	8.7	an average of 25% of volume collected annually
Mushrooms (sales to retailers)	2.4	about 3–33% of volume collected annually

[1)] gross income from private forests is about EUR 1,680 mill.

Source: Finnish Forest Research Institute / Forest Statistics Information Service

clude a separate game management plan, which lists habitats valuable for game, and gives recommendations for game management.

Reindeer Husbandry – An Important Livelihood in the North

Reindeer husbandry in Finland has been regulated by law since the late 19th century. Within the reindeer husbandry area defined in the Reindeer Husbandry Act, herding and husbandry are permitted with certain restrictions on all land regardless of the ownership of the land. The Act also includes provisions on the prevention of and compensation for damage done by reindeer, and on the maximum permitted number of reindeer.

The reindeer husbandry area covers the entire province of Lapland and parts of the province of Oulu. The area is divided among 56 reindeer owners' associations, which carry out all works related to reindeer husbandry and also seek to prevent reindeer from causing damage and from crossing over to the area of other associations. The coordinating body of the associations is the National Federation of Reindeer Owners' Associations. Reindeer and reindeer husbandry are studied in the Game and Fisheries Research Institute and in the Finnish Forest Research Institute.

As an indigenous people, the Sami are guaranteed, under the Finnish Constitution (731/1999), the right to maintain and develop their own language and culture, which also includes traditional natural resource industries (reindeer husbandry, fishing and hunting). There are about 7,000 Samis in Finland (according to the definition in the Act on the Sami Parliament 1974/1995). The Sami constitute a minority in the legislatively es-

Table 3.2. Annual game quarry and its value.

Game species	1 000 specimens 1998	1 000 specimens 1992/93–97 Average	1 000 kg 1998	1 000 EUR 1998
Deer, total	**42**		**4 329**	**20 761**
Moose	30	37	3 768	19 286
White-tailed deer	12	9	558	1 452
Fallow deer	0	0	2	9
Roe deer	0	0	1	14
Wild boar	**–**	**–**	**–**	**2**
Hares, total	**507**		**975**	**4 786**
Northern hare	403	376	726	3 390
Brown hare	104	69	249	1 397
Fur animals	**237**		**..**	**2 886**
Waterflow	**614**		**339**	**4 853**
Grouse, total	**272**		**157**	**2 364**
Capercaillie	24	52	46	511
Black grouse	103	178	68	1120
Hazel grouse	75	108	18	380
Willow grouse	70	94	25	353
Farmland game-birds	**81**		**27**	**489**
Total				**36 142**

Sources: Finnish Forest Research Institute / Statistical Yearbook of Forestry and Finnish Game and Fisheries Research Institute

Table 3.3. Estimated wild berry crops in favourable and unfavourable conditions, and the unit price of wild berries and mushrooms 1988–98.

Species	Total crop Unfavourable conditions 1000 kg	Total crop Favourable conditions 1000 kg	Average annual unitprice EUR/kg
Lingonberry, *Vaccinium vitis-idaea*	200	500	0.77 – 1.87
Crowberry, *Empetrum nigrum*	150	250	
Blueberry, *Vaccinium myrtillus*	150	200	0.87 – 1.41
Bog bilberry, *Vaccinium uliginosum*	20	50	
Rowan, *Sorbus aucuparia*	10	50	
Cloudberry, *Rubus chamaemorus*	20	30	4.24– 8.11
Cranberry, *Vaccinium oxycoccus*	10	20	
Raspberry, *Rubus idaeus*	5	10	
Juniper, *Juniperus communis*	0.1	0.2	
Wild strawberry, *Fragaria vesca*	0.1	0.3	
Buckthorn, *Hippophaë rhamnoides*	0.1	0.3	
Arctic bramble, *Rubus arcticus*		0.1	
Total	565	1 110	

Sources: Finnish Forest Research Institute and Food and Farm Facts Ltd.

tablished Sami region. Under the Act on Natural Economy Industries, the Reindeer Husbandry Act and the Skolt Act, designated tracts of State land are reserved for the Sami as areas for habitation, and resources for reindeer husbandry and natural livelihoods.

Ecotourism

The interest to ecotourism increased in the 1990s, and a great number of new ecotourism enterprises were founded in Finland. As a source of employment and income, the regional and local importance of these new enterprises can at times be quite considerable.

The expansion of ecotourism has also increased the amount of training provided in this sector. Trained guides are either self-employed entrepreneurs or work for ecotourism organisations. As demand and competition in ecotourism has increased, so has marketing and information services related to those services. Together with ecotourism enterprises, the Finnish Forest and Park Service has launched cooperation projects, which seek to take the needs of ecotourism enterprises into account in forest management.

Berries, Mushrooms and Other Wild Products

Everyman's Right is an established practice which has its roots in tradition and also partly in legislation (page 7). It permits free picking of non-protected wild berries, mushrooms and wild flowers, free movement on foot or on skis, and temporary camping in wilderness areas and forests. In the far north, the right to pick wild berries is restricted at certain times of the year to allow the local population to gather berries for commercial purposes. The right to collect lichen and moss is held exclusively by the landowner.

Financial Support for Harvesting Non-Wood Forest Products

Some 70% of Finnish households pick wild berries, and 20% gather mushrooms. Most of these are collected for private consumption, but commercial picking also provides valuable extra income for many.

Under the Skolt Act and the Act on Natural Economy Industries, State support can be granted for natural industries and small enterprises. Regional development funds provide financial support for the establishing and maintenance of enterprises, for example in forest ecotourism. Product development support is also available from the Finnish National Technology Agency (TEKES). Regionally significant initiatives and projects are eligible for support from EU research and development funds.

In addition to support for enterprises, product development and natural economy industries, the provincial governments can also grant funding for development activities in rural villages. Provincial environment centres, provinces and the Ministry of the Environment support various development projects related to the various uses of forests and natural product enterprises.

Indicator 3.10
Quantity and Economic Significance of Non-Wood Forests Products

The Value of Non-Wood Forest Products

On the national scale, the economic significance of non-wood forest products and services is fairly small in comparison with income from timber sales (Table 3.1). However, locally and regionally, as well as for individual households, such income may be quite significant. Below are presented some estimates on the quantity, utilisation and economic significance of the various non-wood products of forests. The figures apply only to the sales of products to retailers.

Reindeer Husbandry and Game

Reindeer husbandry is an important economic activity in northern Finland. The Ministry of Agriculture and Forestry determines the maximum permitted number of reindeer (others than reindeer meant for slaughter) that the Reindeer Owners' Associations may have (Figure 3.10). The maximum number depends, among other things, on the sustainable capacity of winter grazing areas. Income from slaughter is only one part of the income generated by reindeer husbandry; when breeding, trade and traffic are included, the regional income from reindeer husbandry comes to about EUR 33.6 million per year.

In 1998, some 291,000 hunters purchased a hunting licence. According to the Finnish Game and Fisheries Research Institute, the amount of money expended in recreational hunting in 1993 was EUR 128 million.

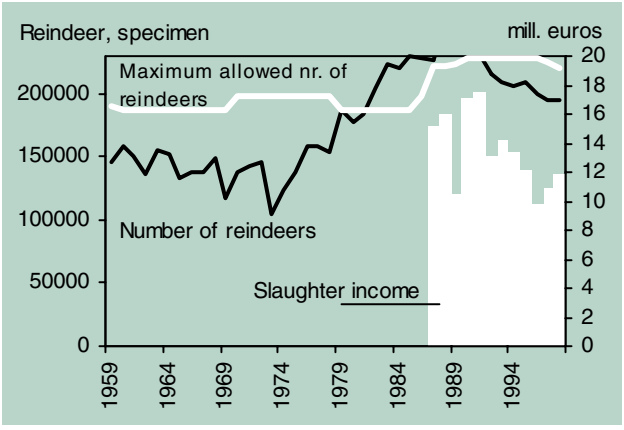


Figure 3.10. Reindeer population and slaughter income 1959–99.
Source: National Federation of Reindeer Owners' Associations

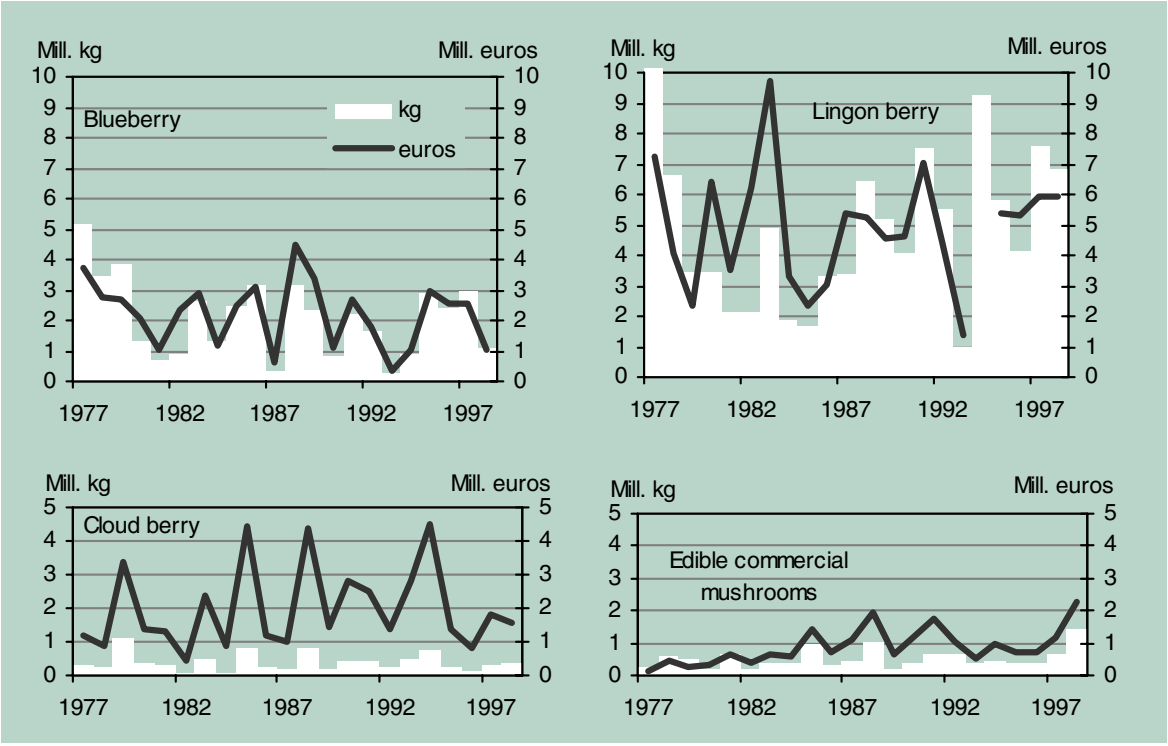


Figure 3.11. Volume and value of wild berry and mushroom sales to retailers in 1977–98. The figures do not include direct sales to consumers.
Source: Food and Farm Facts Ltd.

The average value of the game catch in the 1990s was about EUR 37 million annually. Economically, the most important game animal is the moose (Table 3.2). An estimate of the development of the winter moose population in Finland is presented in Figure 2.5.

Wild Forest Product

The amount of wild berries and mushrooms collected from forests and the income generated by these vary considerably annually due to weather conditions (Table 3.3, Figure 3.11). The annual crop of wild berries is estimated between 600 and 1,100 million kg. Under favourable conditions the amount of lingonberries, blueberries and cloudberries collected is about 40 million kg, which represents only about 5% of the total crop of the berries. About 75% of the collected crop goes for household consumption. The annual crop of edible mushrooms is 50–250 million kg, but only about 6 million kg are picked, mostly for private consumption. In 1988–98, the selling price of forest mushrooms was EUR 0.8–7.6 /kg, depending on the species and the year. Private consumption of mushrooms and berries is not included in statistics, because the amounts and value are difficult to estimate.

The amount of lichen exported from Finland has dropped by about one third from what it was in the early 1980s. Because of price changes, however, the total monetary value of the exports has not changed significantly (Figure 3.12).

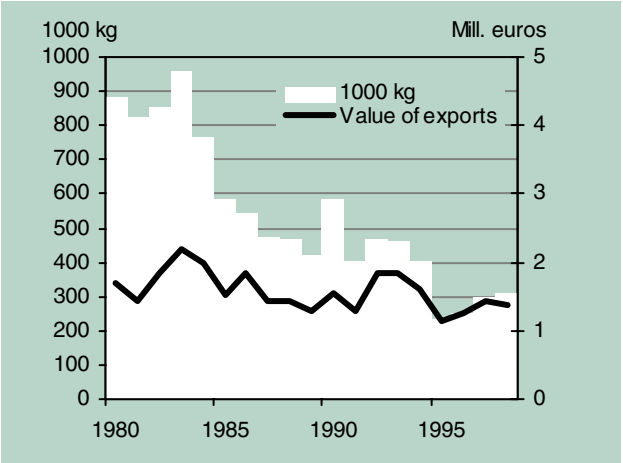


Figure 3.12. Volume and value of decorative lichen exports in 1980–98.
Source: National Board of Customs

Indicator 3.11
Ecotourism

Individual regional surveys on the economic significance of ecotourism have been conducted, but comprehensive data on the extent of ecotourism, its significance and effects are not currently available.

CRITERION 4

Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems

Forest protection and close to nature forest management were developed intensively especially in the 1990s. With conservation programmes, the number of protected forest areas has increased significally and Finland is currently one of the foremost countries in Europe in terms of both forest protection and close to nature forest management. The maintenance of forest biodiversity is one of the key objectives of the reformed Forest Act.

In the Convention on Biological Diversity adopted at the UN Conference on Environment and Development (Rio de Janeiro 1992), biological diversity is defined as the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (Annex 1).

The Environmental Programme for Forestry in Finland (1994) divides the diversity of forest ecosystems into three hierarchical levels. Regional diversity covers the diversity of forest types, communities of organisms and ecosystems, i.e. their number and structural variation. Inter-species diversity consists of the variety and diversity of species inhabiting forests, in other words, variations in the number of species, their relative numbers and their functional significance. Intra-species diversity is the genetic diversity within each species, i.e. the genetic variation of the species.

International agreements, legislation and various action programmes aim at securing biological diversity and its appropriate enhancement. The principal instruments for safeguarding the diversity of forest ecosystems are protection of natural forest ecosystems through the establishment of protected areas and the management of commercial forests in a way that ensures the continued survival of endangered species, protection of valuable habitats (key biotopes) and maintenance of the diversity of forests.

Indicator 4.1
Instruments to Regulate the Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems

International Agreements, National Action Programmes and Biodiversity

The signatory countries of the Convention on Biological Diversity and of the Resolutions of the Ministerial Conferences on the Protection of Forests in Europe in Helsinki (1993) and Lisbon (1998) are committed to protect the biodiversity of forest ecosystems. At the follow-up conference of the Convention on Biological Diversity in Bratislava in 1998, the environmental ministers of the participating countries adopted a special work programme for forest biodiversity that places an emphasis on research and the development of the criteria and indicators of biological diversity (page 4).

The Finnish National Action Programme on Biological Diversity (1997–2005) was created to ensure the implementation of the obligations agreed upon in the Convention on Biological Diversity. The programme includes 124 measures designed to maintain biodiversity and promote sustainable use of natural resources, completed with jurisdictional responsibilities and requirements for cooperation and resources. The goal of the programme is to maintain a sufficient number and variety of ecosystems in terms of their structure and species, and to protect and manage biological diversity in order to ensure that neither species, genetic resources nor habitat types disappear from Finland. At the same time, the programme aims at promoting the sustainable use of natural resources and the economic possi-

bilities for the exploitation of diversity. The maintenance of the biological diversity of forest ecosystems is part of the national programme.

The Finnish Clearing-House Mechanism of the Convention on Biological Diversity (LUMONET) is the national information system required of signatory states of the Convention. The system is maintained by the Finnish Environment Institute.

The Diversity and Protection of Forest Ecosystems in Finnish Legislation

In Finland, issues involving the diversity of forest ecosystems are governed by the Ministry of Agriculture and Forestry and the Ministry of the Environment within their respective jurisdictions. Protected forest areas are covered under the Nature Conservation Act and the Act on Wilderness Reserves. The aims of the Nature Conservation Act adopted in 1997 include the maintaining biological diversity, conserving nature's beauty and scenic value, promoting the sustainable use of natural resources and natural environments, promoting awareness of and general interest in nature, and promoting scientific research. The Act also includes definitions for protected natural or comparable habitats, of which three occur in forests.

The Forest Act of 1997 aims at the sustainable economic, ecological and social management and utilisation of forests in a way that ensures sustainable satisfactory yield while their biological diversity is being maintained. The reformed Forest Act and Nature Conservation Act aim to improve the integration of the various uses of forests with forest protection and biodiversity aspects. Habitats of special importance (key biotopes) for the maintenance of biodiversity in forest ecosystems are defined in the Forest Act, which also includes provisions for the management of high altitude protective forests in Lapland (Criterion 5).

Important natural or comparable habitats as defined in the Forest Act, or habitats protected under the Nature Conservation Act, may not be managed or used in ways that might endanger their natural characteristics. The injunction against altering the natural habitats defined in the Nature Conservation Act enters into force after the relevant regional Environment Centre has passed a decision determining the boundaries of the site and has notified the forest owner of its decision. Habitats of special importance as per the definition of the Forest Act must be taken into consideration in all forest management practices. In addition to habitats stipulated in legislation, forest owners may voluntarily take other valuable habitats into consideration in the management of their forests.

Finnish nature conservation legislation also includes provisions on the protection of and international trade in endangered species. Following the classification of the World Conservation Union (IUCN), species are classified in Finland as critically endangered, endangered or vulnerable. Near threatened species are not considered endangered, and regionally extinct species are not included in the list of endangered species. The list is updated regularly (Table 4.1). The authorities have a statutory obligation to monitor and protect endangered species. In cases of violation of or crimes against nature protection, in addition to other sanctions, the perpetrator is required to pay compensation to the State for the protected animal.

When necessary, the Ministry of the Environment is required to compile a protection programme for species that require special protection. The law prohibits the destruction of habitats necessary for the survival of protected species, as well as any other actions that might impair their conditions of existence. The injunction enters into force when the relevant regional Environment Centre has determined the boundaries of the habitat and has notified the land owner of its decision.

Under the Act on Wilderness Reserves, 12 wilderness reserves have been established in Finland. The forests in these areas are maintained in their natural state, or they are under low-impact, close to nature management. Most of the wilderness reserves are located in northern Finland, in the arctic fjeld area.

Under the Act on the Forest and Park Service, the maintenance and appropriate enhancement of biodiversity must be taken into account by the Forest and Park Service as an essential aspect of the sustainable use and management of natural resources.

Conservation Programmes and Areas

Since the 1970s, the network of conservation areas based on the Nature Conservation Act has been developed through national conservation programmes. The programmes aim at covering as broadly as possible the most valuable and representative sites of the various habitat types. The programmes adopted by the Government include the programme for the development of national parks and strict nature reserves, the mire conservation programme, as well as programmes for the protection of old natural forests, herb-rich forests, bird wetland areas, and shorelines. According to these programmes, national parks, strict nature reserves and other conservation areas are established on State lands by special acts or decrees (Annex 1). Upon application by the landowner, private conservation areas can also be established as per the Nature Conservation Act. Wilderness reserves have been established and rapids protected from the construction of hydroelectric power station under other legislative acts. Furthermore, the Forest and Park Service and the Finnish Forest Research

Institute have established protected and recreational forests under their own decisions.

National conservation programmes cover both State lands and private lands. The goal is to complete the ratified conservation programmes by the end of 2007. This means that about 220,000 hectares forests will be protected; the areas will either be purchased by the State or established as private conservation areas. For this purpose, the Government has set up a funding programme of EUR 540 million. Protected forest areas and wilderness reserves established to date cover approximately 2.7 million hectares.

In addition to actual conservation areas, various other areas, such as high-altitude protective forests in Lapland, protected glacifluvial eskers, habitats of special importance as defined in the Forest Act, and habitats protected under the Nature Conservation Act (page 51), are designated as areas where only restricted forest management is permitted. Other such areas are municipal and State recreational areas, as well as areas reserved for conservation under regional and general land-use plans.

The Natura 2000 network of conservation areas is based on the EU Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC, commonly called the Habitat Directive) and the Directive on the Conservation of Wild Birds (79/409/EEC, called the Bird Directive). The Government made its decision on the proposal for the Finnish Natura 2000 network in 1998. The backbone of the network is made up of existing conservation areas and programmes. About 3 % of the network will consist of new areas. Review of the proposal was carried out in 1999, on the basis of which the EU Commission has requested that Finland amend its proposal. The proposal for the amendment is due for completion in 2001.

In conjunction with the National Forest Programme 2010, a broad-based working group was appointed to develop the forest protection in southern Finland. Appointed by the Ministry of the Environment, the group was charged with determining the ecological and biological conservation principles for the forest protection in southern Finland, and to assess the need for protection on its basis. A separate working group was charged with preparing programmes to define the targets, funding and actions required for protection.

The coverage and representativeness of the conservation areas are assessed in the Evaluation of Finnish Nature Reserve Networks programme, conducted by the Finnish Environment Institute. This programme examines the extent of the current network and its capacity to safeguard the protection of biological diversity in Finland.

Economic Instruments for Protecting Forests

Under the Act on the Financing of Sustainable Forestry, State subsidies may be granted for work in private forests which aim at maintaining biological diversity and managing forest ecosystems. Forest ecosystem management projects funded by State grants include surveys of habitats of special importance as defined in the Forest Act, the preparation of ecosystem management plans, broad-based environmental advisory activities, training and information services, and the development of environmentally friendly methods in forestry. When refraining from work on the habitats of special importance (key biotopes) covered by the Forest Act or the Nature Conservation Act can cause an economic loss deemed significant, forest owners are also eligible for compensation.

Monitoring and Maintenance of Sites of Biological Diversity in Forests

The Environmental Programme for Forestry in Finland, adopted by the Ministry of Agriculture and Forestry and the Environmental Ministry in 1994, emphasised the creation of a comprehensive monitoring system for forest and peatland ecosystems. The collection of data on the biological diversity in forests was added to the 9th National Forest Inventory (Annex 4). The inventories provide information on the national and regional levels on both commercial and protected forests.

Surveys of habitats important from the perspective of nature conservation are conducted by the forest and environmental authorities, the Forest Centres, the Finnish Forest and Park Service and the Environment Centres. The Forest Centres, the Forest and Park Service and the forest industry companies carry out surveys of natural features and habitats important for the preservation of biodiversity in commercial forests; these sites are designated as such in forest management plans. Plans for the protection of endangered species are developed at the Finnish Environment Institute. In addition, environmental organisations carry out voluntary assessment and planning work. The "Research, follow-up and information systems"(TST) working group of the National Action Programme on Biological Diversity is developing a system for monitoring biological diversity on the national level.

Forest management recommendations issued by the Forestry Development Centre Tapio, the Forest and Park Service and by the forest industry companies place an emphasis on the identification of valuable habitats in forests and the creation of deciduous and mixed forests. They also encourage forest owners to pay attention to the characteristics of the site, landscape, game, as well as the multiple and recreational use of forests. The identification and management of valuable forest

Table 4.1. Classification of endagered species in Finland in 2000.

	Total nr. of species	Forest species	Peatland species
Endagered	1 505	564	65
critically endagered	249		
endagered	452		
vulnerable	804		
Regionally extinct	186	62	4
Near threatened	1 060	416	51
Least concern	12 330		
Data deficient	appr. 3 660		
Excluded from estimate	appr. 24 000		

Source: Finnish Environment Institute

habitats is also addressed in the training provided to forest owners and forest workers by the various forest organisations.

Since 1995, the maintenance of biodiversity during harvesting in both private and company-owned forests has been monitored by using the quality monitoring system developed by the Forestry Development Centre Tapio. The field work involved is carried out by the Forest Centres. The Forest and Park Service has been conducting similar monitoring in the State forests under its management since 1994.

Prior to undertaking commercial harvesting or other forestry measures that might endanger habitats of special importance or other protected sites, forest owners are required to submit a Forest Use Declaration to the relevant Forest Centre. The declaration must detail the important habitats in the area where activities are planned, as well as measures designed to preserve their natural characteristics.

Both private forests and forests owned by the forest industry companies are currently managed using a system of multi-objective forest planning, the purpose of which is to integrate the aims of wood production and the enhancement of forest biodiversity as well as environmental values and the multiple use of forests. Under existing forest legislation, the Finnish Forest and Park Service is required to ensure that the maintenance of biological diversity is included as an essential aspect in the sustainable management and utilisation of natural resources.

In addition to protecting and defining the boundaries of conservation sites in forests, measures for their management are also needed. Such measures include mimicking of natural forest fires, increasing the amount of decaying wood in forests, restoration of wetlands, and the management of cultural habitats such as fields, meadows, grazing areas and forests being established after slash-and-burn cultivation.

Continuous Information Support of Biodiversity Significant

In Finland, one of the goals of the Environmental Programme for Forestry was to ensure that forest and conservation research also produce comprehensive information on forest biology, forest biodiversity and its development, as well as on the environmental impacts of silviculture. The informational needs of forest research were surveyed in 1996. Various research organisations have responded to the challenge by establishing extensive research programmes on biodiversity such as the following:

- The Research Programme on Biological Diversity (LUMO) coordinated by the Finnish Environment Institute was carried to its conclusion in 1996. The most important issues were the development of methodology for research, monitoring and inventory, and the design of methods and indicators for the maintenance of biodiversity and the assessment of sustainable use of commercial forests.
- The Forest Biodiversity Research Programme (1995–99) of the Finnish Forest Research Institute covered

Table 4.2. Number of endangered forest species, by type of habitat.

	Heath forest		Herb-rich forests		Esker forests	Burnt over areas	**Endagered species in forests**	**Proportion of all endagered species, %**	Birch-spruce mires	Grazing ground
	total number of species	*– of which old forest species*	total number of species	*– of which old forest species*					Nr. of species	
Vertabrates	7	*4*	3	*1*			**12**	***24***		
Invertabrates	79	*69*	122	*58*	15	29	**252**	***33***	2	31
Vascular plants	3		26		6		**35**	***19***		10
Mosses		*3*	12	*8*			**15**	***11***	9	
Fungi	94	*70*	152	*32*			**250**	***67***	2	22
Total	183	*147*	315	*99*	21	29	**564**	***38***	13	63

Source: Finnish Environment Institute

the indicators of biodiversity, their measurement and monitoring at the national level, the succession and dynamics of natural forests, the effects of the structure and management of forests on their biodiversity, as well as regional forest management planning and biodiversity. Monitoring systems for biodiversity are also developed in conjunction with the National Forest Inventories.

- The Finnish Biodiversity Research Programme (FIBRE, 1997–2002), conducted mostly with funds from the Academy of Finland, produces information on biological diversity and related ecological, socio-economic, cultural and legislative factors. The programme also includes other research projects involving sustainable forestry.
- The "Research, follow-up and information systems" working group of the Finnish National Action Programme on Biological Diversity 1997–2005 promotes cross-disciplinary research cooperation on the maintenance of biodiversity and sustainable use of natural resources, research on ecosystems and the development of the indicators of biological diversity. The group is also developing the system for monitoring biological diversity on the national level.

The protection and biological diversity of forest ecosystems are studied, and the related monitoring and research methods are also developed within several research projects in the Finnish universities, museums of natural history, and research institutions. The Finnish Environment Institute studies, monitors and assesses changes in the development of biological diversity in forests, and their causes, and also develops tools for the prevention of changes deemed detrimental to biodiversity. The Nature and Land Use Division at the Finnish Environment Institute develops and maintains a register of endangered species in Finland (UHEX).

Indicator 4.2
Endangered and Vulnerable Species of Flora and Fauna

There are about 43,000 species of living organisms in Finland, one half of which lives in forests. A possible threat to survival has been identified in the case of 18,700 species. In the new classification completed in 2000, 1,505 species are classified as endangered (Table 4.1; Annex 1). Of the threatened species, 38% lives in forests. Of these, 81% lives in herb-rich forests and old natural forests on mineral soil (Table 4.2).

Most of the forest species in Finland live in commercial forests, but some species depend for their survival on certain natural habitats or natural features such as decaying wood. Forest management can contribute to the preservation or destruction of the habitats of many endangered species, and thus to the species' possibilities for continued survival.

It has been estimated that the greatest threat to survival of species in Finland is posed by the decrease in the number of herb-rich forests, natural old forest remnants, and deciduous and decayed trees. Since most herb-rich forests and other fertile forest lands in Finland were earlier cleared for fields, the existing herb-rich forests are extremely important for the survival of endangered species.

Indicator 4.3
Protected Forests and Forests with Harvesting Restrictions

Although some conservation and protection decisions had been made earlier (e.g. the Act on the High-Altitude Protective Forests in 1922), the first national parks and strict nature reserves were established in Finland in 1938. In the last 25 years, the area of protected forests has increased considerably. At the beginning of 1999, protected forests accounted for 7.6% of forest area (forest land and low productive forest land), and protected forests or forests under limited utilisation accounted for 10.6% of forest and low productive forest area (Table 4.3). In addition to the areas presented in the table 4.3, commercial forests managed by the Forest and Park Service include a total of 123,000 hectares of valuable natural features that are excluded entirely from commercial use by landscape ecological plans (page 34). Furthermore, the Forest and Park Service has restricted the utilisation of commercial forests on sites that are valuable in terms of game and landscape values, as well as on other, ecologically valuable sites (totalling 198,000 hectares of forests).

The regional representativeness of protected forest areas varies in different parts of the country (Figure 4.1). For example, the area of protected old natural forests in northern Finland is estimated to be sufficient for ensuring the survival of the species living there, as well as the preservation of valuable natural sites. The adequacy of protection measures in forests in southern Finland was assessed in 2000 by a working group appointed by the Ministry of the Environment (page 47).

The Government made its decision on the proposal for the Finnish Natura 2000 network in 1998. The proposed network included a total of 1,326 sites as defined in the Habitat Directive (4.72 mill. ha) and 439 sites as defined in the Bird Directive (2.75 mill. ha). The proposal placed special emphasis on the protection of biotopes in the boreal zone. The backbone of the Natura 2000 network consists of existing conser-

Table 4.3. Protected forests in Finland.

Level of protection	Forest and low-productive forest land in protected areas ha	Proportion of forest and low-productive forest land %	Land area of protected areas ha	Proportion of total land area %
1. Strictly protected forests	1 528 300	6.6	3 175 300	10.4
2. Other valuable areas important for nature conservation				
2a. Protected forest areas where restricted harvesting allowed	211 100	0.9	299 900	1.0
1+2a. Protected forests (ha)	*1 739 400*	*7.6*	*3 475 200*	*11.4*
2b. Forest areas under limited utilisation	700 200	3.0	1 013 900	3.3
1+2a+2b Protected forests and forests under limited utilisation	*2 439 500*	*10.6*	*4 489 100*	*14.7*

According to the Working Group for Areas of Protected Forests (1999), strictly protected forests (Class 1) include areas protected under legislation (nature reserves, national parks, protected parts of wilderness reserves and other protected areas) as well as areas protected by the Forest and Park Service and the Finnish Forest Research Institute under their own decisions. Class 2a includes, *inter alia*, habitats of special importance (key biotopes) as well as forests valuable in terms of nature conservation where felling with certain restrictions is permitted. Class 2b includes, for example, high-altitude forests in Lapland and State recreational areas, where felling is controlled. The table also includes areas that are covered by conservation programmes (about 350,000 hectares), although all of these have not yet been officially classified as protected areas. For terminology, see Annex 1.

Source: Publication: The Finnish Environment 300

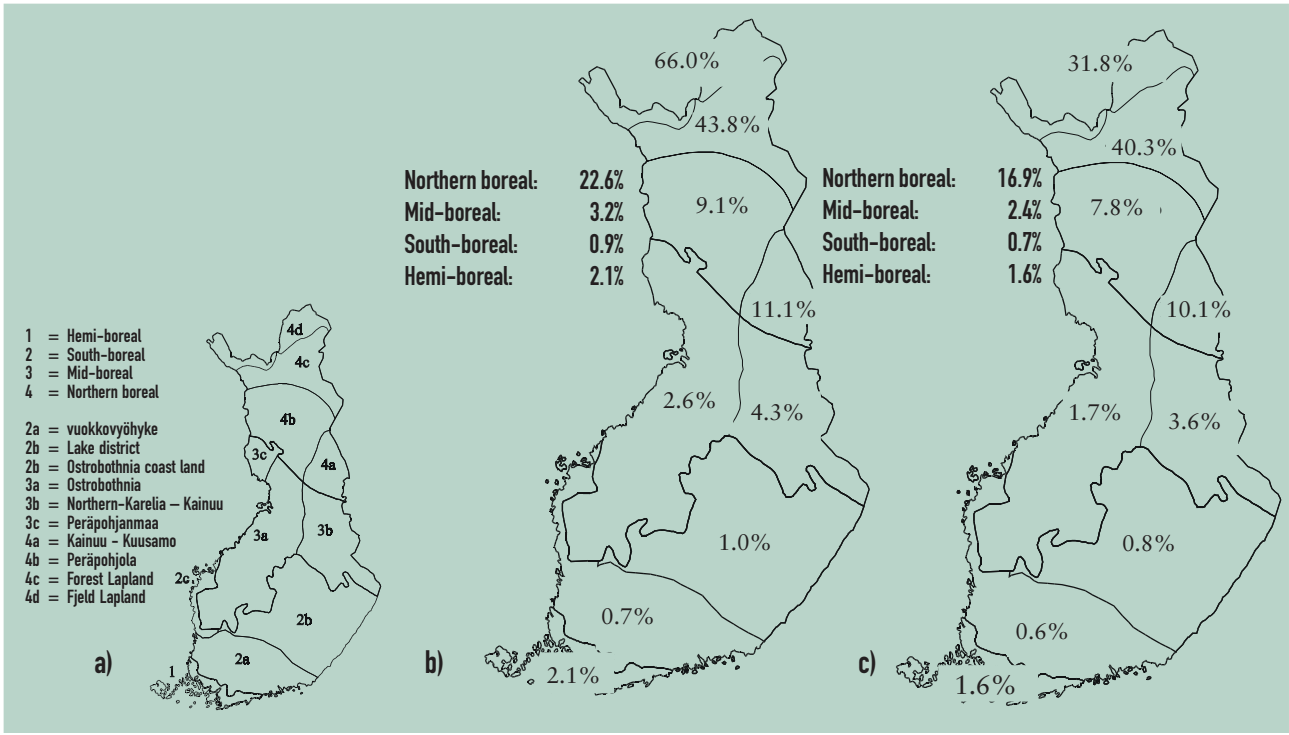


Figure 4.1. Representativeness of protected forests according to NFI8 (1986–94).
a) Forest vegetation zones
b) Proportion of protected forestry land to the forest vegetation zones and their sub-zones
c) Proportion of protected forest land to the forest vegetation zones and their sub-zones

Protected forests include protected areas established under the Nature Conservation Act or the Act on Wilderness Reserves, as well as areas protected under the Old Natural Forest and Herb-Rich Forest Protection Programme, the Mire Conservation Programme, and the Programme for the Development of National Parks and Strict Nature Reserves.

Sources: Finnish Forest Research Institute / National Forest Inventory and Finnish Environment Institute / Publication: The Finnish Environment 395

vation areas: the majority (97%) of the land areas specified in the proposal are either protected previously or reserved for protection. According to the EU Commission, Finland should make a proposal for new conservation areas with respect to 15 biotopes and 17 species habitats, to ensure sufficient coverage of conservation. The Natura network was extended prior to the assessment of Finland's proposal by the scientific expert group of the Commission in 2001.

Indicator 4.4
Valuable Forest Habitats and Their Protection

National data on the quantity and quality of valuable habitats in forests is not available at the moment. However, since 1996, estimates on the number of valuable habitats in Finnish forests have been made in conjunction with the National Forest Inventories. So far results have been completed for a few Forest Centres in southern Finland (Table 4.4). Within the inventoried area (commercial forests and protected forest areas), habitats of special importance as defined in the Forest Act and habitats protected under the Nature Conservation Act represent a total of 1–4% of forestry land, depending of the Forest Centre's area.

The Forest Centres and the forest industry companies carry out surveys of natural features in the commercial forests. Corresponding surveys are also incorporated in the landscape ecological planning prepared by the Forest and Park Service. The surveys were initiated in 1998. According to the results of the surveys completed to date, habitats of special importance as defined in the Forest Act represent 0.35% of the area of private forests (commercial forests).

Differences in the estimates on the number of habitats are due to differences in the method of estimation. Moreover, the National Forest Inventories cover both commercial and protected forests, whereas the surveys of the Forest Centres only cover commercial forests. In 2000, the Forest Centres launched a survey of protected habitats as defined in the Nature Conservation Act.

Since 1995, the Forestry Development Centre Tapio and the Forest Centres have been assessing the quality of nature management on harvesting sites both in private forests and forests owned by the forest industry companies. The Forest and Park Service conducts similar surveys in the State forests in its care. The results published in 1999 show that the area of natural features, i.e. sites excluded from harvesting, accounted for about 3% of the inspected areas of thinning and regeneration harvesting in private forests and forests owned by the forest industry companies. In forests of all owner groups, the corresponding figure is higher because some of the natural features are excluded from the harvesting already in planning. In harvesting sites habitats protected under the Nature Conservation Act and the Forest Act accounted for about 15% of the area of all habitats.

Natural features preserved in State forests managed by the Forest and Park Service comprised 4.3% of the area of regeneration cuttings. On the basis of landscape ecological plans, it is estimated that a total of 5–

Table 4.4. Valuable forest habitats[1)] in the province of Åland and the area of six Forest Centres (see map, page 6), according to the National Forest Inventory.

	Commercial forests		Forestry land, total		
Forest Centre (years of inventory)	Protected by the law[2] ha	Valuable[1] habitats total, ha	Protected by the law[2] ha	Valuable[1] habitats total, ha	Proportion of habitats protected by law[2] to forestry land, %
Åland (1997)	3 897	9 153	4 371	9 670	3.7
South Ostrobothnia (1997)	29 230	106 257	50 544	132 124	3.4
Central Finland (1996)	10 846	76 028	14 897	81 947	1.1
Kymi (1997–98)	5 883	20 813	9 803	26 623	1.2
Southwest Finland (1998)	13 004	108 425	13 342	125 732	1.2
North Savo (1996)	18 661	144 955	22 970	151 212	1.7
Coast (1997–98)	37 131	117 291	55 801	142 885	15.0

[1)] Valuable forest habitats are:
1. Habitats of special importance under the Forest Act (7 habitats)
2. Habitats protected under the Nature Conservation Act (9 habitats, 3 in forests)
3. Other valuable habitats (7 habitats).

[2)] In the inventory, items 1 and 2 are included in the habitats protected by law.

Source: Finnish Forest Research Institute / National Forest Inventory

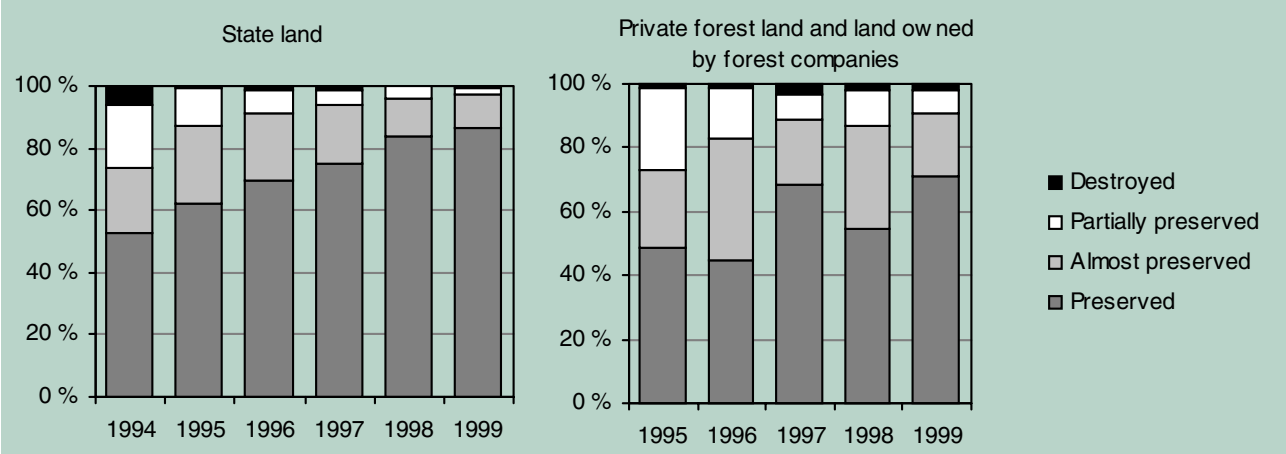


Figure 4.2. Preservation of natural characteristics in harvesting, according to the quality monitoring of the nature management in commercial forests.
Sources: Forestry Development Centre Tapio and Forest and Park Service

6% of forest land in State forests managed by the Forest and Park Service is either entirely or almost entirely excluded from commercial use on the basis of their natural features. According to estimates made by the Forest and Park Service and the Forestry Development Centre Tapio, the characteristics of natural features were on the average preserved well during harvesting (Fig. 4.2).

Indicator 4.5
Tree Species Composition

There are four coniferous and more than 20 deciduous tree species that are native to Finland. Commercially, the most important species are Scots pine and Norway spruce, as well as silver and downy birch, which together make up 97% of the total volume of stock (Figure 1.2 and Table 4.5). In the 1950s and 1960s, the share of deciduous trees, which are important for the maintenance of biodiversity and the ecology of the soil, decreased owing to their use as fuel, and also because of the then prevalent methods of management. Today, forest management recommendations place an emphasis on the creation of deciduous and mixed forest stands; the amount of birch dominated stands has increased and aspen is also favoured in silviculture. The majority of deciduous trees grow in mixed forests where pine and spruce predominate.

The area of forests established with introduced tree species is only about 20,000 hectares, or less than 0.1% of all forests. About two thirds of this area is Siberian larch, the rest mainly lodgepole pine.

Indicator 4.6
Pure and Mixed Forest Stands

According to National Forest Inventory data (1986–98), pure stands (proportion of dominating species exceeding 95% of stock volume) account for 44% of all forest land. The prevalence of pure stands is in part explained by the distribution of site types: most sites grow naturally one tree species such as pine on dry mineral-soil sites.

Approximately 30% of forests have a mixture tree species, with the predominant species accounting for less than 95% but more than 75% of the volume of stock. Mixed forests, with the proportion of dominant species under 75% account for 26% of forest land. It is estimated that the proportion of mixed stands will increase due to present trends in silviculture. For example, management recommendations stipulate that in thinnings a mixture with 10–30% of deciduous trees should be left whenever possible.

Indicator 4.7
Decayed and Wildlife Trees in Commercial Forests and Conservation Areas

Many endangered forest species depend on decaying wood for their survival. The decrease in the amount of dead wood in commercial forests has caused many organisms to become endangered. The amount of decayed wood in commercial forests is now being increased by leaving both living and dead trees standing in regeneration sites, as well as butts and tall stumps. Species benefiting from dead wood, and on the long term from wildlife trees, include many species of lichen, bracket, insects, hole nesters and predatory birds, as well as spe-

cies favouring burnt forests.

According to the National Forest Inventory (1986–98), the volume of dead mechantable trees (commercial forests and protected forest areas combined) was on the average 1.0m³/ha in sourthern Finland, and 2.2m³/ha in northern Finland. In the 9th National Forest Inventory, which commenced in 1996, the amount of decayed wood is estimated with more precision, and includes separate figures for dead trees fit and unfit for industrial use, standing dead trees and down trees.

The amount and quality of trees left in the site in harvesting is assessed annually by monitoring the quality of nature management in forestry. Such monitoring is conducted by the Forest Centres in private forests, and by the Forest and Park Service in the State forests under its management. In 1996–98, the average volume of uncut trees on regeneration sites in private forests and forests of the forest industry companies was 6–7m³/ha. The proportion of uncut trees to the total volume of stock on site prior to regeneration harvesting was 3%, on average. The corresponding figure for State forests in recent years has been about 8m³/ha, which corresponds to 6–8% of the average volume on regeneration sites. In certification inspections, it has been observed that the volume of uncut trees and decayed trees in private forests is 6–12m³/ha.

The amount of decayed wood in natural forests varies considerably with the development stage of the forest and disturbances. In young natural forests, the amount of decayed wood is greatest immediately after the disturbance that led to regeneration, whereas the amount is lowest in forests that are in the middle of their life cycle. The average volume of decayed wood in natural old spruce stands on mineral-soil sites in southern Finland is 90–150m³/ha. In the north and in nutrient-poor sites, the amount of decayed trees decreases, and is at its lowest in the pine stands near the timber line in Lapland (10–20m³/ha). On natural low productive forest land, the figure is even lower.

Indicator 4.8
Gene Reserve Forests

Since 1992, special gene reserve forests have been established to safeguard the genetic diversity of forest trees. These forests are regenerated either naturally or artificially using seeds from the original trees of the particular site, or seedlings grown from them (Table 4.6). Finnish gene reserve forests are part of the European Forest Genetic Resources Programme (EUFORGEN). Logging and other silvicultural measures may also be carried out in gene reserve forests but no gene transfer is allowed. The genetic diversity of natural forests is maintained in conservation areas. Genetic resources are also preserved in registered seed orchards and seed collection areas. There are 923 seed collection areas in Finland, covering a total of 5,120 hectares. The number of seed orchards for various tree species is 210, covering a total of 2,830 hectares.

Table 4.5. Dominance of tree species on forest and low productive forest land according to NFI8 and NFI9 (1986–98). The dominant species is the species with greatest prevalence in the stand by volume (or the number of trees in the seedling stand).

	Southern Finland	Northern Finland	Total
	proportion of forest and low productive forest land, %		
Treeless	1.6	1.1	1.3
Scots pine	58.2	73.2	65.6
Norway spruce	31.3	13.9	22.7
Silver birch	2.8	0.1	1.5
Downy birch	4.9	11.4	8.1
European aspen	0.4	0.1	0.2
Grey alder	0.4	0.0	0.2
Black alder	0.2	0.0	0.1
Other conifer	0.1	0.1	0.1
Other borad-leaved	0.1	0.0	0.0

Source: Finnish Forest Research Institute / National Forest Inventory

Table 4.6. Gene reserve forests in 2000.

Species	Number	Area, ha
Scots pine	23	5219
Norway spruce	8	1326
Birch	4	422
Rare hardwoods	5	64
Total	40	7031

Source: Finnish Forest Research Institute / Forest Genetic Register

CRITERION 5

Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (Notably Soil and Water)

The protection of soil and water is addressed extensively in the Finnish guidelines and recommendations for forest management. The maintenance of forests in high-altitude forest areas in Lapland has been secured in legislation since 1922. Between the 1950s and 1980s, extensive areas of peatland were drained, which caused some local deterioration in water systems. Since then, the issue of environmental impacts has been a point of special concern in guidelines and recommendations for silviculture, as well as in the implementation of nature protection. Mainly owing to the composition of the soil and the geography of the country, there are no major concerns regarding soil or water in Finnish forestry.

Protective functions of forests are important, especially near the tree line in northern Finland. Furthermore, the protection of many smaller habitats, such as brooks, springs and ponds, calls for either special treatment of the surrounding forests, or refraining from all management. Increasing attention is paid to the protection of soil and water in the vicinity of silvicultural operations, and on the prevention of damage that might be caused by forest management. Erosion of soil, avalanches or other similar environmental problems are not encountered in Finland, and therefore play no part in silvicultural decision making, except in some special cases.

Indicator 5.1
Instruments for the Maintenance and Appropriate Enhancement of Protective Functions in Forest Management

High-altitude Protective Forests in Northern Lapland

High-altitude protective forests are forests growing in a specified zone in Lapland in the immediate vicinity of the timber line, generally over 300 metres above sea level. Forests in this zone require protection to prevent the timber line from receding. Provisions regarding these forests are incorporated in the Forest Act (1997) which repealed the Act on the High-Altitude Protective Forests (1922). A Government resolution on high-altitude forests, based on the Forest Act, entered into force on January 1, 1999.

High-altitude protective forests are managed with special care, and their regeneration is monitored constantly to ensure that changes that might endanger regeneration are detected sufficiently in advance. In this zone, cuttings for any other purpose than household consumption of fuelwood are only permitted if covered by harvesting and regeneration plans specifically approved by the forest centre. In special circumstances, the harvesting of wood for household consumption may also be restricted or prohibited.

Although earnings from harvesting in commercial forests in this zone can be an important source of income to the local population, Finnish legislation particularly aims to support natural livelihoods and Sami culture through its emphasis on the careful management of forests in the high-altitude protective forests.

Protective Functions of Forests and Forest and Environmental Legislation

Under the Forest Act, small, especially vulnerable areas which are important for the preservation of forests and their protective functions may be designated as protective forests by the Ministry of Agriculture and Forestry. The Ministry can also issue general directives regarding the use of protective forests, if the preservation of forests to shelter habitation or cultivations, or to prevent landslides, requires special action in areas where forests are especially susceptible to damage from strong winds, such as shores, and high-altitude areas or cliffs.

Under the Forest Act, the management of forests must take into account the special features of natural or corresponding habitats which are important for the maintenance of biodiversity. Such habitats include areas in the vicinity of small bodies of water (brooks,

springs and small ponds), and fertile peatlands.

The Environmental Protection Act, which entered into force in March 2000, combines under one law provisions that were previously scattered in Finnish legislation, and it also improves the consistency of permit procedures for environmental protection. Aspects of the new Environmental Protection Act relevant to forestry include provisions regarding the pollution of surface and ground water, construction on water, drainage, and the discharge of harmful substances into water systems.

The aim of the Act on Environmental Impact Assessment Procedure as well as other environmental provisions is to promote the assessment of environmental impacts, develop consistency in planning and decision making, and enhance the accessibility of information and opportunities for public participation in decision making. For example, environmental impact assessment (EIA) must be carried out for all peat production areas of over 150 hectares, as well as non-fragmented forest, marshland or wetland areas exceeding 200 hectares, where drainage would permanently alter the nature of such areas. Also, permanent removal of tree cover, and regeneration of forests with introduced species requires that EIA be performed. Environmental impacts must generally also be assessed for decisions regarding the management of or livelihoods related to the Natura 2000 network, or other assessment in accordance with the Nature Conservation Act must be carried out.

The Act on Compensation for Environmental Damage confers liability to pay damages to those persons or bodies whose actions have environmental impacts, provided that the causal connection between the action and the damage referred to in the Act is probable. So far there have been no precedents of forest-related damages based on the Act.

Implementation of Water and Soil Protection

The Government's resolve in principle regarding the targets relative to water protection (1998) requires that, in conjunction with ditch cleaning and supplementary drainage, for example, stringent water protection measures be implemented (e.g. sedimentation basins). Furthermore, buffer strips must be created in harvesting areas in order to reduce the environmental phosphor and nitrogen load on water systems caused by loggings by one half of the estimated level of 1993 by the year 2005. The same targets are also set forth in the National Forest Programme 2010. The private forestry organisations, the Forest and Park Service and the forest industry companies, in cooperation with the environmental authorities, have produced guidelines, recommendations, brochures and other material on water and soil protection in forestry. For reasons of water protection, it is recommended that buffer strips be created in conjunction with regeneration cuttings, site preparation and fertilisation, that no fertilisers or pesticides be used in groundwater areas, and that silt run-off from drainage areas be prevented.

Environmental protection is also taken into account in the management plans for commercial forests, protective forest areas, and wilderness reserves. Harvesting on the High-Altitude Protective Forest Zone for uses other than household consumption is permitted only in accordance with the harvesting and regeneration plans approved by the Forest Centres, and in some cases, even harvesting for household fuelwood may be restricted or prohibited. When the use of wood for household consumption is restricted, private forest owners are paid compensation. According to the Act on the Financing of Sustainable Forestry, subsidised activities must be based on appropriate plans. All plans for the ditch cleaning and supplementary drainage made by the Forest Centres must also include a separate plan for water protection.

Compliance with the Environmental Protection Act and the Water Act is monitored by municipalities and the regional Environment Centres. Forest Centres and the Forest and Park Service notify the Environment Centres of any drainage plans that they may have. Drainage on private land, however, is not covered by any statutory procedure for monitoring or for hearing.

Development and Research for Assessing and Monitoring Environmental Issues

In 1990, the Ministry of Agriculture and Forestry and the Ministry of the Environment launched a project on the impacts of forestry on water systems and their prevention (METVE). The final report of the project was published in 1995. Several of the METVE sub-projects continue within the joint research programme "Environmental Impact of Forestry" coordinated by the Finnish Forest Research Institute (1996–2000). The final report of the programme will contain estimates on the national and regional levels of environmental loads.

The Finnish Environment Institute, the Finnish Forest Research Institute and various universities conduct research into environmental issues. *Metsäteho*, a private research company financed by Finnish forest industry enterprises and the Forest and Park Service, has produced several studies and reports on environmental loads. The system developed by the Forestry Development Centre Tapio for monitoring the quality of nature management in commercial forests is used to evaluate the implementation of water protection in soil preparation and harvesting. In addition to monitoring the quality of ecological management in general, the Forest and Park Service also employs a separate system for monitoring water protection annually.

Indicator 5.2
Water Protection in Harvesting and Site Preparation

Systematic procedure for monitoring water protection has not been yet organised in Finland, but since 1996, the Forest and Park Service has been performing an annual survey on water protection in a number of sample sites. Measures undertaken to protect water systems during harvesting and site preparation are assessed in conjunction with the quality monitoring of management in commercial forests (pages 47 and 51). Nature management has improved since 1995, when the assessments were first undertaken. At the same time, the standard for nature management has also been raised as a result of the reform of forest legislation and the introduction of forest certification.

The assessment of the level of nature management and environmental protection is a complex undertaking that involves many practical problems. For example, no strict numerical target widths have yet been determined for buffer strip near water systems where special management is required or where management is prohibited. Ongoing surveys have attempted to develop guidelines for determining the required widths, but at present the width of the buffer strips is determined on a case-by-case basis.

The Forestry Development Centre Tapio and *Metsäteho* have produced a recommendation on the management of shoreline forests. According to the recommendation, the factors to be taken into account when determining the width of the buffer strip include the slope of the terrain, the coverage of canopy and ground vegetation, the high-water line, and the type of water system. The function of the buffer strip with respect to the water system must also be taken into account. Dense tree covered buffer strips must be left for springs and brooks, whereas fellings in the buffer strips along larger bodies of water may sometimes be carried out to open up the landscape.

Indicator 5.3
Phosphor and Nitrogen Loads on Water Systems Caused by Harvesting

Forest management can affect water systems by increasing the load of nutrients and solids during site preparation, harvesting, drainage and ditch cleaning. At present there is no comprehensive data available on such environmental loads caused by forestry. Although the loads from forestry are much smaller than from agriculture, without sufficient protection measures, forest management can locally increase the loads in water systems around which forests predominate, and also in headwaters that are still uncontaminated.

Targets for reducing nitrogen and phosphor loads from forestry by the year 2005 are laid down in the Government's resolve in principle on targets regarding water protection made in 1998 (page 51).

Indicator 5.4
Water Protection Plans in Drainage Projects

Since 1992, drainage projects carried out with State funding granted under the Act on the Financing of Sustainable Forestry must also include a plan for water protection. The amount of drained areas are included in statistics, but the effects of drainage may extend further. Comprehensive data on the extent of areas affected by drainage and the related protection aspects and water protection measures is not currently available.

Indicator 5.5
Area of Forestry Land in High-Altitude Protective Forests

The purpose of forest legislation for protective functions is to secure the maintenance of high-altitude sensitive ecosystems near the timber line in northern Lapland and in other areas where forests prevent erosion or provide shelter from wind.

The High-Altitude Protective Forest Zone comprises the municipalities of Enontekiö and Utsjoki, and parts of the municipalities of Kolari, Muonio, Salla, Savukoski and Sodankylä. The total area of the zone is about 3.3 million hectares, of which forestry land accounts for approximately 770,000 hectares. The State owns 91% of the forestry land in this area (Table 5.1), the remaining 9% is owned by private individuals, municipalities, parishes, and consortia. Around 1,000 Finns own forests in this area, a considerable number of them Samis.

Table 5.1. Area of forestry land in the High-Altitude Protective Forest Zone (state land).

	Commercial forests ha	Special forests ha	Total ha
Forest land	208 589	136 859	345 449
Low productive forest land	78 850	96 380	175 230
Other land area for forestry	88 213	89 857	178 071
Total	375 653	323 097	698 750

Source: Forest and Park Service

CRITERION 6

Maintenance of Other Socio-Economic and Cultural Functions and Conditions

The forest sector and forest cluster have remarkable impact in the Finnish national and regional economy. The share of the forest cluster of the gross national product is 8%, and 40% of net export earnings. Although the number of people employed by the forest sector has decreased, new financing and development measures have strengthened the regional importance of entrepreneur activities in forestry and related fields.

The income level in the forest industry has followed general average wage development in Finland, whereas the income level in forestry is lower than the average. The level of social security benefits of employees in the forest sector is approximately the same as that in other similar fields. The occupational health and safety of forestry workers is covered extensively in Finnish legislation.

Opportunities for public participation in decision making concerning the forest sector have been improved in recent years. New channels and forms of participation are being developed continuously. Furthermore, the preservation of cultural heritage related to forests has increased.

The Everyman's Right guarantees free access to forests in Finland, and forests are used extensively for recreation. The majority of Finns exercises the opportunity offered by the Everyman's Right to collect wild berries and mushrooms. Everyman's Right may, however, only be exercised in ways which cause no damage, loss or disturbance to the landowner.

FORESTS IN NATIONAL AND REGIONAL ECONOMY, AND EMPLOYMENT ASPECTS OF THE FOREST SECTOR

Indicator 6.1
Instruments for Securing the Operating Conditions of the Forest Sector in National and Regional Economy

Occupational Health and Safety Are Safeguarded by Legislation

In Finland, the supply of labour as well as matters of occupational health and safety within the forest sector fall under the jurisdiction of several different ministries and the occupational health and safety of employees in the forest sector is covered extensively in Finnish legislation. The ministries of Agriculture and Forestry and of the Environment cooperate to supervise and secure the social, regional and rural economic conditions for forestry. The Ministry of Social Affairs and Health directs and monitors issues involving occupational safety, the Ministry of Labour is responsible for labour legislation, and the Ministry of Education, for training and education in the forest sector.

General laws governing occupational health and safety, such as the Labour Protection Act, the Supervision of Labour Protection Act, the Act on Young Employees, and the Act on Working Hours, also apply to the forest sector. Legal provisions which apply to the forest sector in particular cover issues such as harvesting work, the use of pesticides, the safe use of tools and protective equipment, and joint accommodation for forestry workers.

Earnings from the sale of wild berries and mushrooms are exempt from tax, and the gathering of natural products may improve both employment and income of people on the rural areas at local level. The gathering of natural products on State land by other than lo-

Forest Sector

Forest sector is comprised of forestry and the forest industry.

- Forestry comprises silvicultural operations and measures to improve wood production, harvesting, other forest management activities and functions which serve forestry.
- Forest industry is divided into the wood-products industry and pulp and paper industry:
  - Wood-products industries comprise sawmilling, planing and impregnation of wood, and the manufacture of plywood and other wood-based panels, joinery products, wooden packaging and other wood products, as well as cork and weaving products.
  - Pulp and paper industries comprise the manufacture of pulp, paper and paperboard, as well as products made from paper and paperboard.

Forest Cluster

In addition to the forest sector, the forest cluster comprises paper-mill, pulp-mill and forestry machinery industries, forestry related chemical industry, automation and packaging systems, the printing industry, energy production, forestry related transportation, and consultation enterprises.

cal inhabitants may be prohibited by the Ministry of Agriculture and Forestry.

Services related to the adequacy and supply of labour include employment exchange services, vocational counselling, and labour market training for adults.

The wages and other terms of employment of forestry workers, as well as of employees in the forest industry, are determined in collective agreements. The system of wages and other terms of employment in the forest and forest machinery sectors was reformed in the 1990s, because rapid mechanisation of harvesting had placed increasing demands on workers, who were required to perform an increasingly diverse range of tasks more independently than previously. Collective agreements cover not only wages but also other terms of employment, such as working hours and exceptional compensation and conditions. The collective labour contracts are negotiated within a collective bargaining system between the employer organisations and trade unions of the forest sector (Annex 2).

Forest Programmes, Economic Instruments and Research

Since the 1950s, the national forest programmes have aimed at promoting the conditions for timber production, securing the supply of industrial roundwood, the facilitation of investments, and the promotion of conditions for increasing the export of forest industry products. The 1980s and 1990s witnessed an increase in the importance of the non-wood uses and ecological and social aspects of forests. The newest forest programme, the National Forest Programme 2010 is based on regional forest programmes (regional forestry target programmes, page 34), drawn up by the Forest Centres for their respective jurisdictions.

The operating conditions of the forest sector are influenced by all actions of the Government and other bodies which seek to stabilise general economic policy and equalise sharp fluctuations in economic cycles. Governmental measures deal with, among other things, taxation, decisions on currency exchange and interest rates, which have a direct effect on foreign trade, as well on subsidies and financing. Finland's membership in the monetary union of the EU has altered the range of instruments available to economic policy.

Education and energy policy are used to secure the supply of raw materials, competent labour, and energy. Companies and entrepreneurs in the forest sector can receive support from both EU and national systems for regional aid. Labour policy is used to balance the supply and demand of labour on both regional and national level.

A great number of small- and medium-sized enterprises (SME) operate in the forest sector. These include forest machinery, hauling and transportation, value-added wood processing companies, sawmills, and other small companies. In recent years, special efforts have been made to improve the operating conditions of SMEs. In the "Finland 2000 towards entrepreneur society" target programme, entrepreneurs have determined the targets for industrial policy in the near future, with special emphasis on the improvement of the operating conditions for companies, and the maintenance and development of the SME sector. Profitable enterprises also support the maintenance of the vitality of rural areas. The operating conditions of SMEs in the forest sector are supported by providing expert services in forest centres and through regional centres of expertise. The special programme has resulted in the establishment of a national network Centre of Expertise for Wood Products, and the North Karelia Centre of Expertise in Woodtechnology and Forestry.

"Time for Wood", a campaign for promoting the mechanical use of timber and raising the level of value-added mechanical wood processing, was conducted under the direction of the Government in 1997–2000.

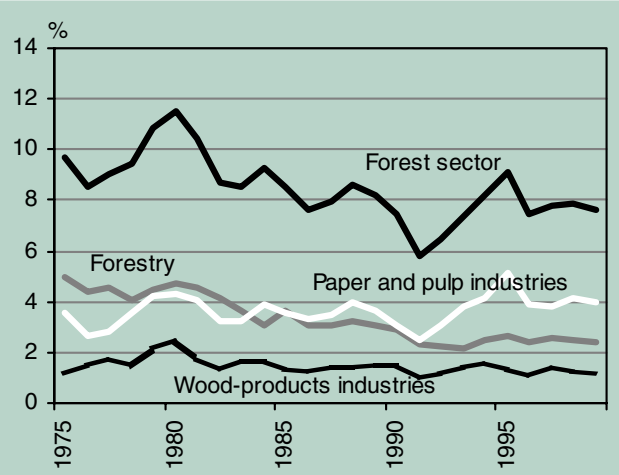


Figure 6.1. Proportion of the forest sector to the GNP in 1975–98.
Source: Statistics Finland

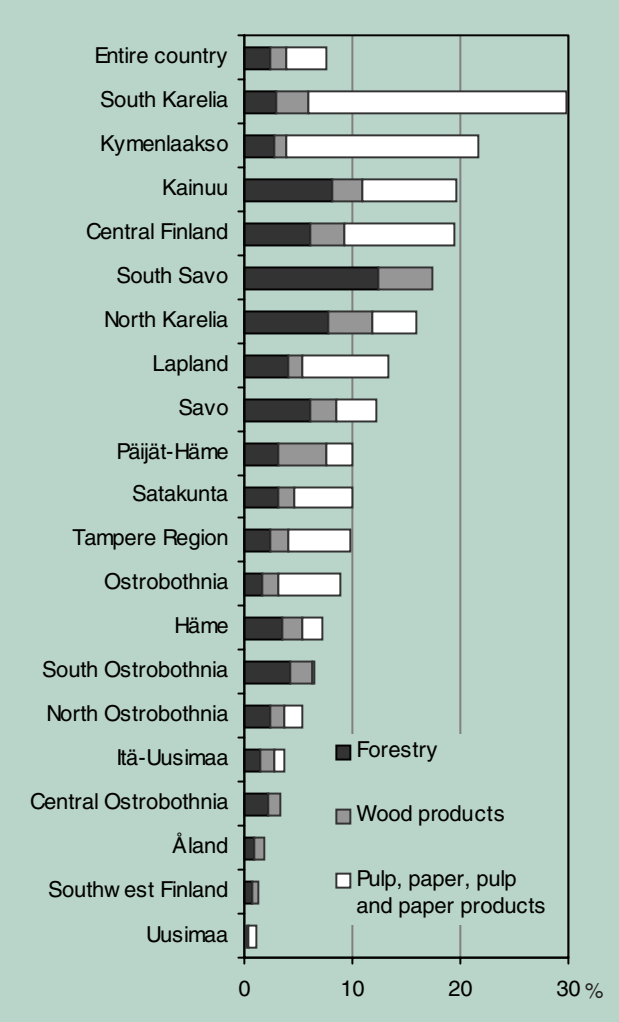


Figure 6.2. Proportion of the forest sector to regional added value by Regional Councils in 1997 (see map, page 6).
Source: Statistics Finland

In conjunction with the campaign, a programme was launched to promote entrepreneurship and exports based on the value-added mechanical processing of wood ("The Wood Finland" action programme), as well as the programme of the Centre of Expertise for Wood Products. "The Wood Finland" action programme is an extension of a similarly named project conducted in 1992–94, and it exploits the results of earlier technology programmes financed by the National Technology Agency (TEKES).

Research activities are constantly required to give new information on the economic circumstances and their development for the forest sector, such as economic trends, the employment situation and operating conditions, as well as national and international scenarios for development in the sector. The Centre of Expertise for Wood Products is linked with the Finnish Forest Cluster Research Programme (Wood Wisdom 1998-2001), which is carried out jointly by several organisations. The aim is to promote the competitiveness of forestry and the forest industry especially taking into account the demands of the client on the end product. This research and technology programme covers both chemical and mechanical processing, from raw materials to the end product.

Indicator 6.2
The Proportion of the Forest Sector of Gross National Product

Indicator 6.2a
Proportion of the Forest Sector of Gross National Product

The gross national product of Finland was EUR 122 mill. in 1999, of which forestry accounted for 2.4%, the wood products industries for 1.2%, and the pulp and paper industries for 4.0% (Figure 6.1).

Indicator 6.2b
Regional Proportion of Forest Sector of GNP

The share of the forest sector of the GNP varies greatly regionally being greatest in areas with a concentration of forest industry: South Karelia, Kymenlaakso, Kainuu and Central Finland (Figure 6.2; see map, page 6). The share of forestry alone is greatest in South Savo, Kainuu and North Karelia.

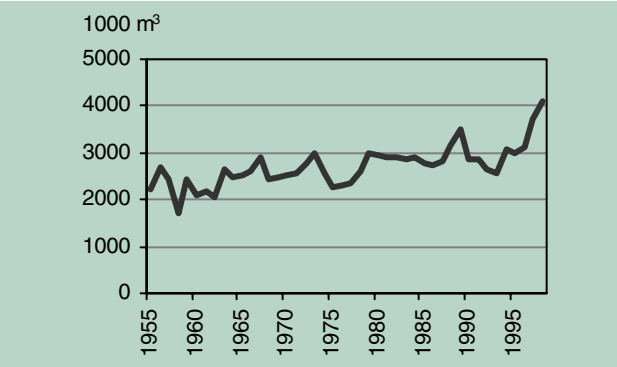


Figure 6.3. Domestic consumption of sawn goods 1955–98.
Sources: Finnish Forest Industries Federation and Forest and Park Service / Statistical Yearbook of Forestry

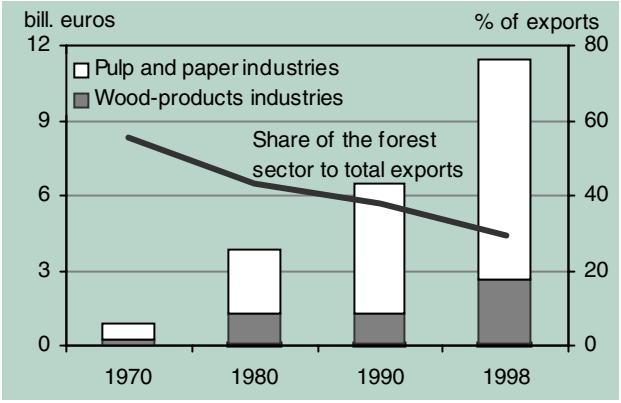


Figure 6.4. Export and import of forest industry products and their share of the total value of Finnish export of goods.
Source: Board of Customs

Indicator 6.3
Domestic and Foreign Trade of the Forest Sector

The majority of forest industry products is exported: about 90% of the annual production of the pulp and paper industries, and 70% of the saw milling products are exported. However, domestic consumption of paper and paperboard has increased steadily: in 1994, Finns used an average of 165 kg of paper and paperboard, whereas in 1998 the figure was 204 kg. The consumption of products of the sawn timber has also grown, although periodic trends are clearly reflected in the figures on consumption (Figure 6.3).

In 1999, the total value of the export of forest industry products was 11.1 billion euros, or 29% of the total exports of Finland (Figure 6.4). High-quality writing and printing paper accounted for one half of the total value of forest industries exports. Both sawn timber and paperboard accounted for about 13%. Although the value of forest industry exports has increased steadily, their proportion of total exports has decreased, as the share of electronic and communication technologies has grown. The share of the forest cluster (page 57) of gross export earnings is about 30–35% (page 6).

Indicator 6.4
Labour and Employment Support in the Forest Sector

Indicator 6.4a
Number of Persons Employed

Since the 1980s, mechanisation and the development of technology have rapidly reduced the number of jobs in the forest sector. In 1998, the number of people employed by the forest industries was 72,000, and 24,000 were employed in forestry. People employed in the forest sector accounted for slightly more than 4% of the total workforce (Figures 6.5 and 6.6). The greatest share of employment provided by the forest sector is in northern and eastern Finland (Table 6.1).

Overall, the entire forest cluster employs about 140,000 people.

Table 6.1. Persons employed by the forest sector (1,000 persons) by province in 1999 (see map, page 6).

Province	Persons employed, total 1,000 persons	Forest sector, total persons employed, total	Forest sector, total proportion of total employed in area, %	Forestry persons employed, total	Forestry proportion of total employed in area, %	Forest industries persons employed, total	Forest industries proportion of total employed in area, %
Entire country	2 296	95	4.1	23	1.0	72	3.1
1. Southern Finland	997	30	3.0	3	0.3	26	2.6
2. Western Finland	797	35	4.4	7	0.8	29	3.6
3. Eastern Finland	232	15	6.5	7	2.9	8	3.6
4. Oulu	183	9	4.7	3	1.8	5	2.9
5. Lapland	75	6	7.6	3	3.6	3	4.0
6. Åland	12	0	0.0	0	0.0	0	0.0

Source: Statistics Finland

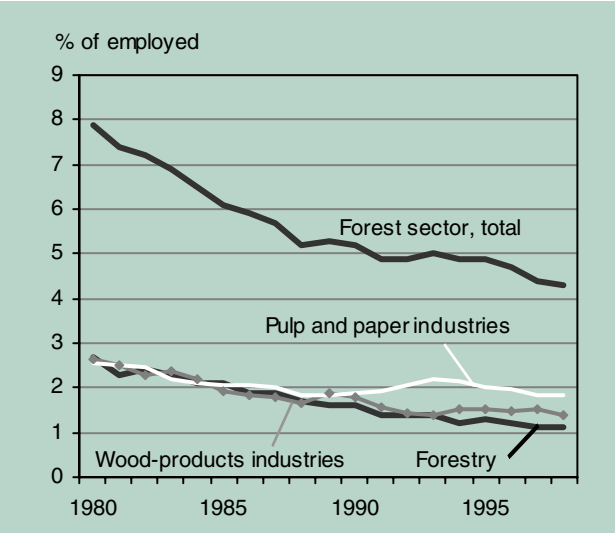


Figure 6.5. Persons employed by the forest sector, proportion of all employed by the national economy 1980–98.[1]
Source: Statistics Finland

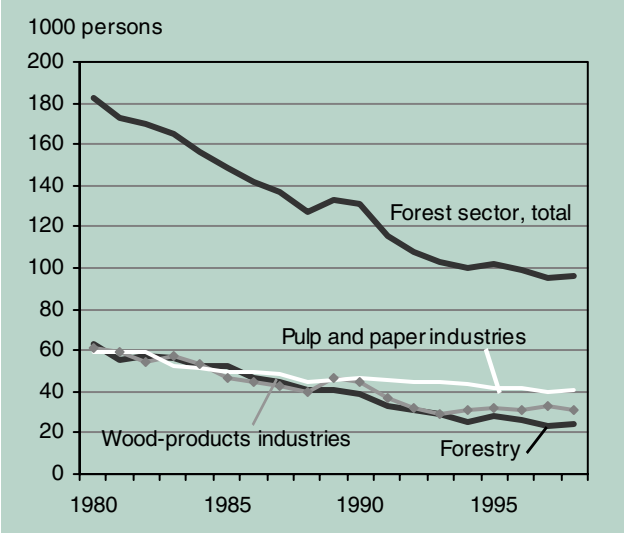


Figure 6.6. Persons employed by the forest sector 1980–98.[1]
Source: Statistics Finland

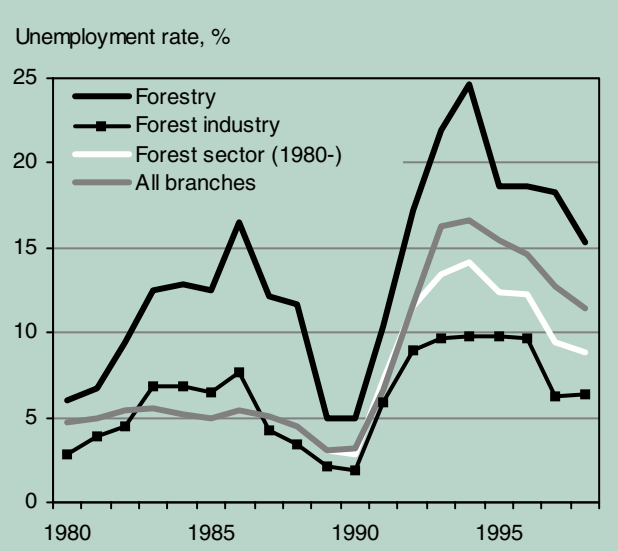


Figure 6.7. Unemployment rate in the forest sector and in all branches of industry in 1980–98. Figures for the forest industries includes the printing and publishing industries.[1]
Source: Statistics Finland

[1] The standard industrial classification changed in 1995 (*TOL-95), and labour research was reformed in 1997–98 in accordance with the definitions of ILO/EU. The data has been updated from 1989 onwards. Because of the new classification, figures for years before 1989 are not commensurate with more recent figures: the reform increased the share of persons employed by the forest sector by 2%, and decreased the share of persons classified as unemployed by 22%.

Indicator 6.4b
Unemployment Rate

Since the 1980s, the unemployment rate in forestry has been considerably greater, and that within the forest industry lower, than the overall average in Finland (Figure 6.7). In 1998, the unemployment rate in forestry was 15%, and 6% in the forest industry, while the unemployment rate in all branches of industry was 11%. Geographic variation of the unemployment rate within forestry and the forest industries is considerable (Table 6.2).

Table 6.2. Unemployment rate in the forest sector by province in 1999 (see map, page 6).

Province	All branches	Forest sector	Forestry	Forest industries
	Unemployment rate, %			
Entire country	10.2	8.1	14.7	5.8
1. Southern Finland	8.0	5.7	8.3	5.4
2. Western Finland	10.5	5.6	10.7	4.3
3. Eastern Finland	13.6	11.2	14.1	8.7
4. Oulu	14.1	14.1	23.8	7.0
5. Lapland	16.3	12.3	18.2	6.3
6. Åland	1.0	..	..	..

Source: Statistics Finland

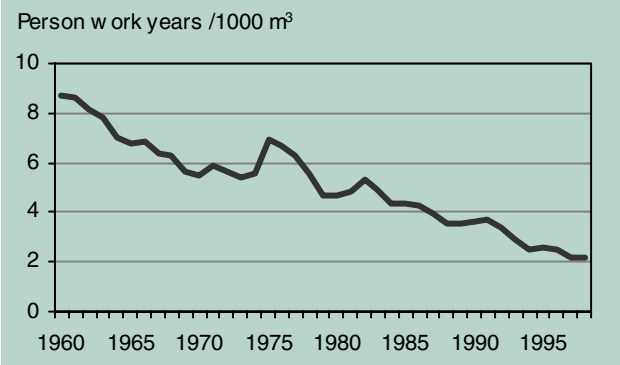


Figure 6.8. Calculatory labour intensity in the forest sector 1960–98. The figures are calculated on the basis of the number of persons employed.
Sources: Finnish Forest Research Institute and Statistics Finland

Indicator 6.4c
Labour Intensity

Labour intensity describes the amount of labour (in working years) which is required to produce a certain amount of the end product. Labour intensity in the forest sector varies considerably from one branch to another. The average labour intensity in the sector has decreased significantly owing to e.g. increased mechanisation and automation (Figure 6.8).

Indicator 6.4d
Education

The number of students concluding school within the forest sector increased in the 1980s, but has since then decreased close to the level of the early 1970s (Figure 6.9). Because of a revision of the structure of vocational education, no commensurate statistics for 1998 are available. However, the total number of graduations, vocational qualifications and diplomas is not very different from previous years.

The number of students getting their vocational qualifications and diplomas within the pulp and paper industries was at its highest in the late 1970s. After the recession of the early 1990s, the figures took an upward trend by the end of the decade. The number of students getting their vocational qualifications and diplomas in the wood products industries has not grown as rapidly since the early 1990s as those in the pulp and paper industries.

Competence-based qualification in the forest sector has been available since 1996 (Table 6.3). Most of them are based on independent study, and confer on the examinee a professional vocational qualification.

In addition to vocational training, supplementary extended training is provided in the sector. Training programmes have been created for people with an aca-

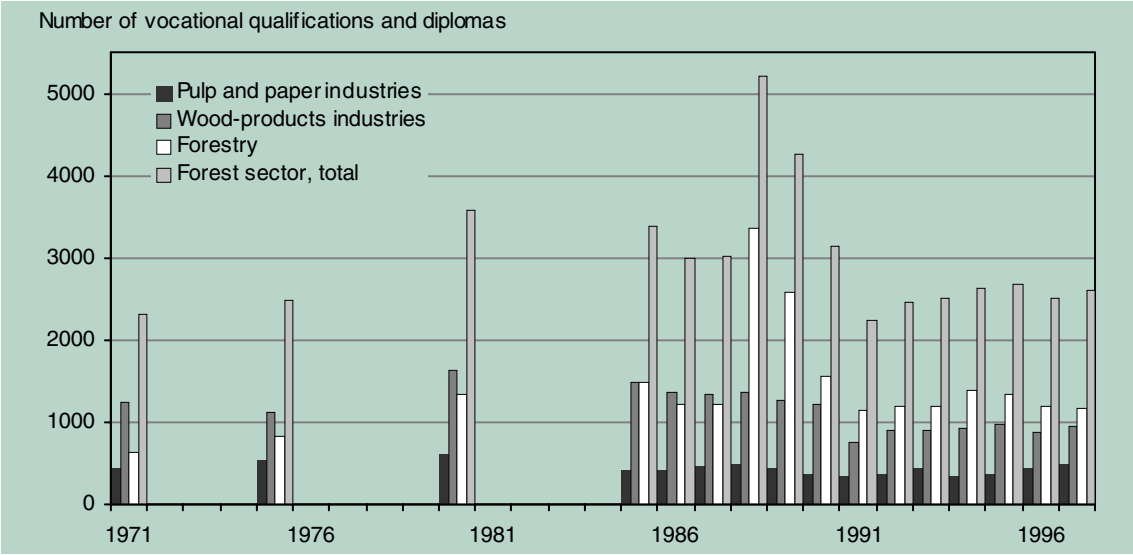


Figure 6.9. Education in the forest sector. Number of students with vocational qualification or diploma in forestry annually in 1971–97. The sharp rise in the figures in the late 1980s is due to the reform of vocational nomenclature.
Source: Statistics Finland

Table 6.3. Competence-based qualifications in the forest sector and nature resources management 1996–99.

	Enrolment	Qualification granted
Competence-based qualifications in the forest sector		
Initial vocational qualification		
Forestry	47	42
Forest machine operator	4	
Extended vocational qualification		
Multiple use of forests	3	3
Forestry worker	–	–
Forest machine technician	38	27
Forest machine operator	193	72
Forest entrepreneur	60	52
Driver, timber transport	33	19
Peat industry	2	2
Specialist vocational qualification		
Ecological surveyor	69	4
Multiple use of forests	66	33
Forestry worker	–	–
Forest machine operator	–	–
Forestry official	–	–
TOTAL	515	254
Competence-based qualifications for natural resources management		
Initial vocational qualification		
Natural resorces and forestry	–	–
Further vocational qualification		
Wilderness and nature guide	435	187
Specialist vocational qualification		
Inspector of nature products	74	26
Gamekeeper	28	
TOTAL	537	213

Source: National Board of Education

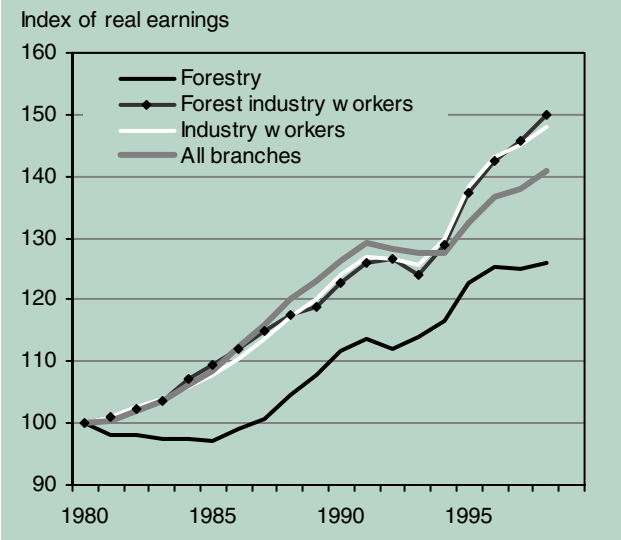


Figure 6.10. Index of real earnings, salaried employees in forestry and the forest industry 1980–99. The development of nominal wages is adjusted by deflating it by the consumer price index to reflect the real development of earnings. 1980=100.

Source: Statistics Finland

demic degree. Forestry engineers are given opportunities to supplement their education and acquire a polytechnic diploma. Other, more limited programmes for extended education include various supplementary courses, such as a diploma in nature management in forestry for officials within the sector. The diploma focuses on forest ecosystem management and biodiversity issues.

A range of courses and training packages are also provided for forest owners. For example, the competence-based vocational qualification in forest entrepreneurship presented in Table 6.3 is tailored for forest owners. Since 1998, forest owners have also had the opportunity to acquire a qualification in natural resources management. Several organisations provide training and advisory services for forest owners (Indicators 3.1 and 3.4).

Indicator 6.4e
Income Development of Professions

The index of real earnings in forestry has grown less, and that in the forest industries more, than the average index in all branches of industry (Figure 6.10).

The average annual income of salaried employees in forestry in 1998 was about 19 000 euros. This figure does not include the income of contractors and entrepreneurs, for example, whose incomes are not recorded in statistics. Annual income within the wood products industries was approximately EUR 23,000 and about EUR 32,500 in the pulp and paper industries.

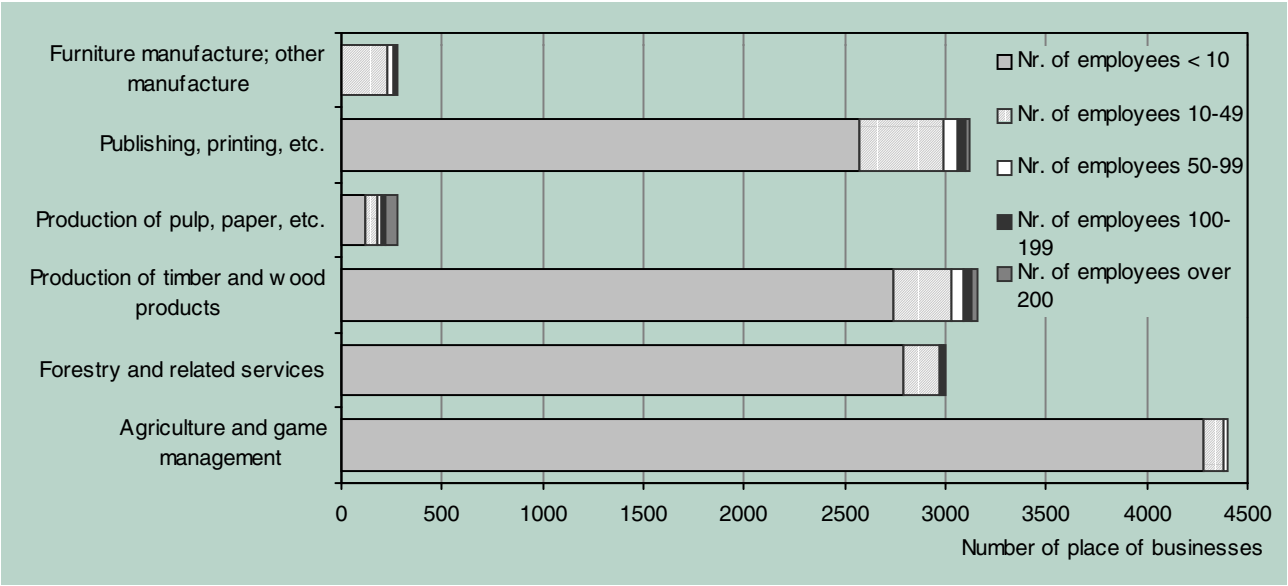


Figure 6.11. Small- and medium-sized enterprises in the forest sector by branch of industry 1998. Forest machine entrepreneurs (about 2,500 persons) and transportation entrepreneurs (about 800 persons) are not included in the figures.

Source: Statistics Finland

Indicator 6.5
Small- and Medium-Sized Enterprises

The distribution of SMEs in the forest sector by branch and number of employees is presented in Figure 6.11. Regional variation in the number of enterprises, their effects on employment, and in branch structure is considerable.

Indicator 6.6
Social Factors of the Forest Workforce

Indicator 6.6a
Occupational Accidents

Owing to developments in technology, training and occupational safety measures and equipment, the frequency of occupational accidents in the forest sector has decreased considerably faster than in all branches on average. In the early 1980s, salaried workers in forestry had about 120 accidents /1,000 workers. Rapid mechanisation of harvesting has contributed to the decrease, and in the late 1990s there were fewer than 30 accidents/1,000 forestry workers annually. In the wood products industries, the number of occupational accidents dropped by half within the same period, and in the late 1990s was 80 accidents/1,000 employees. The average figure for all branches of industry in the late 1990s was 25 accidents/1,000 employees.

Indicator 6.6b
Payment of Social Security Fees

Surveys or statistics on employer compliance with the requirement to pay statutory social security fees are not available. In general, employers pay the fees in due course, and payments are not neglected. The forest certification launched in 1999 also supports the payment of the fees: one of the criteria of the Finnish Forest Certification System (page 16) is payment of statutory fees.

THE POSSIBILITIES FOR PUBLIC PARTICIPATION IN DECISION MAKING

Indicator 6.7
Instruments for Securing and Maintaining Equitable Opportunities for the Public to Participate in Decision Making

Open Access to Information and Opportunities to Participate in Decision Making

Opportunities for public participation in decision making and their improvement in the forest sector are emphasised in Finnish legislation as well as in several international conventions, decisions and recommendations, notably the UN Conference on Environment and Sustainable Development, the Convention on Biological Diversity, recommendations of the Pan European Environmental Ministers Conference in Aarhus, the Ministerial Conferences on the Protection of Forests in Europe, and the ILO Convention on Indigenous and Tribal Peoples.

The democratic system of public decision making in Finland supports the opportunities for public participation. Transparency and equality are supported by e.g. free access to information, the Act on Equality, the Act on the Publicity of Official Documents, and the multiparty political system. Democratic, participatory decision making is implemented in practice in various Government committees and public forums. Activities of non-governmental organisations are supported by e.g. awarding State funds for their functions.

Forest ownership is wide-spread in the Finnish society. Close to 900,000 Finns have a stake in forests, and are thus guaranteed to have a say in their management. Public discussion and debate on forests is extensive and covers a broad range of topics, because forests are regularly discussed in the media on both regional and national level. Furthermore, special information campaigns are carried out in conjunction with forestry issues of national importance.

Opportunities for public participation are being improved, and new forms and models of activity are introduced. Enhancing interactivity and promoting the efficient use of communication networks are among the key targets for development. Opinion polls and surveys are used to map out the attitudes and opinions of the public towards forests and their management. Organisations of forest owners and NGOs participate in various preparation and decision-making processes. Direct channels for participation have also been made available to the public: for example, regional public hearings were organised in conjunction with the preparation of the National Forest Programme 2010 in 1998–99.

The Forest Centres draw up regional forest programmes (regional forestry target programmes) for their respective jurisdictions in cooperation with the interest groups in forestry. Natural resources planning and landscape ecological planning of the Forest and Park Service are developed in a procedure that includes public participation, in which all interest groups have an opportunity to participate in the decision-making process. In the preparation of plans for the management of forests in built-up areas, the inhabitants, village committees and other local organisations participate in the process in its various stages.

Through its provisions on land use planning, the Land Use and Building Act, reformed in 2000, also enhances the opportunities for the public to participate in land use and town planning. The law stipulates that public consultations in conjunction with the revision of land use plans must be increased. Furthermore, the Act on Environmental Impact Assessment Procedure, and the Act on the Openness of Government Activities, as well as the Act on Cooperation with Undertakings, all encourage public participation. They also require that authorities make publicly available any information that affects the citizens. According to the Act on Equality, minority viewpoints and gender equality must be taken into consideration in decision making. Compliance with the Act on Equality is enforced in Finland by the Equality Ombudsman and the Board of Equality.

Special attention is paid to safeguarding the rights and maintaining the heritage of the Sami people. Wilderness reserves have been established in Lapland to preserve the natural features of wilderness areas, and to secure the preservation of the Sami's culture and natural livelihoods. According to the Act on Wilderness Reserves, the reserves must be maintained in their natural state. Any forest management activities undertaken in these areas must be suited to the special circumstances, and must also take into consideration the livelihoods of the local people (Criterion 3). The Skolt Act and the Act on Natural Economy Industries also seek to enhance possibilities for public participation. The Act on Natural Economy Industries, hunting regulations and the Off-Road Traffic Act also confer on the local population special rights related to livelihoods, hunting and gathering berries.

MULTIPLE-USE AND CULTURAL VALUERS OF FORESTS (Recreational Values)

Indicator 6.8
Instruments to Maintain the Multiple-Use and Cultural Values of Forests

Forests in Finnish Cultural Heritage

Forests represent a significant aspect of the Finnish cultural heritage. In ancient times, timber and wooden utility articles were part of the everyday life for Finns in their work and leisure. In addition to the construction of buildings and other large structures, wood was used to make a variety of articles: ploughs, birch-bark bags and shoes, roof shingles, draw wells, tankards, tubs, and spinning wheels are just some examples of the various uses of wood.

Forests in Finland have provided a repository of motifs for folk traditions and tales. Forests have in the past and to this day provided inspiration and material for artists, whether in the field of painting, literature, music or other arts. Handicrafts utilising forest materials, as well as the use of wood to make both utility articles and art are an integral part of Finnish culture. The value of such crafts has been recognised in recent years, and many traditional skills have been revived. The close affinity to forests is also reflected in numerous idioms and phrases of the Finnish language.

Provisions to Safeguard the Cultural Heritage

The preservation of the cultural values of forests is safeguarded globally by the UNESCO World Heritage sites. There are currently five Finnish sites included in the World Heritage list. Furthermore, there are two biosphere areas which are included in the programme "Man and Biosphere".

Cultural values are protected also by the Antiquities Act. The National Board of Antiquities maintains a register of discovered prehistoric monuments and sites (Indicator 6.9). From the perspective of forestry, the most important of these are fixed sites, which generally are stone constructions such as graves and burial grounds. Known sites must be taken into account in the use and management of forests. Discoveries of new sites made during forestry operations must be reported to the Board of Antiquities before work can be resumed. The State has the option of either purchasing the site, or compensating the forest owner for the costs incurred by the discovery.

Forest Culture – Maintaining Traditions and Creating New Forms of Activity

The Finnish Forest Museum Lusto in Punkaharju was founded in 1994 to preserve and maintain the traditional uses of forests. At the end of 1999, the collections of the museum contained about 7,000 objects and 100,000 photographs, hundreds of visual and sound recordings, books, other printed and archive material. The museum also organises events and demonstrations that highlight Finnish forest culture and traditions, such as traditional logging skills, log carving, shingle making, and blacksmithing skills. On average, some 40,000 people visit the museum annually; about 10% of them are foreign tourists.

A Sami Museum was founded in Inari in 1959 (renamed in 1998 Sami Museum Siida). The mission of the museum is to preserve and exhibit the spiritual and material cultural heritage of the Sami. In addition to national museums, there are a number of smaller regional and local forest museums around the country.

Forest traditions and forest-related cultural heritage – handicrafts, art, legends, beliefs, tales and other folk traditions – are collected in the National Archives. Furthermore, the Finnish Forest History Society as well as many local and regional associations and organisations collect and publish material related to forest culture. Various foundations, such as the Metsämiesten säätiö Foundation, provide funding for the recording of forest traditions.

To the forest culture belongs also different kind of shows and competitions (e.g. in forest, logging or wilderness skills) which serve to demonstrate and maintain traditional arts related to forests and nature. National and world championship chainsaw competitions are just one example of the new forms of forest culture that were introduced in the 1980s and 1990s.

Heritage demonstrations highlight traditional, vanished or declining modes of forestry, such as slash-and-burn cultivation and prescribed burning. The Finnish Forest Research Institute and the Finnish Forest and Park Service arrange demonstrations of slash-and-burn practises, in which the spectators may participate if they wish.

Measures designed to create new forest culture and to revive traditional crafts include the organisation of competitions in telling tales of forests, idea competitions for the use of wood, as well as plays and exhibitions depicting the cultural traditions in forestry and logging. Forest and nature photography is a popular hobby, which records life of the forests for future generations; this is supported by various competitions and events. The use of wood to make art objects has also increased.

Forest Information in Education and Training

Several adult education and study centres as well as folk high schools offer courses, study programmes and other education related to forests. Forest information is also made available in books and other printed publications, on the Internet, and in forest and environmental magazines published by various forestry organisations, NGOs and interest groups.

Efforts to increase forest-related knowledge and skills among children and young people have been stepped up in recent years. For a number years, the Finnish Forest Association has been organising a Forest Quiz for pupils in secondary schools, to test their forest knowledge and skills. Schools are provided with educational material both in printed form and on the Internet. Educational work among pre-school children and young people is carried out by many voluntary organisations, including the Finnish 4-H Federation, the guides and scouts of Finland, the National Association for Recreational Sports and Outdoor Activities, the Finnish Nature League, as well as other NGOs.

Management of Traditional Landscapes

A number of areas have been designated as valuable traditional landscapes (Indicator 6.9). Methods used in the management of these areas include conservation of open agricultural landscapes, protection of buildings in traditional rural environments, land use planning, information and advisory services, and education. Valuable landscape areas or traditional biotopes do not restrict the land use options of the landowner.

The management of traditional landscapes is part of voluntary work for the preservation of national heritage. Traditional landscapes include forest grasslands, forest grazing areas, and meadows. The preservation of traditional landscapes was initiated by WWF-Finland 20 years ago with various campaigns and voluntary actions. Traditional landscapes are also actively maintained by many municipalities, the Forest and Park Service, as well as other organisations. For example, in 1998 the Forest and Park Service had 527 hectares of traditional biotopes under its management. The preservation of traditional landscapes and forest areas is increasingly taken into account in the management of commercial forests, protected and recreational areas, and forest parks. For example, demonstrations of slash-and-burn cultivation and other traditional work methods and crafts organised by the Finnish Forest Research Institute at the Koli National Park under its management have resulted in the creation of an extensive landscape area with many traditional features.

Recreational Use of Forests – A Fundamental Right

Outdoor recreation in nature is an integral part of the Finnish lifestyle. The recreational use of forests comprises all leisure activities that take place in forests – picking wild berries and mushrooms, nature observation, hiking, cross-country skiing and camping. Owing to Everyman's Rights, nearly all forms of leisure activity are permitted in commercial forests and in national parks on the guided trails. Increase in the number of outdoor recreation areas, hiking trails as well as the provision of related services also support the recreational use of forests.

Opportunities for outdoor recreation are affected by the number, accessibility and functionality of services: it is important that outdoor recreation areas be located close to where people live, and that the areas and other recreational natural resources be of a high quality. Owing to Everyman's Rights, the need for organised recreational services is lower in Finland than in many other countries. Providers of recreational outdoor services, such as the Forest and Park Service, the Finnish Forest Research Institute, municipalities and private service providers, seek to develop these services to meet the needs of users. Surveys are used to map user needs and wishes.

Access to recreational natural resources is dependent on rights related to movement, gathering of natural products, fishing and hunting. Rights of movement in nature areas and gathering of wild berries and mushrooms are generally covered in Everyman's Rights (page 7 and Criterion 3). Hunting right is usually tied to land ownership; landowners may also lease their land to outsiders for hunting. In northern Finland, local inhabitants may hunt freely on State land, except when some restrictions are placed on the use of the areas. Angling and ice fishing are both Everyman's Rights. Rod fishing generally requires a permit and the payment of a fishing fee.

The Outdoor Recreation Act allows the establishment of hiking trails on both private and State land. The Act also stipulates that forest management, hunting, fishing and other use of State recreational areas must be organised in a way that takes the needs of outdoor recreation into account.

Under the Land Use and Building Act, the primary uses of land areas are defined in general land use plans and town plans, along with any restrictions on their management warranted by the nature of that use. For example, general land use plans may prohibit the felling of trees without permission from the municipality in areas covered by town planning or general land use plans. Under the Forest Act, the maintenance and adequacy of recreational aspects of the environment must be secured whenever silvicultural operations are under-

taken. The Act also requires that Forest Centres cooperate with municipalities in order to harmonise the goals of the Forest Act and the Land Use and Building Act in areas already covered by land use plans, or designated as such.

The Off-Road Traffic Act seeks to prevent harm to nature or other environments, to rural livelihoods and to the general recreational use of nature caused by the use of motor vehicles in nature and on snow mobile routes. The Act prohibits the off-road use of motor vehicles without the landowner's permission.

The Ministry of Agriculture and Forestry and the Labour Ministry provide funding for the creation and maintenance of recreational services on State land. Conservation areas, as well as the various outdoor recreation services provided in them, are developed with funding provided by the Ministry of the Environment and the Labour Ministry. Outdoor recreational areas on municipal land are mostly financed by the municipalities.

Planning and Research Support the Recreational Use of Forests

Management plans for recreational areas place an emphasis on the development of recreational services, while seeking to safeguard the carrying capacity of nature by controlling the use of the areas. Under the Forest Act, recreational needs can be taken into account in the utilisation and management of commercial forests. In recent years, the multiple use of forests has increased in importance.

The various uses of forests were studied in the Research Programme on Multiple-Use of Forests (1990–94) and the Programme for the Coordination of the Various Uses of Forests (1995–99), both conducted by the Finnish Forest Research Institute. The extensive National Inventory of the Recreational Use of Nature (LVVI) has produced information on the amount, quality and accessibility of such use. Several other studies related to the recreational use of forests and landscape management are under way in various research organisations and universities.

Indicator 6.9
Cultural Values – Archaeological Monuments and Landscape Values

According to the Registry of Ancient Monuments maintained by the National Board of Antiquities, there are about 14,000 prehistoric monuments in Finland. New sites are constantly being discovered. Typical prehistoric monuments in forests are graves and burial grounds.

Landscape areas defined as nationally valuable comprise a total of 730,000 hectares in Finland. Of this, about 300,000 hectares is agricultural land (approximately 12% of the total area of agricultural land). The number of valuable landscape sites is 156.

A national inventory of heritage landscapes was due for finalisation in 2000.

Indicator 6.10
Recreational Use of Forests

Because outdoor activity in Finland is generally based on Everyman's Rights, comprehensive, reliable data on the amount and changes in the recreational use of forests is not available. No systematic surveys of outdoor activitiy are carried out in Finland, not even on designated outdoor recreation areas. The majority of hiking and cross-country skiing trails and recreational outdoor areas are maintained by municipalities. No comprehensive data on the provision and use of municipal outdoor recreation areas is available either in the municipalities or the State.

The Number of Outdoor Recreation Areas

There are about 5 million inhabitants in Finland, and 23 million hectares of forest (forest land and low productive forest land), which means that there are over 4 hectares of forest per inhabitant. However, forests and habitation are not distributed uniformly throughout the country. Under Everyman's Rights, nearly all forests in Finland are in principle accessible for outdoor recreation. The national network of forest roads ensures easy access to forests. In addition to Everyman's Rights, opportunities for the recreational use of forests are secured by the establishment of special areas for outdoor recreation.

There are 33 national parks (7,750km^2) and seven State outdoor recreational areas (383km^2) in Finland. Nature reserves (total of 19) are generally closed to the public, although walking is allowed on designated trails in nine of them. The 12 wilderness reserves in Finland cover a total area of 1.5 million hectares. In addition, municipalities have their own areas designated for recreational use, and the Forest and Park Service has established special recreation forests. Nature trails designed to provide opportunities for nature study have been established in several national parks as well as in forests owned by municipalities, associations and companies.

The Use of Recreation Services

Everyman's Rights are extensively exploited in Finland. Finns engage in outdoor activities in forests on an average of 150 times a year. The majority of Finns have outdoor areas suitable for recreation close to their home: for half of the population, the distance from their home to a park, forest or outdoor recreation area is 200 to 300 metres or less, and not more than 500 metres to areas suited to skiing. The average distance to areas suited for hiking and picking wild berries and mushrooms is 4 to 5 kilometres; one half of the population lives no more than 1 to 2 kilometres from areas growing with wild berries.

There are 450,000 summer cabins in Finland. 56% of Finns spend at least 30 days a year in their summer cabin. Finns place great value on the use, based on the Everyman's Right, of forests at or near their summer cabin.

In 1998, over one million visits to national parks, and about 350,000 visits to State outdoor recreation areas, were recorded. In addition to these, the State has also other conservation areas where hiking trails or other services are available to the public. The number of visitors to national parks almost doubled in the 1990s (Figure 6.12). However, outdoor activities on State land only account for one tenth of all recreational use of forests (Figure 6.13). No data has been compiled on the use of hiking trails outside designated recreational areas.

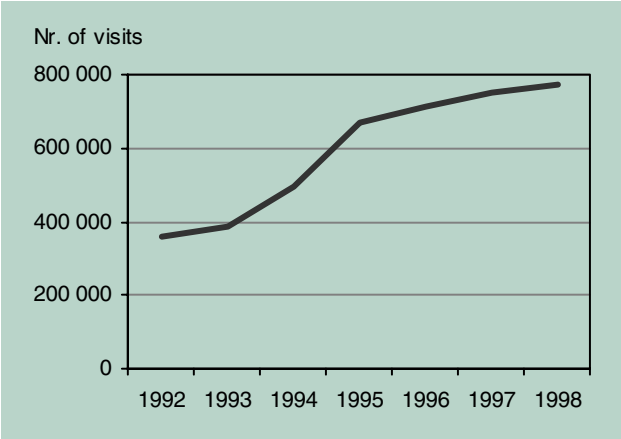


Figure 6.12. Recorded visits to the national parks managed by the Forest and Park Service 1992–98.
Source: Forest and Park Service

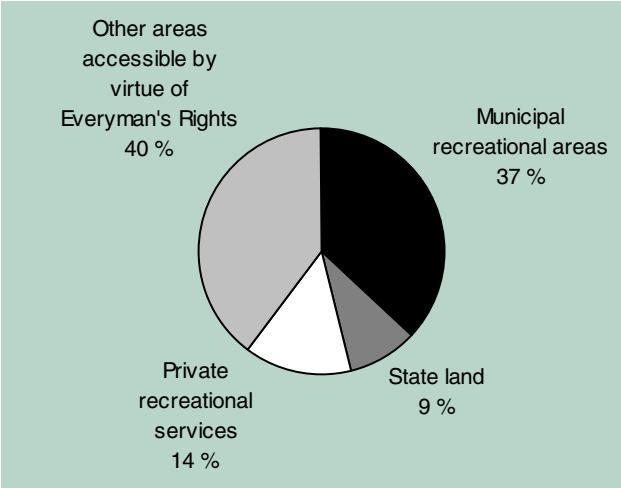


Figure 6.13. Distribution of visits on land owned by the State, municipalities and private persons. The category "Other areas accessible by virtue of Everyman's Rights" comprises mainly private lands.
Source: Finnish Forest Research Institute

6 Conclusions and Recommendations

In terms of its basic structure, the present revised list of Finnish national criteria and indicators for sustainable forest management corresponds to the first list prepared in 1997. Since the first list of criteria and indicators was drawn up, international discussion on the concept of sustainability has evolved, new research data on the different dimensions of sustainability have become available, and general interest in the sustainable management of forests has increased. For all these reasons, the present revised criteria and indicators differ somewhat from the previous list. The most significant changes are the development of the content of Criteria 4 and 6, and the change in the number of indicators considered.

After the Helsinki process (1993–95), the pan-European criteria and indicators were developed further for the Ministerial Conference on the Protection of Forests in Europe in Lisbon (1998) by defining the principles for their practical application. These principles set forth concrete targets for the implementation of 27 indicators. At the same time, special attention has been paid to the development of Criterion 4 (Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems) and Criterion 6 (Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems). Since the second Ministerial Conference in Helsinki in 1993, a significant amount of information and experience regarding those criteria has become available.

The goal of the revision of the Finnish national criteria and indicators was to adjust them so as to better serve the need for their practical application in forestry. The aim of the revision process was to focus on those indicators which best measure the achievement of sustainability in forestry and the changes in forest ecosystems. For this purpose, some indicators have been combined to make them more comprehensive, and some have been left out. The descriptive indicators have been merged into one single indicator for each criterion. Each new indicator embraces all the regulatory, economic, informational and institutional factors that affect sustainability. The present revised list of criteria and indicators contains a total of 47 individual indicators, whereas the previous list contained about 160 of them.

Collecting the data proved to be more demanding than expected. Some parameters that had proved to be effective indicators of sustainability were difficult to express in numerical terms, or there was no comprehensive statistical data available on them. Some parameters were successfully compiled thanks to the results of special studies.

In order to develop the monitoring of sustainability in forestry into a transparent, continuous and efficient system, the efficiency of the systems for gathering data to measure sustainability must be improved. This will be one of the most challenging tasks in the process of developing the criteria and indicators in the future. The most important national sources of information in Finland are the National Forest Inventories, forest statistics, statistics on the national economy, and statistics on forest protection and environmental issues in forestry. The Finnish Forest Research Institute, the Forestry Development Centre Tapio, the Finnish Environment Institute, and the regional Forest Centres and Environment Centres occupy a key position in developing the system for gathering data on sustainable forestry. Co-operation in the collecting of data needs to be

increased, and the compilation of statistics must increasingly take into consideration aspects that can be used to measure the achievement of sustainability in forestry.

The present criteria and indicators can be used in reporting on the regional sustainability of forest management and as an aid to decision making. In the Pirkanmaa pilot project conducted in 1996-97, the criteria and indicators were applied for the first time to the development of regional forest programmes (regional forestry target programmes). Experiences from the project showed that there was insufficient information on the regional level, in particular on the multiple use of forests, their social significance, or the biological diversity of forest ecosystems. Therefore, data gathering on the regional level must be developed if the criteria and indicators are to become efficient tools for monitoring of regional forest programmes.

New, generally accepted criteria and indicators applicable to local conditions will be prepared in conjunction with the revision of regional forest programmes. Under the Forest Decree, the regional forest programmes must be revised every five years at the most.

In the last three years, forest certification has gained attention in international discussions on forests. The sustainable management of forests can be promoted by the development of the criteria and indicators for sustainable forestry, but also by the development of forest certification. However, the approaches used in these two processes of development are different. The criteria and indicators are based on intergovernmental agreements, whereas forest certification represents voluntary activity by market actors. Forest certification is based on the criteria and indicators as well as on the forest and environmental legislation of each country, and supplement their development.

The work on the national criteria and indicators in Finland has been in line with the results, conventions and recommendations of international and intergovernmental processes (UNCED, IPF/IFF, the pan-European Ministerial Conferences on Forest Protection). On the national level, the work has aimed at promoting transparency, consensus and the discussion of basic values.

When the criteria and indicators are next developed and updated, developments in general forest policy as well as international forest processes must be taken into consideration. Themes important for the process of developing the pan-European criteria and indicators include the social and cultural significance of forests, the profitability of forestry, rural development policy, and climate change. Another aspect which needs to be addressed is the relationship between the criteria and the practical principles for pan-European sustainable management of forests.

The process for the development of the criteria and indicators for sustainable forest management is an important regulatory instrument for forest policy, one which has both a national and a regional dimension. The criteria and indicators provide a tool for describing and monitoring, in international contexts, sustainable forest management as it is practised in our country. Furthermore, this set of criteria and indicators provide a constructive, Finnish perspective on the international debate on forests. As examples of application, they can contribute to the achievement of a wider consensus on the content of sustainable forest management globally.

ANNEX 1

Terms and Definitions

Forest

The Finnish Definition

In Finland, forestry land is divided into three categories according to site productivity:

- On **forest land**, the annual potential increment calculated for a rotation period of one hundred years is at least one cubic metre per hectare.
- **Low productive forest land** (scrub land) is mainly exposed bedrock, scree or mires, where the annual increment is below one but over 0.1 cubic metre per hectare.
- **Other land area for forestry** consist of almost treeless areas where the growth is less than 0.1 cubic metres per hectare annually (waste land) and of storage areas, forest roads, etc.

There are 23.0 mill. ha of forest and low productive forest land in Finland and 3.3 mill. ha of other land area for forestry (3.1 mill. ha waste land and 0.2 mill. ha other forestry land).

International definition (FAO / TBFRA 2000)

The definition of forest used by the UN Food and Agriculture Organisation (FAO) in its forest statistics is based on crown density.

- **Forests** are land areas with tree crown cover of more than 10 percent and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 meters at maturity *in situ*.
- **Other wooded areas** are lands either with a tree crown cover (or equivalent stocking level) of 5–10 percent of trees able to reach a height of 5 meters at maturity *in situ*; or with a crown cover (or equivalent stocking level) of more than 10 percent of trees not able to reach a height of 5 meters at maturity *in situ* and with shrub or bush cover.

According to the FAO definition, there are about 22 mill. ha of forest in Finland, or 23 mill. ha when land when with low forest cover is included.

In this report, the term "forest" refers to forest land and low productive forest land as per the Finnish definition.
Available statistics and the long time series on the development of forest resources in the National Forest Inventories are based on the national definition of forest. In the future, data on forest resources will be available also as per the FAO definition, because the ongoing 9th National Forest Inventory uses both definitions in parallel.

In this report, commercial forests refer to semi-natural forests which are mostly used for wood production but simultaneously serve several other purposes such as recreation, hunting, landscape management, tourism, etc.

Forest Sector and Forest Cluster

Forest Sector

The forest sector includes forestry and the forest industry.

- **Forestry** encompasses silviculture operations and measures to improve wood production, harvesting, other forest management activities and functions which serve forestry.
- **Forest industry**
  - **Wood-products industries** include sawing, planing and impregnation of wood, and the manufacture of plywood and other wood-based panels, joinery products, wooden packaging and other wood products, as well as cork and weaving products.
  - **Pulp and paper industries** includes the manufacture of pulp, paper and paperboard, as well as products made from paper and paperboard.

Forest Cluster

In addition to the forest sector, the forest cluster comprises paper-mill, pulp-mill and forestry machinery industries, forestry related chemical industry, automation and packaging systems, the printing industry, energy production, forestry related transportation, and consultation enterprises.

Valuable Habitats in Forest Ecosystems

Valuable habitats in forest ecosystems, commonly known also as key biotopes, include habitats of special importance as defined in the Forest Act (7 habitats) and habitats protected under the Nature Conservation Act (9 habitats). In addition to these, seven other valuable habitats have been defined. They are not protected by legislation, but are covered by a recommendation that they be taken into consideration in the forest management.

Biological Diversity of Forest Ecosystems

According to the Environmental Programme for Forestry in Finland, the biological diversity of forest ecosystems encompasses:

1. the abundance and diversity of forest organisms
2. the diversity within the genotype of each organism
3. the abundance and diversity of different forest habitats, communities of organisms, and ecosystems.

Biodiversity of forest ecosystems is usually divided into three ecological levels of hierarchy:

- Regional level denotes the abundance and diversity of forest habitats, communities of organisms and ecosystems, i.e. variation in their number and structure.
- Species level denotes the abundance and diversity of forest organisms, i.e. variation in the number, relative abundance and functional significance of species.
- Intra-species level denotes the diversity of the genotype of each species of organism, i.e. genetic variation within and between species.

(Source: Metsäluonnon arvokkaat elinympäristöt 1998)

Classification of Endangered Species

The classification used for endangered species in Finland is based on the classification of endangered species defined by the World Conservation Union (IUCN), and the type of habitat and threat factors, adjusted to conditions in Finland. The classes are:

- Near threatened (NT)
- Vulnerable (VU)
- Endangered (EN)
- Critically endangered (CR)
- Regionally extinct in the wild (EW)
- Regionally extinct (RE)
- Data deficient (DD)
- Not evaluated (NE)

Protected Forest Areas

- Nature reserves (Strict Forest Reserves) are areas established legally binding on State land for the purpose of ensuring the natural development and preservation of natural forests for the biodiversity and needs of education and scientific research. Public access to and movement in nature reserves are restricted, a permission is required to enter these areas.
- National parks are extensive areas (min. 1,000 hectares) which contain a diversity of natural features, or other significant features important for protection. The principal purpose of national parks is the conservation of biodiversity, but they are also important as natural sights or for increasing knowledge of and general interest in nature.
- For the purpose of preserving various types of herb-rich forests and their characteristic species of flora and fauna, protected herb-rich forests have been established. The purpose of mire protection areas is to preserve valuable peatland areas. The protection of old forests aims at preserving old natural forests and the ecological systems and species characteristic to them. Special protection areas can also be established by special act or decree. They are usually small in size, and their character as well as the reasons and legal provisions for their protection vary considerably.
- Wilderness reserves are areas protected under the Act on Wilderness Reserves. They are established for preserving the wilderness character of these areas, safeguarding the Sami culture and nature-based forms of livelihood.
- Protected forests are small fragments of natural forests protected under the Nature Conservation Decree. Their purpose is to provide possibilities especially for the survival of species that rely on dead and decaying wood.
- Recreational forests include areas where fellings are prohibited, park-like areas, as well as areas under practically normal management.
- Protective forest (previously State forest reserve) denotes the southern edge of High-Altitude Protective Forest Zone established by Government decision, or a separate protective forest area.
- Other protected areas are either ancient monuments or sites protected under the Antiquities Act, or sites protected by a separate decree under the Nature Conservation Act. Protected monuments and sites include, for example, prehistoric graves and burial grounds, sacrificial springs, trees and stones, and natural formations associated with ancient customs, stories or historical events. A protected site can also be a tree, a group of trees or other natural formation, which is considered sufficiently important for scientific reasons or because of its peculiarity to warrant protection under the Nature Conservation Act.

Regional Forest Programme (Regional Forestry Target Programme)

Regional forest programmes stipulated in the Forest Act are prepared by the Forest Centres for their jurisdictions in cooperation with forestry organisations and other interest groups. Regional forest programmes are a compilation of data on forests in the region and the need for their development, such as sustainable management and the general goals for the development of forestry. The first programmes were prepared in 1997–98, and they were revised in 2000. Information from the regional as well as district forest plan can be used, for example, for assessing the conditions for operations of the forest industry in the provinces. Regional forest programmes provided the basis for the preparation of the National Forest Programme 2010.

ANNEX 2

Forest and Environmental Organisations

Ministry of Agriculture and Forestry

As the highest forest authority in Finland, the mandate of the Ministry of Agriculture and Forestry is to create the conditions for the sustainable and diversified use of renewable natural resources and for developing the economic and leisure-time activities of the countryside. The Ministry of Agriculture and Forestry also secures the quality of the commodities obtained from renewable natural resources. The duties of the Ministry also include the drawing up of forest legislation and supervision and monitoring of its implementation. The Finnish Forest and Park Service, the Forest Research Institute, the Forestry Development Centre Tapio as well as the regional Forest Centres are all under the supervision of the Ministry.

Ministry of the Environment

The mandate of the Ministry of the Environment is to promote sustainable development and ensure that the environmental perspective is given proper consideration in international cooperation and society, and at all levels of government. The Ministry formulates environmental policies, carries out strategic planning and makes decisions in its own sphere of interest. It is also responsible for preparing and supervising environmental legislation. The Finnish Environment Institute and the regional Environment Centres come under the jurisdiction of the Ministry of the Environment. The Ministry oversees the Forest and Park Service and the Finnish Forest Research Institute (Metla) with respect to maintenance of protected forest areas.

Forestry Development Centre Tapio

The Forestry Development Centre Tapio is a development and expert organisation which prepares proposals and initiatives on forestry, and provides development and expert services for the forest management sector. It also provides administrative services for the Forest Centres.

Forest Centres

The thirteen Forest Centres in Finland are charged with monitoring compliance with forest legislation, along with other administrative duties. The mandate of the Forest Centres is to promote the sustainable utilisation and management of forests and the protection of their diversity, and other environmental protection in forestry. Within their jurisdictions, the Centres develop cooperation within forestry, develop the occupations, forestry-based trade and livelihoods, and provide training, advisory and information services related to silviculture. The Forest Centres monitor the state and development of the forests within their jurisdictions, and draw up the regional forest programmes (regional forestry target programmes) for their region.

Finnish Forest Research Institute (Metla)

The Finnish Forest Research Institute is an impartial, nation wide research organisation under the administration of the Ministry of Agriculture and Forestry. Its mandate is to promote – through research – economically, ecologically and socially sustainable management and utilisation of the forests. Metla conducts scientific research, promotes the use of research results, develops national and international cooperation within forest research, and monitors the development of the health of forest resources and forests.

Finnish Environment Institute and Regional Environment Centres

The Finnish Environment Institute is an environmental research and development organisation that promotes sustainable development by conducting research and development. The duties of the thirteen regional Environment Centres in Finland include environmental protection, land use, supervision of construction activities, nature conservation, maintenance of the cultural environment, and the management of water resources.

Finnish Forest and Park Service

The Forest and Park Service is a state enterprise charged with managing, utilising and protecting the State lands and waters under its management (8.7 million hectares) while securing their sustainability and profitability. The Forest and Park Service provides a broad range of services and commodities based on the utilisation, management and protection of natural resources. Its areas of operation include the management of forests and the acquisition of timber, the production of seeds and seedlings of forest trees, ecotourism, international consulting, as well as the trade and leasing of land, and trade in soils. Public environmental services provided by the Forest and Park Service include the management of conservation areas, nature conservation, and the promotion of the recreational use of nature. The Forest and Park Service is also charged with certain public responsibilities. The Forest and Park Service operates under the jurisdiction of the Ministry of Agriculture and Forestry in all other matters except maintaining protected forest areas, in which it is administered by the Ministry of the Environment.

Forest Management Associations (FMAs) and Their Unions

There are 213 Forest Management Associations in Finland (figure as of January 1, 2000). Each one covering the area of one or more municipalities, the associations are statutory service organisations funded by forest owners. The mission of the Forest Management Associations is to promote the profitability of forestry practised by forest owners and the realisation of the other goals they have set for forestry, and to advance the economically, ecologically, and socially sustainable management and utilisation of forests. They provide professional services in matters pertaining to silviculture, timber trade and forest planning. The membership of the Forest Management Association is made up of the forest owners who pay their forest management fees and own forests within the associations' jurisdictions.

The mission of the regional *Unions of Forest Management Associations* is to protect the common interests of forest owners and to develop private forestry and the activities of the Forest Management Associations in their area. They also promote the profitability of silvicultural activities undertaken by forest owners. The Unions also act as intermediaries between the associations and the Forest Commission of the Central Union of Agricultural Producers and Forest Owners (MTK).

Forest Owners' Interest Organisations and Groups

The *Forest Commission* of the Central Union of Agricultural Producers and Forest Owners (MTK) is the central organisation of private forest owners in economic policy issues. The purpose of the Commission is to protect the interests of private forest owners and promote the operation and profitability of private forestry. The *Finnish Association of Forest Owners* representing the urban forest owners, also has a representative on the Forest Commission.

Interest Groups of the Forest and Timber Industries

The *Finnish Forest Industries Federation* represents the forest industry enterprises in Finland. Its membership covers the chemical forest industry and about 80% of the mechanical forest industries, calculated in terms of turnover. Other interest organisations of the forest industries are *Finnish Sawmills* (the federation of independent sawmills), *Sahayrittäjät ry* (the organisation of small private sawmills), the *Trade Association of Finnish Forestry and Earth Constructing Contractors*, and the *Association of Forest Industry Road Carriers*.

Trade Organisations

Trade organisations in the forest sector are the *Society of Finnish Professional Foresters*, *the Union of Finnish Foresters*, the *Paper Industry Workers Union*, and *the Wood and Allied Workers' Union*. The representative organisation of employers in private forestry is *Yksityismetsätalouden työnantajat ry (the Private Forestry Employers' Federation)*.

Non-Governmental Organisations (NGO)

The major NGOs in Finland are the various environmental organisations, such as the *WWF-Finland*, the *Finnish Nature Conservation Union*, and the *Finnish Association for Nature Conservation*. Many other organisations also participate in public activities within the forest sector, such as the *National Association for Recreational Sports and Outdoor Activities*, the *Guides and Scouts of Finland*, the *Finnish 4-H Federation*, and the *Finnish Orienteering Federation*.

International Organisations

The UN Food and Agriculture Organisation FAO serves as a global forest information organisation, which carries out an assessment of the forest resources of the world every ten years. The FAO also promotes the development of technology, institutions and information exchange for the protection and management of forests. The highest organ of the FAO in forest issues is the **Committee on Forestry (COFO)**, which convenes every other year. All FAO member countries may participate in COFO's meetings. The FAO also has regional forestry commissions. The mission of the **European Forestry Commission (EFC)**, which also convenes every other year, is to serve as a discussion forum for forest policy, and to make initiatives, coordinate and promote the development of forest policy in Europe.

The Timber Committee of the Economic Commission for Europe (ECE) produces information on the timber markets and wood resources in Europe and North-America, and acts as an intermediary between Eastern and Western Europe in matters related to technology. The Committee also monitors the implementation of the resolutions of the Helsinki Ministerial Conference and the recommendations of UNCED within its field. The Committee meets every year to discuss short-term forecasts for timber markets in its area. The Committee works in close cooperation with the EFC of the FAO.

The objective of the **International Tropical Timber Organisation (ITTO)** is to produce information on the market for tropical timber, and to promote forest industries and sustainable forestry. ITTO is committed to implementing the International Tropical Timber Agreements (ITTA) made in 1985 and 1997. In addition, ITTO, through its open meetings, offers a discussion forum for forest policy, implements numerous development projects, draws up instructions for forest management, and develops criteria and indicators for sustainable forestry.

The World Trade Organisation (WTO) was founded in 1995 as successor to GATT. WTO is an intergovernmental organisation that develops the rules of international trade and seeks to ensure that international trade can be conducted predictably, equitably and freely with a minimum of obstacles.

ANNEX 3

Finnish Legislation Related to the Sustainability of Forestry

Forest Act (1094/1996)

The *Forest Act*, which repealed the Private Forest Act and the Act on Protective Forests, entered into force on January 1, 1997. The Act applies to forests of all forest owners. It aims at promoting the sustainable economic, social and ecological utilisation and management of forests in a way that provide a sustainable satisfactory yield while their biological diversity is being maintained. The Act regulates fellings and places landowners under the obligation to secure the regeneration of the forest after final felling. In order to secure the maintenance of biological diversity, the Act contains definitions of habitats that are especially important for the preservation of biodiversity in forest ecosystems. If the habitats are in natural state or resemple natural state, all management work carried out in them must preserve their natural features. In order to harmonise the goals of timber production and the multiple use of forests, the Act requires Forest Centres to produce regional forest programmes for their jurisdiction.

Legislation on Forestry Organisations

Most of the legislation concerning forestry organisations was reformed in the 1990s. The revised *Forest and Park Service Act (1169/1993)* entered into force on January 1, 1994, and established the Forest and Park Service as a State-owned corporation. In March 1996, the *Act on Forest Centres and the Forestry Development Centre Tapio (1474/1995)* entered into force. Its purpose was to streamline the organisation for promoting and monitoring private forestry, and to improve the efficiency of its operation and management system. The *Act on Forestry Management Associations* came into force on January 1, 1999. The new law aimed at promoting cooperation between forest owners and advisory services in forestry. (See also Annex 2, forest and environmental organisations).

Act on the Financing of Sustainable Forestry (1094/1996)

The *Act on the Financing of Sustainable Forestry*, which entered into force at the beginning of 1997, replaced the earlier Forest Improvement Act. The purpose of the Act is to promote the sustainable management of forests in accordance with the Forest Act. Under the Financing Act, State subsidies and loans may be granted to private forest owners for management work that aims to secure the sustainability of timber production, maintain the biological diversity of forests, and manage the forest ecosystems. Moreover, funding may be provided for the prevention and compensation of forest damage.

Forest Insect and Fungi Damage Prevention Act (263/1991)

The Forest Insect and Fungi Damage Prevention Act (entered into force on July 1, 1991) limits the storage of coniferous timber in forests in the summer, requires that damaged trees be removed from the forest when their amount exceeds the specified maximum limit, and regulates measures for the prevention of insect and fungi damage in conjunction with harvesting and the tending of seedling stands. The Act also places forest owners under the obligation to comply with the orders and instructions issued by authorities for the prevention of large-scale damage by insect and fungi. The cost of such measures to forest owners are compensated from State funds.

Forest Taxation (Income Tax Act 1535/1992, Decree on Forest Tax 1208/1991)

In conjunction with the revision of capital income taxation, which entered into force at the beginning of 1993, the system of forest taxation based on soil productivity was replaced by a system based on net earnings from timber sales. However, during the transition period (1993-2005), forest owners have the option of deciding which taxation system they want to apply. With the taxation of timber sales income, the net difference between forest income and expenditure is taxed like any other capital income.

In addition to income tax, a value added tax is currently levied on forestry income. Like any other property, forests are subject to property tax, and in various cases of ownership transfer, inheritance and gift duties, capital transfer and sales profit taxes may also be levied.

Act on Trade in Forest Reproductive Material (684/1979)

This Act, which entered into force at the beginning of 1980, aims to ensure the creation of healthy and vigorous seedling stands through provisions regulating the production, sale, import and export of seedlings, which must be suited to the site in terms of their species and provenance, free of diseases, viable and otherwise suitable.

Nature Conservation Act (1096/1996)

The Nature Conservation Act was drafted in tandem with the Forest Act, and it entered into force on the same date, January 1, 1997. The Act aims at maintaining biological diversity, supporting the sustainable use of natural resources and the natural environment, promoting public awareness of and general interest in nature, preserving nature's beauty and scenic value, and promoting scientific research. Biological diversity is safeguarded by conservation programmes, by establishing conservation areas, protecting habitats and species, and by extending the range of conservation measures. The new Act incorporated also international agreements into national legislation.

Nature conservation legislation contains provisions on the implementation of the EU Habitat and Bird Di-

rectives, special provisions on the Natura 2000 network, and a list of protected habitats in Finland. The Act developed the planning of the establishment and use of conservation areas, created a system for funding the implementation of conservation programmes, improved the legal protection of forest owners, and diversified the tools for the implementation of conservation.

Environmental Protection Act (86/2000)

The Environmental Protection Act, which entered into force in March 2000, combines under one law provisions that were previously scattered in Finnish legislation, and it also improves the consistency of permit procedures. Provisions relevant to forestry in the new Act include provisions on the pollution of surface and ground water, construction on water, drainage, and the runoff of harmful substances into water systems.

Land Use and Building Act (132/1999)

The Land Use and Building Act, which entered into force at the beginning of 2000, places an emphasis on safeguarding public participation in land development planning. The Act aims at organising the land use and building activities in such a way as to enhance the conditions for the creation of good living environments and to promote sustainable development. The harmonisation of the various uses of forests is in practice carried out in conjunction with the preparation of general land use and town plans based on the Act.

Act on Environmental Impact Assessment Procedure (468/1994)

The Act on Environmental Impact Assessment Procedure entered into force in 1994, and was amended in 1999. It aims to promote the assessment of environmental impacts and the consistent use of EIA in planning and decision making, and to enhance opportunities for public participation and the accessibility of information. Under the Act, environmental impact assessment must be carried out for all peat-production areas of over 150 hectares, as well as non-fragmented forest, marshland or wetland areas exceeding 200 hectares where ditching or drainage would permanently alter the nature of such areas. Also, permanent removal of tree cover, and regeneration of forests with introduced species requires that EIA be performed.

Acts Appearing in this Report

Forestry

Forest Act (1094/1996)	Chapter 1, Criteria 1, 3, 4 and 5
Act on the High-Altitude Protective Forests (196/1922; in force until December 31, 1996; Government Decision on Protective Forests (1998/844)	Chapter 2, Criteria 2 and 5
Act on Trade in Forest Reproductive Material (684/1979)	Criteria 2 and 3
Act on the Financing of Sustainable Forestry (1094/1996)	Criteria 1, 2, 3, 4 and 5
Forest Insect and Fungi Damage Prevention Act (263/1991)	Criterion 2

Conservation, recreation, hunting

Nature Conservation Act (1096/1996)	Chapter 1, Criteria 3 and 4
Act on Environmental Impact Assessment Procedure (468/1994), amendment (267/1999)	Criterion 5
Water Act (264/1961)	Criterion 5
Antiquities Act (295/1963)	Criterion 6
Act on Wilderness Reserves (62/1991)	Criterion 4
Outdoor Recreation Act (606/1973)	Criterion 6
Off-Road Traffic Act (670/1991)	Criterion 6
Environmental Protection Act (86/2000)	Criteria 2 and 5
Air Pollution Control Act (67/1982); in force until February 29, 2000	Criterion 2
Act on Compensation for Environmental Damage (737/1994)	Criterion 5
Hunting Act (615/1993)	Criteria 3 and 6

Reindeer husbandry and other natural livelihoods

Skolt Act (253/1995)	Criterion 3
Act on Natural Economy Industries (610/1984)	Criterion 3
Reindeer Husbandry Act (848/1990)	Criterion 3

Other acts

Land Use and Building Act (132/1999)	Criteria 1 and 3
Act on the Openness of Government Activities (621/1999)	Criterion 6
Act on Young Employees (998/1993)	Criterion 6
Act on Equality (609/1986)	Criterion 6
Supervision of Labour Protection Act (131/1973)	Criterion 6
Labour Protection Act (299/1958)	Criterion 6
Finnish Constitution (731/1999)	Introduction, Criterion 4

ANNEX 4

Information Systems for Compiling Data on the Monitoring of Sustainability

National Forest Inventories (NFI)

The National Forest Inventories (NFI) is a system for monitoring forests and forest resources which produces reliable national information on forest resources, land use, forest ownership, health and the biological diversity of forests.

The first National Forest Inventory was completed as early as the 1920s, and since the 1960s, inventories have been carried out every 5 to 10 years. The 8th National Forest Inventory (NFI8) was carried out 1986-94, and surveying for the 9th inventory was initiated in 1996. The National Forest Inventories are conducted by the Finnish Forest Research Institute.

The National Forest Inventories are based on extensive field surveys. The first NFIs used line surveys, since the 1960s systematic cluster samples have been employed. For the NFI9, over 70,000 sample plots on forestry land are determined, on which over 150 parameters are measured or assessed. The number of individual trees covered by the inventory is about 0.5 million. Some of the sample plots are established as permanent plots for further measurement. The permanent plots will provide data on changes occurring in forests.

The sample plots are used to calculate reliable data covering extensive areas (over 200,000 hectares), as well as the entire country. For example, the sampling error for the total volume of growing stock is 0.6%. In addition to field data, multiple-source inventory utilises satellite images and other numerical data, such as numerical base maps and contour maps. These allow the data from sample plots to be extrapolated for the areas falling in between the relatively thin network of sample plots. The key advantage of the multiple-source system, over using field inventory only, is that data can also be obtained for smaller areas.

National Monitoring of Biodiversity

Biodiversity monitoring in Finland is still relatively unsystematic. Several organisations gather data, but a centralised monitoring system is still lacking. Furthermore, the coverage of the monitoring systems remains low, and the analysis of data with respect to biodiversity issues is often insufficient.

Under the Nature Conservation Act, responsibility for the organisating of monitoring for naturally occurring species of flora and fauna as well as habitats belongs to the Ministry of the Environment, whereas responsibility for coordinating the organisation of biodiversity monitoring comes under the Finnish Environment Institute. A centralised national information network on biodiversity is under construction. One of the two expert working groups appointed to support the monitoring of the national action programme for biological diversity in Finland was charged with preparing the construction of a national system for monitoring biodiversity, and to determine its content, scope and allocation of costs.

The Nature and Land Use Division at the Finnish Environment Institute conducts research on endangered species, develops the monitoring of species and their habitats as well as the means for their protection, studies and assesses changes in population structure, and develops and maintains a register of endangered species in Finland (UHEX).

Monitoring of Forest Health

Since 1985, Finland has participated in the International Cooperative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests). The programme is based on the Convention on Long-Range Trans-Boundary Air Pollution (CLRTAP), and it is funded by the European Commission. Under regulations adopted in 1986 and 1994, the Finnish Forest Research Institute monitors the health of forests in the EU Member States. Data on the health of forests are also gathered in conjunction with the National Forest Inventories.

Forest Statistics

The Forest Statistics Information Service of the Finnish Forest Research Institute produces extensive, up-to-date statistics on the activities of the forest sector in Finland. Forest statistics are based on research projects and data compiled by the Finnish Forest Research Institute, and on cooperation with various statistics authorities (e.g. Statistics Finland) and forest sector organisations (e.g. Forest and Park Service, Finnish Forest Industries Federation, Forestry Development Centre Tapio, and the Board of Customs). The statistics of the Information Service are compiled on the basis of data on permanent forest operations, forest statistics and forest taxation, and are supplemented regularly with special studies.

Forest statistics are published in the Finnish Statistical Yearbook of Forestry, in statistics bulletins, and via the Internet at the Metinfo Statistics -service.

ANNEX 5

International Conventions, Agreements and Processes

Conventions and Agreements

- Convention on Biological Diversity, CBD
- Convention on International Trade in Endangered Species of Wild Fauna and Flora, CITES
- United Nations Convention to Combat Desertification, UNCCD
- United Nations Framework Convention on Climate Change, UNFCCC
- International Tropical Timber Agreement, ITTA
- ILO Convention on the Indigenous and Tribal Peoples
- CLRTAP Convention on Long Range Trans-boundary Air Pollution

Organisations and Processes

COFO	UN Committee on Forestry
CSD	see UNCSD
ECE	Economic Commission for Europe
EFC	European Forestry Commission
EUFORGEN	European Forest Genetic Resources Programme
FAO	United Nations Food and Agriculture organisation
ICP – Forests	International Cooperative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests
IFF	Intergovernmental Forum on Forests
ILO	International Labour Organisation
IPF	Intergovernmental Panel on Forests
ITTO	International Tropical Timber Organisation
OECD	Organisation for Economic Co-operation and Development
UNCED	United Nations Conference on Environment and Development
UNCSD	United Nations Commission on Sustainable Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFF	United Nations Forum on Forests
WB	World Bank
WTO	World Trade Organisation

Forest Research Organisations

CIFOR	Center for International Forestry Research
EFI	European Forest Institute
ICRAF	International Centre for Research in Agro-forestry
IUFRO	International Union of Forestry Research Organizations

ANNEX 6

The General Declaration and Resolutions

Second Ministerial Conference on the Protection of Forests in Europe, 16–17 June 1993 in Helsinki

GENERAL DECLARATION

The Signatory States and the European Community,

A. Recalling the First Ministerial Conference on the Protection of Forests in Europe, held in Strasbourg in 1990, where ministers agreed that close co-operation between the Signatory States for the protection and sustainable management of forests was necessary, that common objectives and principles, including that of conservation, should be progressively implemented at the scientific and technical level, and that the efforts of international organisations with similar objectives should be stimulated,

B. Appreciating the importance of the follow-up work carried out since the Conference in 1990 and taking note of the need to continue to develop further the co-operation between European states,

C. Considering that the countries of Europe are responsible for the stewardship of approximately one quarter of the world's forests, the production of wood from which is and will remain an essential function, and that the increasing demands for non-wood goods and services that are made on the European forests should be met in a manner that is consistent with their sustainable management and conservation and appropriate enhancement of their biodiversity,

D. Appreciating the role of the Helsinki Conference and its Resolutions for the long-term prospects for forestry, so that it may better contribute to national and regional objectives with respect to the rural sector, to the environment and to economic growth, trade and sustainable development in all European countries,

E. Taking into account the difficult economic situation faced by the forestry sector, including some forest industries, of certain European countries,

F. Concerned with the threat to the health of European forests from air pollution, fires, pests, diseases, game, storms and receding of ground water tables, which stresses the need for further control or protection,

G. Aware of the limited resources currently available to combat the decline of forests and forest lands and to implement sustainable forest management in European countries with economies in transition,

H. Aware of the further contribution that the forestry sector could make to the mitigation of climate change and also that the process of such change might require a degree of adaptation through forest management so that forests can be maintained on a sustainable basis,

I. Recalling the 1979 Convention on Long-Range Transboundary Air Pollution, and reaffirming the need to have regard to the commitments contained in the Helsinki and Sofia protocols linked to this convention,

J. Recalling that the Signatory States and the European Community participated in the United Nations Conference on Environment and Development in June 1992 in Rio de Janeiro and that they signed the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change, and that by their adoption of Agenda 21 and the non-legally binding authoritative statement[1] of principles for a global consensus on the management, conservation and sustainable development of all types of forests at that Conference, and by their support for the establishment of the United Nations Commission on Sustainable Development, the Signatory States and the European Community demonstrate their will to promote the incorporation of the Statement of Forest Principles in the implementation of Agenda 21, in particular, in the context of the review of the implementation of Chapter 11 (Combating deforestation),

K. Affirming their intention to keep the Statement of Forest Principles under assessment for its adequacy with regard to further international cooperation on forest issues,

L. Stressing that the conservation and appropriate enhancement of biological diversity is an essential element of sustainable management of all kinds of forests and forest ecosystems, and that therefore Resolutions H1 and H2 should be implemented in an integrated manner that is reflected in national guidelines and local technical solutions,

M. Recognising the valuable work already carried out by international organisations and institutions on the implementation of the Strasbourg Resolutions thereby putting special emphasis on European forests,

N. Acknowledging the desirability of enabling participation by local communities, forest owners and Non-Governmental Organisations in the formulation and implementation of forest policies and programmes, and

O. Considering that each nation, while its separate iden-

tity must be respected, should assume its share of the responsibility to all European countries as regards the future of forests, and recognising the need for *follow-up* action to be coordinated in order better to ensure that progress is made towards fulfilling the commitments entered into by the Parties concerned;

DECLARE THEIR INTENTION TO:

1. Collaborate in the collection of data and the production of periodic reports on progress towards achieving the protection and sustainable management of forests in Europe,
2. Stimulate and promote cooperation and, if necessary, coordination of actions facilitating the adjustment of the forestry sectors in those European countries with economies in transition,
3. Take action through research to prepare the European forestry sector for a long-term process of mitigation of, and to explore, where appropriate, possibilities for adaptation to, climate change,
4. Stimulate and promote, without delay, the implementation of the Rio Declaration, Agenda 21, the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change as they apply to the forestry sector, and of the Statement of Forest Principles in the European context and conditions,
5. Participate in, and promote, international activities towards a global convention on the management, conservation and sustainable development of all types of forests, and
6. Implement the Resolutions of this Conference, by continuing, enhancing and improving the coordinated follow-up initiated in Strasbourg in 1990, building on the experience gained from this process and making use of existing institutions and mechanisms where this is appropriate and feasible, in accordance with the following principles:
   - 6.1. In the same spirit as that which presided over the conference proposal first made jointly by the French and Finnish and then shared by the Finnish and Portuguese Ministers of Agriculture and Forestry, further Ministerial Conferences could be convened as and when these are considered necessary by a sufficient number of Signatory States in the light of progress made towards fulfilment of the commitments entered into by them and of work carried out within the international bodies mentioned below. The chairmanship will be assumed by two participants, one of whom will have been co-chairman of the preceding Conference, during which the other will have declared candidacy for chairmanship. The host country or organisations will be in charge of the secretariat,
   - 6.2. The follow-up of the Resolutions adopted at the preceding Conference will be guided by the two participants which assumed the co-chairmanship of the Conference,
   - 6.3. The follow-up will also be included in the agenda of each Conference, as well as new proposals for joint action that may interest several of the participating countries put forward on the initiative of one or several ministers. Each proposal examined would be open for signature by those countries interested in joint action in the field in question, and
   - 6.4. The proposals examined should be supported by expert research and consideration carried out in a spirit of openness, in diverse international bodies such as the United Nations Economic Commission for Europe, the Food and Agriculture Organization of the United Nations, and in particular its Regional Forestry Commissions, the United Nations Environment Programme, the Council of Europe, the working groups of the European Community, and, *inter alia*, such non-governmental organisations as the International Union of the Forestry Research Organizations, the European Environment Agency, Greenpeace International, the World Conservation Union and the World Wide Fund for Nature.

RESOLUTION H1
General Guidelines for the Sustainable Management of Forests in Europe

The Signatory States and the European Community,

A. Recalling that the Signatory States and the European Community have endorsed the Rio Declaration and Agenda 21 and signed the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change at the United Nations Conference on Environment and Development in June 1992 and considering that they therefore recognise the need to reconcile the legitimate and sustainable use of wood and other forest products with all other functions of forests in the ecological and social conditions prevailing in Europe, and that the conservation and appropriate enhancement of biological diversity in all types of forests is an essential element in their sustainable management,
B. Recognising the non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests, as adopted by the 1992 United Nations Conference on Environment and Development, hereafter referred to as the Statement of Forest Principles,
C. Considering the objectives of sustainable management as stated in the Statement of Forest Principles: *viz.* "Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual human needs of present and future generations",
D. Agreeing that, for the purposes of this resolution, "sustainable management" means the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological,

economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems,

E. Acknowledging the need when implementing policies for sustainable management to take account of potential impacts of climate change on forest ecosystems,

F. Acknowledging the need to carry out sustainable forest management in accordance with national development policies and priorities and on the basis of environmentally sound national guidelines, and recognising that in the formulation of such guidelines account should be taken of internationally agreed principles relevant to the various conditions in Europe,

G. Recognising that forests provide wood as an essential product that can also, to a large extent, substitute for products from non-renewable resources, as well as provide energy and a multitude of other goods, services and functions, which will be necessary for the welfare of society and the environment for the foreseeable future,

H. Recognising that forests in Europe grow in a widely varying environment (boreal to Mediterranean, continental to maritime, alpine to lowlands), have a long history and have been influenced by human settlements and actions over centuries, leading, *inter alia*, to knowledge, skills and experience in forestry practices, to the development and implementation of management policies and regulations based on long-term planning, and to a fragmented ownership structure increasing in some areas, all of which factors have a bearing on the protection and sustainable management of forests in Europe,

I. Noting that the report 'The Forest Resources of the Temperate Zones' (the UN-ECE/ FAO[2] 1990 Forest Resource Assessment) shows that the European forest resource is continuing to expand in terms of area, standing volume and increment, and that the demand for non-wood products and services is increasing in absolute and relative importance,

J. Noting with concern that on average more than one fifth of the trees in Europe have in recent years shown damaged foliage, as stated in the 1992 report 'Forest Condition in Europe' by the UN/ECE International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests and the Commission of the European Communities, and that a continuation of the present pollution load for extended periods of time or an increase in pollution levels will threaten the vitality of forests over large areas of Europe,

K. Considering the adverse effects on forests in some parts of Europe of storms, inadequate management, pests, diseases, game, overgrazing and unregulated browsing, and of inadequately planned large industrial and infrastructure development, and being concerned over the destruction of large areas of forest by fires,

L. Considering the responsibility of Europe to contribute to the sustainable management of the global forest;

COMMIT THEMSELVES TO PROMOTE:

1. The implementation of the General Guidelines set out in Part I of this resolution, these being regarded as particularly relevant to the achievement of sustainable forest management in Europe;
2. Cooperation in carrying out the Future Action set out in Part II.

PART I: GENERAL GUIDELINES

1. Human actions must be avoided which lead, directly or indirectly, to irreversible degradation of forest soils and sites, the flora and fauna they support and the services they provide. Efforts should be increased to keep the emissions of air pollutants and greenhouse gases below the expected tolerance level of forest ecosystems, taking into account the long- term cumulative and/or synergistic effects of pollutants. Forest fires and the pollution of soils must be strictly controlled and could dictate overall policy and management objectives and practices in particularly sensitive parts of Europe.
2. Forestry policies, as adapted to local laws within the framework of national traditions and constitutional processes, should recognise the long-term nature of forestry by having an appropriate level of continuity in legal, institutional and operational matters and should strongly encourage practices in state and private forests which facilitate multiple functions and sustainable management, including the conservation and appropriate enhancement of biodiversity. Forest owners who provide multiple-use benefits to the community should be encouraged and supported by society or other beneficiaries, as appropriate, when such provision involves them in excessive costs.
3. Forest management should be based on stable and long-term land-use policies and regulations, which, *inter alia*, are aimed at conserving functional forest ecosystems and take account of the ownership structure in Europe, and which are based on the general presumption that forest land, particularly land considered natural or semi-natural, will remain dedicated to that use.
4. Forest management should be based on periodically updated plans or programmes at local, regional or national levels, as well as for ownership units, when appropriate and on forest surveys, assessments of ecological impact and on scientific knowledge and practical experience.
5. Forest management should provide, to the extent that it is economically and environmentally sound to do so optimal combinations of goods and services to nations and to local populations. Multiple-use forestry should be promoted to achieve an appropriate balance between the various needs of society.
6. Forest management practices should have due re-

gard to the protection of areas of ecological fragility, to the conservation of primary and climax forests, areas with cultural heritage, and the landscape, to safeguarding the quality and quantity of water, and to maintaining and developing other protective functions of forests such as the protection of aquatic and agricultural ecosystems and protection against floods, erosion and avalanches.

7. Forest management practices should aim at maintaining and, if possible, improving the stability, vitality, regenerative capacity, resistance and adaptive capacity of forest ecosystems towards stresses, including their protection against fire, pests, diseases, game and other agents of damage such as overgrazing and unregulated browsing. The prevention and control of large-scale biotic and abiotic damage should be supported. Special attention should be paid to maintaining and, if needed, to improving the quality of forest soils. Silvicultural practices emulating nature should be encouraged. Practices contrary to sustainable management should be actively discouraged.
8. In the management of existing forests and the development of new forests, the chosen tree species should be well suited to local conditions and be capable of tolerating climatic and other stresses, such as insects and diseases, and potential climate changes, throughout the growing period. Genetic selection, which is commonly practised in Europe, should not favour performance traits at the expense of adaptive ones, except in particular cultures where intensive care may protect them against damage. Afforestation should be conducted in a manner that does not negatively affect ecologically interesting or noteworthy sites and landscapes.
9. Native species and local provenances should be preferred where appropriate. The use of species, provenances, varieties or ecotypes outside their natural range should be discouraged where their introduction would endanger important/valuable indigenous ecosystems, flora and fauna. Introduced species may be used when their potential negative impacts have been assessed and evaluated over sufficient time, and where they provide more benefits than do indigenous ones in terms of wood production and other functions. Whenever introduced species are used to replace local ecosystems, sufficient action should be taken at the same time to conserve native flora and fauna.
10. Due to the high levels of human consumption and waste common in many areas of Europe, recycling and use for energy of forest products should be encouraged both to alleviate the problem of waste disposal and to increase the potential of forest products to substitute for products from non-renewable sources.
11. Because of the expanding European forest resource, the use of wood and non-wood forest products should be encouraged on a basis compatible with the sustainable management of forests, thereby providing and increasing the potential for traditional and new forest products, sales of which can provide, for both the owner and society, a ready means of financing forest management.
12. As knowledge, skills and public opinion will affect forestry policies in Europe, public awareness and understanding of sustainable management should be promoted, and the provision, through appropriate research, of information and training to forestry practitioners and forest owners on the concept and on methods of implementing it should be intensified. To ensure the sustainable management of forests, a sufficient number of adequately trained and competent staff is essential.

PART II: FUTURE ACTION

13. The Signatory States and the European Community commit themselves to preparing, without delay, specific national or regional guidelines and to incorporating them into their forestry plans and programmes for the implementation of the above General Guidelines, in a manner consistent with the Statement of Forest Principles, and will collaborate in the further development of these General Guidelines for the sustainable management of forests in Europe.
14. The Signatory States and the European Community will collaborate in efforts to increase reforestation, afforestation and forest conservation in Europe, in ways consistent with the above General Guidelines and the chapter in Agenda 21 on combating deforestation.
15. The Signatory States and the European Community will collaborate in order to develop common measures consistent with these guidelines that would favour the production, use and marketing of products from forests under sustainable management.
16. The Signatory States and the European Community will participate, under the aegis of the United Nations Commission on Sustainable Development, in international activities towards the preparation of a global convention on the management, conservation and sustainable development of all types of forests.

RESOLUTION H2
General Guidelines for the Conservation of the Biodiversity of European Forests

The Signatory States and the European Community,

A. Having regard to the fact that the conservation and appropriate enhancement of biological diversity in all types of forests is an essential element for their sustainable management,
B. Recalling the definition of biological diversity agreed upon in the Convention on Biological Diversity: *viz.* "Biological diversity means the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.",

C. Recalling the concept of conservation defined in the World Conservation Strategy (1980) as the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations,

D. Considering the urgent need to show respect for the evolutionary heritage of species and forest ecosystems, in order to enable the adequate genetic adaptive capacity to be safeguarded in the interest of present and future generations,

E. Considering that the combination of the direct and indirect actions of man on forests can contribute to a decrease in intraspecific variability, species diversity and ecosystem variety,

F. Considering the objectives and measures set out in the Convention on Biological Diversity that was signed at the United Nations Conference on Environment and Development in June 1992 in Rio de Janeiro, and considering in particular the precautionary principle in the preamble to the Convention, which notes that "where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimise such a threat",

G. Recalling that biological diversity is also the basis of genetic improvement of species and varieties of technical and economic interest,

H. Considering the general objectives and specific measures stated in the Convention concerning the Protection of the World Cultural and Natural Heritage (1972), the Convention on the Conservation of European Wildlife and Natural Habitat (1979), the Convention of Barcelona and its Protocol Concerning Mediterranean Specially Protected Areas (1982), the EC Directives concerning the Conservation of Wild Birds (1979) and the Conservation of Natural Habitats and Wild Fauna and Flora (1992), the Council of Europe's European Network of Biogenetic Reserves (1976), and the Council of Europe's Decision on Preservation of Natural Forests (1977);

COMMIT THEMSELVES TO PROMOTE:
The implementation of the following General Guidelines at the level (local, regional or national) appropriate to the exercise of their individual competencies in matters of forestry policy, and their further development.

PART I: GENERAL GUIDELINES

1. The conservation and appropriate enhancement of biodiversity should be an essential operational element in sustainable forest management and should be adequately addressed, together with other objectives set for forests, in forestry policies and legislation.
2. The conservation and appropriate enhancement of biodiversity in forests should be based both on specific, practical, cost-effective and efficient biodiversity appraisal systems, and on methods for evaluating the impact on biodiversity of chosen forest development and management techniques.
3. Where possible, the size and degree of utilisation of forest compartments and other basic management units should take account of the scale of variation of the site, in order to better conserve and manage the diversity of habitats. Management should aim at increasing the diversity of forest habitats.
4. Where possible the establishment of taxa[3] which are naturally associated with those that occur most frequently in the forest should be encouraged, and a variety of structure within stands should be favoured, where the natural dynamics of such associations permit.

PART II: FUTURE ACTION

5. The Signatory States and the European Community will recognise the conservation and appropriate enhancement of biodiversity as an essential element of sustainable forest management. This would mean, *inter alia*:
   5.1. The conservation of genetic resources of forest taxa, both those currently exploited for economic purposes and those considered secondary or rare as detailed in Resolution 2 of the Strasbourg Conference, and
   5.2. Taking account of the protection of threatened forest species and ecosystems, as listed nationally or locally, in the formulation of national forest policies.
6. The Signatory States and the European Community will establish at national or regional levels a coherent ecological network of climax, primary and other special forests aimed at maintaining or re-establishing ecosystems that are representative or threatened.
7. The Signatory States and the European Community will establish educational and public awareness programmes on the conservation of biodiversity emphasising, *inter alia*, the positive aspects of sustainable management of forests on the conservation of biodiversity. These programmes should be aimed, *inter alia*, at enabling effective participation by local communities, forest owners and Non- Governmental Organisations in the conservation and appropriate enhancement of biological diversity.
8. The Signatory States and the European Community will promote technical cooperation including exchange of experts, courses and seminars, and transfer of technology.
9. The Signatory States and the European Community will develop a coherent and responsible approach to the conservation and appropriate enhancement of biodiversity in forests through the development of national or regional guidelines with the aim, *inter alia*, of:
   9.1. Obtaining sufficient knowledge about the eco-

system functions and services derived from European forests,

9.2. Obtaining sufficient knowledge of the status and requirements for management of the endangered, rare or representative biotic elements of the forests, and

9.3. Achieving adequate forecasting, monitoring and evaluation of the consequences for biodiversity of different silvicultural techniques.

10. In order to attain aims 9.1., 9.2. and 9.3. the Signatory States and the European Community will implement surveys and research programmes which are specially adapted to their economic, social and environmental conditions and which are, where appropriate, coordinated and integrated with similar work resulting from the implementation of the relevant resolutions of the Strasbourg and Helsinki Conferences.

11. The Signatory States and the European Community will continue to improve methods for assessing biodiversity in forests and for evaluating the impact on biodiversity of forest management methods.

RESOLUTION H3
Forestry Cooperation with Countries with Economies in Transition

The Signatory States and the European Community,

A. Recognising the importance of the forestry sector to Countries with Economies in Transition, in relation to the development of their political, economic and social conditions as they adjust their former centrally-planned economies to market economies,

B. Being aware of the possible consequences of the economic transformation process in the Countries with Economies in Transition for the sustainable management of forests and for forest conservation,

C. Emphasising the increasing need for broadly-based bilateral and multilateral cooperation in the forestry sector, and noting with appreciation the existing cooperation and the activities, at national, regional and interregional levels, of programmes and organisations[4] , including the Commission of the European Community, which are involved in cooperation with Countries with Economies in Transition,

D. Emphasising the need for initiative and priority-setting by the Countries with Economies in Transition to promote European cooperation which benefits the forestry sector in general,

E. Recalling the results of the Dobris (Czechoslovakia, 1991) as well as of the Luzern (Switzerland, 1993) conferences of European environment ministers, and in particular the Environmental Action Programme for Central and Eastern Europe,

F. Being aware of the generally adverse impact on the management, conservation and sustainable development of forests in Countries with Economies in Transition arising from air pollution, loss of biodiversity and genetic resources, fires and lowered ground water tables and, in certain areas, nuclear radiation,

G. Noting that requests have been made for assistance in the monitoring of forest resources, especially in relation to their state of health over large areas,

H. Recognising the particular importance of programmes to support Countries with Economies in Transition in their endeavour to protect their forest resources and biodiversity and the need to enhance sustainable development of their forest and forest products sector,

I. Recognising the human and natural potentials within the Countries with Economies in Transition and the importance of the existing cooperation between them;

COMMIT THEMSELVES TO PROMOTE AND SUPPORT cooperation for mutual benefits, within the framework of the following General Guidelines, in order to provide relevant expertise and advice, and to invite appropriate organisations and institutions to do likewise.

PART I: GENERAL GUIDELINES

1. Countries with Economies in Transition should be encouraged to promote actions for the sustainable management of forest resources, in conformity with the General Guidelines developed in the resolutions of the Helsinki Ministerial Conference.
2. The Signatory States and the European Community should support and complement these actions, based on the principle of partnership and taking into account the needs, priorities and commitments of the Countries with Economies in Transition themselves.
3. Cooperation may take the form of transfer of knowledge, and of bilateral and multilateral projects, and should focus on technical, scientific, institutional and legal matters.
4. Within bilateral contacts, twinning arrangements should be promoted between institutions such as universities, vocational schools and research institutes as well as between individuals.
5. Cooperation should be further developed in particular in the following areas: strengthening of institutions, development of the legal and policy framework for the sustainable development of forestry and the forest products sector; and, in this context, activities to support the development of market oriented and ecologically sound enterprises.
6. Adequate assessments of forest resources and of environmental impacts should take place before initiating cooperation projects which are likely to have major consequences for the transboundary environment, in accordance with the ECE Convention on Environmental Impact Assessment in a Transboundary Context (1991).
7. Countries should develop, by mutual cooperation, information exchange and monitoring systems related to transboundary factors causing forest damage and forest decline, such as air pollution, fires, nuclear radiation, game and others; and should co-

operate in preventing and combatting damage from such harmful agents.

8. Where coordination of multilateral cooperation initiatives is necessary, this should be done by existing institutions.

PART II: FUTURE ACTION

9. The member countries of the ECE, FAO, UNEP, UNDP, World Bank and EBRD, as well as the European Community, and the international Non-Governmental Organisations should consider activities aiming at promoting progress in the topics mentioned in the General Guidelines.
10. The Signatory States and the European Community will promote the transfer of knowledge, bilateral and/or multilateral contacts, mutually beneficial joint research projects and the preparation of national forest programmes.
11. The Signatory States and the European Community will promote professional contacts, the transfer and publication of information, documentation and professional literature, exchanges of experts and students, educational workshops, seminars, conferences, training courses and other forms of education, with the participation of groups of specialists from Countries with Economies in Transition and from European countries with market economies.
12. The Signatory States and the European Community agree to support existing efforts aimed at promoting the development of the national forestry databases of Countries with Economies in Transition and their linkage to existing European databases.

RESOLUTION H4
Strategies for a Process of Long-term Adaptation of Forests in Europe to Climate Change

The Signatory States and the European Community,

A. Recognising that human activities are substantially increasing the atmospheric concentrations of greenhouse gases, and thus altering the composition of the atmosphere,
B. Recognising that the increase in concentrations of greenhouse gases in the atmosphere enhances the natural greenhouse effect, which in turn will result, on average, in an additional warming of the Earth's surface and lower atmosphere, and that the emissions of chlorofluorocarbons (CFCs) and other ozone depleting compounds in the atmosphere are causing a considerable decrease in the concentration of ozone in the stratosphere, and also tropospheric ozone is inducing phytotoxic effects,
C. Appreciating that natural forest ecosystems of Europe have adapted, during long periods of evolutionary development, to the climatic conditions now prevailing,
D. Appreciating that rotations of forest stands in Europe can be considerably longer than the likely time in which anthropogenic climate change will have an effect on forest ecosystems,
E. Whereas these changes in the composition of the Earth's atmosphere and consequent changes in climate are likely to have, within the time span of one rotation of a forest stand, both favourable and adverse effects on forest ecosystems in Europe, which may include:
   E.1. Reduced vitality, stability and regeneration of trees and forests, more favourable conditions for harmful insects and pathogens, and increased risks of forest fires and storms,
   E.2. Increased mineralisation of organic matter, which will release carbon dioxide, increase soil leaching, affect soil processes, and lead to eutrophication of waters,
   E.3. Altered ground water tables and soil moisture regimes, due to shifts in the balance of precipitation and evapotranspiration or due to sea level rise, which may cause stress and reduced vitality and pest and disease resistance in trees, and
   E.4. Increased growth of forest vegetation which is likely to occur, for a certain time and provided no soil changes adversely affect this, as a result of increases in CO2 in the atmosphere leading to sequestration of carbon,
F. Recognising the complexity of interactions between climate and ecosystems, including feedback processes, and the present limited understanding of the ranges, flexibility of adaptation and acclimatisation mechanisms of these ecosystems,
G. Recognising the present limited ability to predict and assess the net outcome of favourable and adverse effects,
H. Recognising that changes in the atmosphere may also affect human activities, such as the management of watersheds and coastal zones, agriculture, etc., and that any large-scale change in these activities will also affect the forestry sector,
I. Recognising that altered water use caused by changing and adapting forest ecosystems in hydrological catchments may have an impact on water resource planning,
J. Recognising that measures taken within the forestry sector can contribute to the mitigation of climate change only if the existence and health of forest ecosystems is assisted of by a sufficient reduction in emissions of harmful substances such as acidifying compounds, nitrogen compounds, and release of greenhouse gases,
K. Considering it necessary to initiate a process of long-term adaptation and adjustment of forests and the forestry sector in Europe to climate change by means of research and other actions that are compatible with the aims and objectives of the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity, as well as other relevant international legal instruments,
L. Noting the activities of large international programmes such as IGBP[5] and WCP, and recognising the task of IPCC within WMO and UNEP

and other relevant international and regional/sub-regional organisations to assess the impact of climate change;

COMMIT THEMSELVES TO SUPPORT

appropriate measures for the mitigation of climate change and the limitation of greenhouse gas emissions, as provided for in the United Nations Framework Convention on Climate Change, and further to support national and international research into, and to enhance international cooperation on, the following subjects:

- the impact of possible climate change on forest ecosystems and forestry
- the possible adaptation of forest ecosystems and forestry to climate change
- the mitigation of the adverse effects of climate change by forest ecosystems and forestry in Europe,

and for that purpose identify the following specific areas for research and future action.

PART I: AREAS FOR RESEARCH

1. Greater understanding through research of the linkages between climate change and forest ecosystems, including feedbacks from the ecosystem to the climate system.
2. Studies on the role of forests, forest soils, and peatlands in Europe as reservoirs, sinks and sources of carbon, in order to understand the role of European forests in global fluxes, especially in the global carbon cycle. Research in this field may include the development of common methodologies for research and for national and regional inventories and the development and maintenance of databases on a European scale on reservoirs, sinks and sources of carbon in terrestrial ecosystems.
3. Studies on genetic variability of regionally important tree species in response to changes in climate and increased concentration of carbon dioxide, and on the degree and rate of evolutionary processes and adaptation, by means of genetic changes.
4. Studies on the dynamic equilibrium of host-parasite relationships in new climatic environments.
5. Studies on soil formation processes, including the mineralisation of organic matter and leaching, in response to climate change.
6. Development of process-based predictive ecosystem models applicable to the European scale, and which may be used in comprehensive ways to integrate anticipated changes in the climate and their interaction with air pollution, with their effects on forest ecosystems and the fluxes of greenhouse gases and with their effects on different forest management systems.
7. Studies on the adjustment of European forest management systems in order to optimise adaptation to climate change, to ensure the health and multiple functions of existing forests, and to optimise the sequesteration and storage of carbon.

PART II: FUTURE ACTION

8. The Signatory States and the European Community will intensify research and international cooperation carried out by existing organisations and working groups dealing with the research areas mentioned above.
9. The Signatory States and the European Community will review, develop and coordinate the present monitoring schemes to assess more effectively those large-scale patterns and dynamics of alterations that may be due to climate change in European forest ecosystems. These tasks should be carried out in coordination with existing European networks of permanent sample plots.
10. The Signatory States and the European Community will promote the utilisation, with low emission technology, of wood as a renewable energy source, and, in so doing, contribute to the sustainable development of forests by protecting the environment and mitigating the greenhouse effect.

[1] Hereafter referred to as the Statement of Forest Principles

[2] UN-ECE/FAO: United Nations Economic Commission for Europe/Food and Agriculture Organization

[3] Any taxonomic group

[4] 1 Reference list, not exclusive:

ICP Forests: International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests

ECE: Economic Commission for Europe

FAO: Food and Agriculture Organization

UNDP: United Nations Development Programme

UNEP: United Nations Environment Programme

GEF: Global Environment Facility

IUFRO: International Union of Forestry Research Organizations

EBRD: European Bank of Reconstruction and Development

[5] IGBP: International Geosphere-Biosphere Programme

WCP: World Climate Programme

IPCC: Intergovernmental Panel on Climate Change

WMO: World Meteorological Organization

UNEP: United Nations Environment Programme

ANNEX 7

The General Declaration and Resolutions

Third Ministerial Conference on the Protection of Forests in Europe, 2–4 June 1998 in Lisbon

GENERAL DECLARATION

We, the Ministers responsible for Forests, at the Third Ministerial Conference on the Protection of Forests in Europe, held in Lisbon, 2-4 of June 1998, recalling the forest-related decisions and agreements of UNCED[1], UNGASS[2] and XI World Forestry Congress as well as the provisions of the United Nations Conventions, CBD[3], FCCC[4] and CCD[5]; recognising the progress and achievements made in the implementation of the commitments of the Strasbourg and Helsinki Ministerial Conferences; and being aware of the many challenges, opportunities as well as threats related to forests and sustainable forest management, share the following Vision:

> In the 21st century, the European forest sector, while respecting the social, economic, environmental and cultural functions of forests, will optimise its contribution to the sustainable development of society, especially to the development of rural areas, the provision of renewable resources and the protection of the global and local environment.

Society, understanding the multiple roles of forests and recognising the importance of the conservation and sustainable management of forests, will support a sound development of the forest sector by providing conducive regulatory, institutional, economic and social frameworks for practising sustainable forest management, taking informed decisions on the best possible use of wood and non-wood forest products and services, and reducing existing strains on forest health and vitality.

An effective partnership between society and the forest sector will be strengthened, recognising the role of forests as a key renewable resource, the responsibility of forest owners in their sustainable management, and the responsibility of Europe in demonstrating the integration of all forest functions and in the innovative production and use of wood and non-wood forest products and services.

The heritage of healthy and biologically diverse forests for future generations, the positive contribution to the global carbon and hydrological cycles, the protection of soil and water resources, the protection of population and infrastructures against natural hazards, the creation of income and employment particularly in rural areas and the excellence for providing recreational and cultural values for all people, are characteristics associated with forests on which generations of forest owners and society in general have built and will continue to build present and future values.

In the spirit of the above vision, we declare our commitment to:

1. Enhance the social and economic elements of sustainable forest management and strengthen the links between the forest sector and society by increasing dialogue and mutual understanding on sustainable forest management and the role of forests and forestry. Develop to their full value the potential contributions from the forest sector to rural development, employment, environment and to overall sustainable development of society by implementing the Resolution L1, "People, Forests and Forestry – Enhancement of the Socio-Economic Aspects of Sustainable Forest Management".
2. Further promote sustainable forest management contributing, *inter alia*, to the conservation of biological diversity, to the mitigation of the negative effects of air pollution and climatic change, and to the combat of the desertification, by:
   a) Adopting the six Pan-European criteria for sustainable forest management, endorsing, implementing, while continually improving the Pan-European indicators for sustainable forest management and endorsing the voluntary "Pan-European Operational Level Guidelines for Sustainable Forest Management', by implementing the Resolution L2, 'Pan-European Criteria and Indicators and Operational Guidelines for Sustainable Forest Management";
   b) Collaborating with the Ministerial Process "Environment for Europe", especially through endorsing the "Work-Programme on the Conservation and Enhancement of Biological and Landscape Diversity in Forest Ecosystems 1997-2000", promoting its implementation and future revision, in line of resolution H2[6] and the proposals for action agreed at the United Nations Intergovernmental Panel on Forests;
   c) Taking action to stimulate and promote the sound use of wood and other forest based products as environmentally friendly and renewable materials;
   d) Evaluating the role of forest ecosystems to the mitigation of climatic change, in line with the United Nations Framework Convention on Cli-

mate Change, as a carbon sink and reservoir, combined with growing use of long life-cycle wood products and enhancing the multiple contributions of forest ecosystems to the conservation and enrichment of soils and for the regulation of water cycles.

3. Take national as well as co-operative actions towards the implementation of the decisions of the United Nations General Assembly Special Session (UNGASS) concerning the proposals for action agreed at the *ad-hoc* Intergovernmental Panel on Forests (IPF) and contributing to the work of the Intergovernmental Forum on Forests under the United Nations Commission on Sustainable Development (UNCSD/IFF).
4. Continue to share the results obtained in the Pan-European Process with all interested parties and in all important international *fora*, within and outside the United Nations system, and thereby contributing positively with our experience and achievements to promote sustainable forest management at all levels, to build consensus on forest policy issues and to the implementation of the important forest related political commitments and agreements.
5. Develop a programme of work to implement the decisions of this Conference and to reinforce the implementation of previous commitments made at Strasbourg and Helsinki Ministerial Conferences, in collaboration with international bodies and organisations, in particular FAO[7] European Forestry Commission, UN/ECE[8] Timber Committee, UNEP[9], ILO[10], NGO's[11] and other relevant stakeholders. This programme will be based on scientific and technical co-operation in Europe, providing a dynamic approach to problem solving in European forestry.
6. Pursue within the spirit that presided Strasbourg and Helsinki Ministerial Conferences, reaffirming the principles agreed for the implementation of the decisions taken by these Conferences and continuation of the Ministerial Process. Further Conferences should be convened when considered necessary by a sufficient number of Signatory States and progress in implementing commitments has been made at national and regional levels.
7. Actively work towards consensus building on the need and possible elements of a global legally binding instrument on the management, conservation and sustainable development of all types of forests within the work of UNCSD/IFF, recalling our firm commitment to such an instrument.

RESOLUTION L1
People, Forests and Forestry – Enhancement of Socio-Economic Aspects of Sustainable Forest Management

The Signatory States and the European Community,

A. Recalling the objectives of sustainable forest management as stated in the Forest Principles[12] adopted by the United Nations Conference on Environment and Development (UNCED)[13] and recalling the definition of sustainable forest management adopted at the Helsinki Ministerial Conference in Resolution H1[14],
B. Recognising the significant role of the forest sector and sustainable forest management in the overall sustainable development of society,
C. Recognising the importance of the social and economic functions of forests together with the environmental, ecological and cultural functions as essential elements for sustainable forest management, and the need to address these in order to positively respond to increasing and sometimes conflicting demands of society,
D. Aware of the need for an increasing dialogue between the forest sector and the general public to define widely accepted objectives for forest policy,
E. Affirming that forests and forestry constitute one of the main pillars of sustainable rural development and recognising the complementarity between forestry and other sectors for sustainable development,
F. Aware of the contribution of the forest sector in most European countries as a source of direct and indirect employment, and the potential to generate new job and income opportunities mainly in rural areas in such diverse businesses as non-traditional small scale industry, other forest related activities such as recreation and eco-tourism, and other emerging ventures,
G. Recalling that sound and adequate regulatory, institutional and economic frameworks are important for practising sustainable forest management,
H. Recalling that forest management in Europe, relies on millions of private owners as well as on the activities of state bodies and other public structures with long traditions and rights,
I. Emphasising the renewable and environmentally friendly nature of wood and non-wood forest products from forests under sustainable management, and that development of proper assessment and valuation methods are needed for the non-marketed forest goods and services,
J. Acknowledging the valuable contribution of the FAO/ECE/ILO[15] Team of Specialists on Social Aspects of Sustainable Forest Management, notably through the report "People, Forests and Sustainability";

COMMIT THEMSELVES TO PROMOTE:

1. The implementation of the General Guidelines and Future Actions set out in this resolution;
2. The exchange of experience and co-operation in carrying out the Future Actions within Europe through existing international organisations and institutions.

PART I: GENERAL GUIDELINES

1. The interaction between forestry and society in general, should be promoted through partnerships, and be strengthened by raising general awareness of the concept of sustainable forest management and the role of forests and forestry in sustainable development. Therefore an adequate level of participation,

education, public relations and transparency in forestry is needed.
2. Sound regulatory, institutional and economic frameworks should be maintained and improved at national level, conducive to enabling and motivating all forest owners to practice sustainable forest management and to make long term investments in forestry.
3. Structures of co-operation, particularly organisations of forest owners, should be encouraged in their development and capacity to reinforce sustainable forest management practices and to facilitate *inter alia*, information flow, production and marketing of products and services, including new and hitherto non-marketed forest products and services.
4. The contribution of forestry to sustainable rural development should be fully utilised through the coherence of forest policies and programmes and activities in other sectors, such as agriculture, tourism, environment, energy and industry taking advantage of complementarities and synergies.
5. The marketed and non-marketed cultural, social and environmental services of forests should be assessed and their contributions to society and sustainable rural development should be integrated in the overall policies and programmes of the forest and other sectors.
6. New employment and income opportunities in sustainable forestry should be stimulated notably through diversification of activities related to forests.
7. Human resources development policies should stimulate the adaptation to changing job opportunities related to forests, broaden the competence of forest owners and managers and forestry workforce in forest management, and to strive to offer equal opportunities in employment, income, training and careers.
8. Gender aspects in European forestry and their potential in further development of sustainable forest management should be recognised and fully utilised.
9. The production, marketing and consumption of wood and other forest products and services from forests under sustainable management, a key renewable resource, should be actively promoted as a means for improving the economic viability of forest management, taking advantage of the new market opportunities.

PART II: FUTURE ACTIONS

The Signatory States and the European Community, commit themselves to:

1. Develop, at adequate levels, a dialogue with the public and efficient programmes to increase awareness of the benefits of sustainable forestry for society.
2. Continue to develop the conditions for the participation of relevant stakeholders in the development of forest policies and programmes.
3. Explore ways and means to maintain and develop at national level sound regulatory, institutional and economic frameworks conducive to enabling and motivating all forest owners to practice sustainable forest management and to make long term investment in forestry.
4. Adapt education and training systems and programmes contributing to the development of a highly skilled, multidisciplinary workforce, also enhancing the involvement of women in forest related activities.
5. Encourage studies on gender aspects of forest policy and practices in Europe especially in the context of education, training, communication and decision making to improve sustainable forest management.
6. Promote the development of education and training programmes, especially directed to forest owners and managers, focusing on new opportunities and techniques for the production of goods and services from forests under sustainable management.
7. Encourage comparative studies of wood and non-wood substitutes, considering their complete life-cycles and strive for conditions favourable for the production, marketing and consumption of wood and other products and services from forests under sustainable management, as viable alternatives to competing products using non-renewable natural resources, generating more employment and income.
8. Promote the improvement and application of appropriate safety and health standards and practices, professionalism of forest owners, forest workers, and contractors, and skills certification.
9. Engage further research efforts on the socio-economic aspects of sustainable forest management, in particular on the assessment and valuation of the full range of forest goods and services, in order to provide reliable information for policy and decision making and public dialogue.
10. Promote the incorporation of the results of assessment and valuation of wood and non-wood forest goods and services into national economic and natural resource accounting systems.
11. Evaluate the potential impacts of quality assurance systems and programmes such as voluntary and independent forest certification systems on sustainable forest management in the line of the proposals for action agreed by the Intergovernmental Panel on Forests (IPF).

RESOLUTION L2
Pan-European Criteria, Indicators and Operational Level Guidelines for Sustainable Forest Management

The Signatory States and the European Community,

A. Recalling the resolutions adopted at the Helsinki Ministerial Conference, namely in Resolution H1 "General Guidelines for the Sustainable Management of Forests in Europe" and Resolution H2 "General Guidelines for the Conservation of the Biodiversity of European Forests", and noting that pan-European criteria, indicators and operational level guidelines for sustainable forest management are based on Resolutions H1 and H2,

B. Acknowledging the co-operative work between the European countries and organisations in the formulation of criteria, describing the different aspects of sustainable forest management in Europe; through quantitative and descriptive indicators the development of a coherent set of tools to assess and assist further progress in sustainable forest management, at the international and national levels; and, guidelines for practical use on a voluntary basis at operational level,

C. Noting that criteria and indicators are potentially useful tools in promoting sustainable forest management by providing relevant information for forest policy development and evaluation, national forest policies, plans and programmes and as a basis for cross-sectoral forest related data collection,

D. Noting that the pan-European operational level guidelines, despite their voluntary nature, can contribute to improved communication, awareness building and implementation of appropriate action at the practical level for sustainable forest management when adapted to the specific conditions of the implementation level,

E. Aware of the need to refine and improve these pan-European tools as the concept of sustainable forest management evolves, technical and scientific knowledge improves and relevant international agreements are developed,

F. Recognising the effort made and progress achieved by European and other countries and international organisations to expand the development and use of criteria and indicators for sustainable forest management,

G. Acknowledging the contacts and co-operation with other international and regional processes and initiatives, as well as international organisations, for the development and implementation of criteria and indicators, and emphasising the importance to continue the co-operation to promote comparability among the various sets of criteria and indicators,

H. Acknowledging the collaboration with UN/ECE[16] and FAO[17], and particularly the support given in data collection by inclusion of most of the existing pan-European quantitative indicators in the temperate and boreal component of the Forest Resource Assessment (FRA) Programme.

HAVE DECIDED TO:

1. Adopt the six criteria for sustainable forest management from the "Pan-European Criteria and Indicators for Sustainable Forest Management" (Annex 1) and endorse the associated indicators as a basis for international reporting and for development of national indicators;
2. Proceed to implement, continuously review and further improve the associated indicators;
3. Endorse the "Pan-European Operational Level Guidelines for Sustainable Forest Management" (Annex 2) as a framework of recommendations for sustainable forest management for practical use on a voluntary basis.

AND COMMIT THEMSELVES TO:

1. Promote the development and implementation of national criteria and indicators using the Pan-European criteria and indicators as a reference framework, and taking into account specific country conditions and integrate them into national forest programmes or other relevant policy frameworks.
2. Improve the quality and promote the necessary adaptations of national data collection systems, to fulfil the needs of information for national and international reporting on sustainable forest management recognising the need for continuity of terms and definitions.
3. Use to the extent possible the criteria and indicators in international reporting on the status and conditions of European forests. Also call upon the UN/ECE, FAO and other relevant organisations to consider whether their regular international reporting, particularly the Forest Resource Assessment (FRA) Programme, could take into account the most updated criteria and indicators.
4. Encourage national and international research institutes to evaluate the consistency, relevance and cost effectiveness of indicators in assessing sustainable forest management, as well as availability of national data. Together with governments and organisations, identify needs, promote and support necessary co-operative research to improve and better assess the multiple functions and uses of forests which are considered as being insufficiently covered by the existing set of criteria and indicators.
5. Evaluate, at a national level, the development over time in measurable indicators with respect to the agreed developed objectives in order to assess progress made in sustainable forest management.
6. Engage efforts with other international and regional processes and initiatives, FAO, UNEP[18] and other relevant international organisations as well as conventions, to further elaborate common definition of key terms and concepts, as well as methodologies for data collection, storage and dissemination in order to enhance comparability of the different sets of criteria and indicators for sustainable forest management.
7. Encourage the adaptation of the "Pan-European Operational Level Guidelines for Sustainable Forest Management" to the specific national, sub-national and local economic, ecological, social and cultural conditions, with participation of the interested parties.
8. Disseminate the "Pan-European Operational Level Guidelines for Sustainable Forest Management" or equivalent existing national standards in line with the guidelines, to the forest owners, forest managers, forest organisations, general public, and other interested parties, and encourage their voluntary use.

Annexes

(1) Pan-European Criteria and Indicators for Sustainable Forest Management
(2) Pan-European Operational Level Guidelines for Sustainable Forest Management

ANNEX 1 OF THE RESOLUTION L2
Pan-European Criteria and Indicators for Sustainable Forest Management

Criteria and Quantitative Indicators were adopted at expert level by the First Expert Level Follow-Up Meeting of the Helsinki Conference, held in Geneva in June 24, 1994. The Descriptive Indicators were adopted at expert level for possible use by the Second Expert Level Follow-Up Meeting of the Helsinki Conference, held in Antalaya in January 23, 1995.

CRITERION 1
Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles

CONCEPT AREA: GENERAL CAPACITY
Descriptive indicators (examples):
1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides an overall policy framework for conservation and sustainable management of forests
2. Existence and capacity of an institutional framework to:
   - provide guidelines for national plans or programmes
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - permits the flow of capital in and out of the forest sector in response to market signalsand public policy decisions
4. Existence of informational means to implement the policy framework, and the capacity to:
   - recognise the full range of forest values and potentials with periodic forest-related planning and assessment of national forest resources

CONCEPT AREA: LAND USE AND FOREST AREA
Quantitative indicator:
1.1. Area of forest and other wooded land and changes in area (classified, if appropriate, according to forest and vegetation type, ownership structure, age structure, origin of forest)
Descriptive indicators (examples):
1. Existence of a legal / regulatory framework, and the extent to which it:
   - maintains forest resources and prevents forest degradation;
   - clarifies property rights and provides for appropriate land tenure arrangements
2. Existence and capacity of an institutional framework to:
   - carry out integration between land-use planning and forest management
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports mechanisms promoting integration between land-use planning and forest management planning
4. Existence of informational means to implement the policy framework, and the capacity to:
   - conduct and apply management guidelines for land-use planning in relation to forest resources
   - enhance conversion of agricultural and other treeless land to forest land by afforestation

CONCEPT AREA: GROWING STOCK
Quantitative indicator:
1.2. Changes in:
   a. total volume of the growing stock
   b. mean volume of the growing stock on forest land (classified, if appropriate, according to different vegetation zones or site classes)
   c. age structure or appropriate diameter distribution classes
Descriptive indicators (examples):
1. Existence of a legal / regulatory framework, and the extent to which it:
   - supports sustainable management while increasing the growing stock of both merchantable and non-merchantable tree species on forest land available for timber production
2. Existence and capacity of an institutional framework to:
   - undertake and develop regular assessment of forest resources
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - provides appropriate incentives to support forest policy aiming at bigger growing stock
4. Existence of informational means to implement the policy framework, and the capacity to:
   - improve execution of forest resources assessment by acknowledged research institution or other similar organisations

CONCEPT AREA: CARBON BALANCE
Quantitative indicator:
1.3. Total carbon storage and, changes in the storage in forest stands
Descriptive indicators (examples):
1. Existence of a legal / regulatory framework, and the extent to which it:
   - clarifies policies for enhancing the use of forest products for energy
2. Existence and capacity of an institutional framework to:
   - develop programmes for enhancing the use of forest products for energy
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - provides subventions for the use of wood for energy

4. Existence of informational means to implement the policy framework, and the capacity to:
   - enhance studies on the length of the life cycle of wood products
   - enhance effectively organised collection of waste paper

CRITERION 2
Maintenance of Forest Ecosystem Health and Vitality

Quantitative indicators:

2.1. Total amount of and, changes over the past 5 years in depositions of air pollutants (assessed in permanent plots)

2.2. Changes in serious defoliation of forests using the UN/ECE and EU defoliation classification (classes 2, 3, and 4) over the past 5 years

2.3. Serious damage caused by biotic or abiotic agents:
   a. severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth
   b. annual area of burnt forest and other wooded land
   c. annual area affected by storm damage and volume harvested from these areas
   d. proportion of regeneration area seriously damaged by game and other animals or by grazing

2.4. Changes in nutrient balance and acidity over the past 10 years (pH and CEC); level of saturation of CEC on the plots of the European network or of an equivalent national network

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - enforces laws and policies related to maintaining forest health and vitality
2. Existence and capacity of an institutional framework to:
   - develop mechanisms for controlling the occurrence of serious damages / damage agents
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - creates appropriate incentives to prevent extreme disruption of ecological processes
4. Existence of informational means to implement the policy framework, and the capacity to:
   - strengthen regular field monitoring on forest health status and inventories of soil acidification
   - prevent serious damage caused by machinery and forestry operations: compaction of soil, injuries into standing trees, etc.

CRITERION 3
Maintenance and Encouragement of Productive Functions of Forests (Wood and Non-wood)

CONCEPT AREA: WOOD PRODUCTION

Quantitative indicators:

3.1. Balance between growth and removals of wood over the past 10 years

3.2. Percentage of forest area managed according to a management plan or management guidelines

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - encourages forest owners to practice environmentally sound forestry based on a forest management plan or equivalent guidelines
2. Existence and capacity of an institutional framework to:
   - develop institutions and mechanisms advocating economic, environmental and social factors as essential elements in wood production
   - develop and maintain efficient physical infrastructure to facilitate the delivery of forest products and services
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports investment and taxation policies which recognise the long-term nature of investments in forestry
   - supports non-discriminatory trade policies for forest products
4. Existence of informational means to implement the policy framework, and the capacity to:
   - improve technologies and plans based on proper forest inventories

CONCEPT AREA: NON-WOOD PRODUCTS

Quantitative indicator:

3.3. Total amount of and changes in the value and/or quantity of non-wood forest products (e.g., hunting and game, cork, berries, mushrooms, etc.)

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides legal instruments to regulate forest management practices for recreation and the harvesting of important non-wood forest products
2. Existence and capacity of an institutional framework to:
   - support appropriate organisations for extension services on non-wood benefits
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - enables the implementation of guidelines for management of non-wood benefits
4. Existence of informational means to implement the policy framework, and the capacity to:
   - develop management plans for non-wood benefits

CRITERION 4
Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems

CONCEPT AREA: GENERAL CONDITIONS

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - clarifies the concept of management, conservation and sustainable development of forest

- provides for national adherence to international legal instruments

2. Existence and capacity of an institutional framework to:
   - maintain, conserve and appropriately enhance biological diversity at the ecosystem, species and genetic levels
   - identify economic value in forests whose management is adjusted in favour of maintaining biological diversity
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - creates new resources and incentives to enhance the mechanisms for predicting impacts of human interventions on forests
   - supports economic value in forests whose management is adjusted in favour of maintaining biological diversity
4. Existence of informational means to implement the policy framework, and the capacity to:
   - develop new inventories and ecological impact assessments on biological diversity
   - develop tools to assess the effects of forest management on biological diversity

CONCEPT AREA: REPRESENTATIVE, RARE AND VULNERABLE FOREST ECOSYSTEMS

Quantitative indicator:

4.1. Changes in the area of:
   a. natural and ancient seminatural forest types
   b. strictly protected forest reserves
   c. forests protected by special management regime

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments to protect representative, rare or vulnerable forest ecosystems
2. Existence and capacity of an institutional framework to:
   - develop and maintain institutional capacity and distribution of responsibilities related to protected areas
   - maintain degree of implementation of confirmed national forest conservation programmes
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports the representativeness of protected forests in relation to ecological and regional distribution
4. Existence of informational means to implement the policy framework, and the capacity to:
   - enhance measures to re-establish the endemic biological diversity in forests managed for production
   - apply measures for rehabilitation of degraded forest areas

CONCEPT AREA: THREATENED SPECIES

Quantitative indicator:

4.2. Changes in the number and percentage of threatened species in relation to total number of forest species (using reference lists e.g., IUCN, Council of Europe or the EU Habitat Directive)

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments to protect threatened species
2. Existence and capacity of an institutional framework to:
   - develop and maintain institutional instruments to protect threatened species
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports implementation of management guidelines to take into account threatened species
4. Existence of informational means to implement the policy framework, and the capacity to:
   - construct periodically reviewed lists of threatened forest species
   - enhance level of knowledge on threatened species / assessments, inventories or research on threatened species

CONCEPT AREA: BIOLOGICAL DIVERSITY IN PRODUCTION FORESTS

Quantitative indicators:

4.3. Changes in the proportions of stands managed for the conservation and utilisation of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous and introduced species

4.4.Changes in the proportions of mixed stands of 2–3 tree species

4.5. In relation to total area regenerated, proportions of annual area of natural regeneration

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments to ensure regeneration of managed forests
2. Existence and capacity of an institutional framework to:
   - develop and maintain institutional instruments to ensure regeneration of managed forests
   - conduct inventories on proportion of area covered by trees significantly older than the acceptable age of exploitation currently used
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - provides for economic incentives for taking account of environmental issues in management planning
   - conducts inventories / assessments on bioindicators
4. Existence of informational means to implement the policy framework, and the capacity to:
   - take measures to maintain or to re-establish biological diversity in old forests
   - monitor changes in the proportions of afforested or reforested areas covered by indigenous and introduced species, conifer and deciduous species

CRITERION 5
Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (notably soil and water)

CONCEPT AREA: GENERAL PROTECTION

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments to regulate or limit forest management practices in forests protected for infrastructure / protection forests
2. Existence and capacity of an institutional framework to:
   - develop and maintain institutional instruments to regulate or limit forest management practices in forests protected for infrastructure / protection forests
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports the preparation of management guidelines for infrastructure and protection forests
4. Existence of informational means to implement the policy framework, and the capacity to:
   - conduct research on infrastructure and protection forests in relation to land use practices / forest management

CONCEPT AREA: SOIL EROSION

Quantitative indicator:

5.1. Proportion of forest area managed primarily for soil protection

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments to regulate or limit forest management practices in areas with vulnerable soils
2. Existence and capacity of an institutional framework to:
   - strengthen institutional instruments to regulate or limit forest management practices in areas with vulnerable soils
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports the preparation of management guidelines for areas with vulnerable soils
4. Existence of informational means to implement the policy framework, and the capacity to:
   - conduct inventories and research on soil erosion

CONCEPT AREA: WATER CONSERVATION IN FORESTS

Quantitative indicator:

5.2. Proportion of forest area managed primarily for water protection

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments to regulate or limit forest management practices in favour of water conservation or protection of water resources
2. Existence and capacity of an institutional framework to:
   - develop and maintain institutional instruments to regulate or limit forest management practices in favour of water conservation or protection of water resources
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports the preparation of management guidelines for taking into consideration water conservation in forest management practices
4. Existence of informational means to implement the policy framework, and the capacity to:
   - conduct inventories and research on water quality and flow characteristics in relation to land use practices / forest management

CRITERION 6
Maintenance of other Socio-Economic Functions and Conditions

CONCEPT AREA: SIGNIFICANCE OF THE FOREST SECTOR

Quantitative indicator:

6.1. Share of the forest sector from the gross national product

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments to ensure development of the forest sector
2. Existence and capacity of an institutional framework to:
   - develop and maintain efficient physical infrastructure to facilitate the supply of forest products
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - ensures new investments in the forest sector to meet future demands
4. Existence of informational means to implement the policy framework, and the capacity to:
   - develop and put into practice new improved technology
   - conduct market analysis to better fulfil the needs of society

CONCEPT AREA: RECREATIONAL SERVICES

Quantitative indicator:

6.2. Provision of recreation: area of forest with access per inhabitant, % of total forest area

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - recognises customary and traditional rights of indigenous people, and provides means of resolving access disputes
2. Existence and capacity of an institutional framework

to:
- undertake planning and assessment in recreational services on forestry

3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports forestry constituencies to conserve special environmental, cultural, social and scientific values in relation to recreational services
4. Existence of informational means to implement the policy framework, and the capacity to:
   - conduct assessment on recreation

CONCEPT AREA: PROVISION OF EMPLOYMENT

Quantitative indicator:

6.3. Changes in the rate of employment in forestry, notably in rural areas (persons employed in forestry, logging, forest industry)

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for legal instruments for securing income levels in forest sector
2. Existence and capacity of an institutional framework to:
   - develop and maintain human resource skills in all relevant tasks
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - supports programmes to ensure employment in rural areas in relation to forestry
4. Existence of informational means to implement the policy framework, and the capacity to:
   - secure a fair share of income from non-wood products coming from rural sources of income

CONCEPT AREA: RESEARCH AND PROFESSIONAL EDUCATION

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for national programmes for research and professional education
2. Existence and capacity of an institutional framework to:
   - develop and maintain institutional instruments to enhance forest related research and education
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - provides public and private funding for research, educational and extension programmes
4. Existence of informational means to implement the policy framework, and the capacity to:
   - guarantee a sufficient number of people educated at different levels of forestry and cross-cutting field of education

CONCEPT AREA: PUBLIC AWARENESS

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides opportunities for public access to information
2. Existence and capacity of an institutional framework to:
   - strengthen organisations to provide extension services for general public
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - guarantees that part of forest revenues are reinvested in informing the public about forests
4. Existence of informational means to implement the policy framework, and the capacity to:
   - support teaching and informing of environmental issues and other forestry related subjects

CONCEPT AREA: PUBLIC PARTICIPATION

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides opportunities for public participation in public policy and decision making on forests
2. Existence and capacity of an institutional framework to:
   - enforce institutional mechanisms for the involvement of local people and NGOs in decision-making
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - attracts public outreach and preparatory planning
4. Existence of informational means to implement the policy framework, and the capacity to:
   - enhance public participation in decision-making processes related to implementation of forest policy

CONCEPT AREA: CULTURAL VALUES

Descriptive indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
   - provides for programmes and management guidelines which recognise cultural heritage in relation to forestry
2. Existence and capacity of an institutional framework to:
   - develop and maintain programmes to conserve culturally valuable sites and landscapes
3. Existence of economic policy framework and financial instruments, and the extent to which it:
   - provides for sufficient financial incentives for acknowledgement of cultural values in forest management planning
4. Existence of informational means to implement the policy framework, and the capacity to:
   - conduct studies on proportion of culturally valuable sites and sites with special visual value

ANNEX 2 OF THE RESOLUTION L2
Pan-European Operational Level Guidelines for Sustainable Forest Management

The Operational Level Guidelines form a common framework of recommendations that can be used on a voluntary basis and as a complement to national and/or regional instruments to further promote sustainable forest management at the field level, on forest areas in Europe.

Adopted at the Fifth Expert Level Preparatory Meeting of the Lisbon Conference on the Protection of Forests in Europe, 27–29 April 1998, Geneva Switzerland.

1. INTRODUCTION

Forests in Europe grow in a wide and diverse range of ecological conditions, from boreal to Mediterranean and from alpine to lowlands. These forests have been influenced by human settlement and action over the centuries, and in some countries planted forests constitute a major part of the resource. Forest management in Europe is characterized by a large proportion of private, fragmented, small-scale farm-related ownership structures in the majority of countries, as well as a large proportion of public forests and forests owned by private forest enterprises in others.

Forest management takes place within clearly established ownership rights and with a long history of national/regional laws and regulations based on long-term planning. Thus, the concept of sustainability has a long tradition in forestry in Europe. However, the meaning of 'sustainable forest management' has developed over time according to the changing needs of society. Originally, sustainability in forest management was mainly considered as the sustained yield of timber to cope with historic wood shortages. However, the importance of other multiple functions of forests have gradually been incorporated in forest management. During the 1980's the concern about the deterioration of forests throughout Europe led to an increasing awareness of the economic, ecological, social and cultural values of forests by the broader public. Nowadays many important aspects of sustainable forest management are covered by national and/or regional laws and regulations and are already being regularly monitored.

The wish for a concerted effort at a political level to protect and further improve the sustainable management of European forests led to the First Ministerial Conference on the Protection of Forests in Europe held in Strasbourg in 1990. At the Second Ministerial Conference, held in Helsinki in 1993, the ministers responsible for forestry in Europe embraced the internationally accepted UNCED[19] Forest Principles, taking a further step in the history of the concept of sustainable forest management by adopting, *inter alia*, Resolution H1 "General Guidelines for Sustainable Management of European Forests" and Resolution H2 "General Guidelines for the Conservation of the Biodiversity of European Forests".

These General Guidelines represent the political commitment of the signatory states of the Helsinki Resolutions by providing a general policy direction and a long-term goal to meet the demands on European forests for multiple goods and services in a manner that is consistent with their sustainable management, and conservation and enhancement of their biological diversity.

A new, common definition of 'sustainable forest management' was laid down in Resolution H1:

> 'the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems'

For the follow-up and the implementation of the General Guidelines, the pan-European national level criteria and indicators[20] were adopted at the expert level within the Follow-Up Process of the Helsinki Ministerial Conference in 1994. They are a policy instrument for evaluating and reporting progress towards sustainable forest management, as described in Resolution H1, in individual European countries and in Europe as a whole.

The six pan-European criteria for sustainable forest management are:

1. Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles;
2. Maintenance of forest ecosystem health and vitality;
3. Maintenance and encouragement of productive functions of forests (wood and non-wood);
4. Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems;
5. Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water); and
6. Maintenance of other socio-economic functions and conditions.

The Pan-European Operational Level Guidelines have been elaborated to further promote sustainable forest management in Europe by translating the international commitments down to the level of forest management planning and practices. They represent a common framework of recommendations for reference at the field level that can be used on a voluntary basis. These Guidelines are directly based on Resolutions H1 and H2, and they follow the structure of the six pan-European criteria that were identified as the core elements of sustainable forest management. For clarity they are divided into 'Guidelines for Forest Management Planning' and 'Guidelines for Forest Management Practices', focusing on basic ecological, economical and social requirements for sustainable forest management within each criterion.

The Pan-European Operational Level Guidelines are designed to be applied in the context of, and in full respect to, national and/or regional instruments and

actions. They cannot be used in isolation to determine sustainability in forest management. Their purpose is to identify complementary actions at the operational level which will further contribute to sustainability of forest management. This should reflect national, economic, ecological, social and cultural conditions, research and traditional knowledge, and must respect forest and environmental legislation, decisions on protected areas, other general principles, as well as codes for forest practice such as standards used for forest management in any given country.

The effective implementation of these Guidelines implies recognizing the major role and the legal rights of forest owners. Furthermore, the implementation of sustainable forest management in the field requires continuous extension, training and education of forest managers, owners and workers, for which the Pan-European Operational Level Guidelines can provide an important reference.

2. POTENTIAL USES OF THE PAN-EUROPEAN OPERATIONAL LEVEL GUIDELINES

In general, the Pan-European Operational Level Guidelines are designed for sub-national applications at a practical level. Whenever used, their content should be adapted to the specific local, economic, ecological, social and cultural conditions, as well as to the respective forest management and administrational systems already in place; in this process participation of all interested parties should be encouraged. Therefore, all guidelines may not necessarily be relevant for all levels, all types of forest, or ownership categories.

In order to facilitate the implementation of these voluntary Guidelines, there might be a need for the promotion and equitable support by government, society and other beneficiaries to create and maintain a sound balance of interests including a sound economic basis for forestry.

The potential applications and users of the Pan-European Operational Level Guidelines are:

- **Forest managers and forest owners**
  The Guidelines can assist forest managers and forest owners in planning and implementing improved sustainable management practices and operations in the field. They can be used for increasing communication and awareness in relation to the evolving concept of sustainable forest management and the desired actions at the operational level amongst forest owners, managers, employees, contractors or others.
- **Sub-national organisations**
  The sub-national (regional or local) organisations can use the guidelines as a reference tool in informing and advising forest owners and forest managers, in planning the practices and/or in supervising their implementation. These types of organisations include, for example, sub-national administrational forestry organisations and forest owners or management associations.
- **National/governmental decision makers**
  The Guidelines can be used as an internationally agreed framework for the guidance of forest management bringing the commitments made in the international policy *fora* (UNCED Forest Principles and Helsinki Resolutions) down to the field level. They can serve as a reference for setting codes for forest practice and forest management planning.
- **International forest dialogue**
  The Guidelines form a European reference to the global forest dialogue. They can contribute, as an instrument representing consensus within the Pan-European Process, to the achievement of further consensus on sustainable management of all types of forests on a global scale.
- **Communication tools and certification systems**
  These guidelines can serve as a tool to improve communication and awareness building related to sustainable forest management. In addition, although certification and other quality assurance systems or programmes as such would remain independent from the Pan-European Process and are voluntary to the interested parties, the Guidelines could provide an indicative reference for the establishment of standards for those systems.

3. PAN-EUROPEAN OPERATIONAL LEVEL GUIDELINES FOR SUSTAINABLE FOREST MANAGEMENT

CRITERION 1

Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles

1.1 Guidelines for Forest Management Planning

a. Forest management planning should aim to maintain or increase forest and other wooded area, and enhance the quality of the economic, ecological, cultural and social values of forest resources, including soil and water. This should be done by making full use of related services such as land-use planning and nature conservation.

b. Inventory and mapping of forest resources should be established and maintained, adequate to the local and national conditions, and in correspondence with the topics described in these Guidelines.

c. Management plans or their equivalents, appropriate to the size and use of the forest area, should be elaborated and periodically updated. They should be based on legislation as well as existing land use plans, and adequately cover the forest resources.

d. Monitoring of the forest resources and evaluation of their management should be periodically performed, and their results should be fed back into the planning process.

1.2 Guidelines for Forest Management Practices

a. Forest management practices should safeguard the quantity and quality of the forest resources in the medium and long term by balancing harvesting and growth rates, and by preferring techniques that minimise direct or indirect damage to for-

est, soil or water resources.

b. Appropriate silvicultural measures should be taken to maintain the growing stock of resources at - or bring to - a level that is economically, ecologically and socially desirable.

c. Conversion of abandoned agricultural and treeless land into forest land should be taken into consideration, whenever it can add economic, ecological, social and/or cultural value.

CRITERION 2.

Maintenance of forest ecosystem health and vitality

2.1 Guidelines for Forest Management Planning

a. Forest management planning should aim to maintain and increase the health and vitality of forest ecosystems and to rehabilitate degraded forest ecosystems, whenever this is possible by silvicultural means.

b. Health and vitality of forests should be periodically monitored, especially key biotic and abiotic factors that potentially affect health and vitality of forest ecosystems, such as pests, diseases, overgrazing and overstocking, fire, and damage caused by climatic factors, air pollutants or by forest management operations.

c. Forest management plans or their equivalents should specify ways and means to minimise the risk of degradation of and damages to forest ecosystems. Forest management planning should make use of those policy instruments set up to support these activities.

2.2 Guidelines for Forest Management Practices

a. Forest management practices should make best use of natural structures and processes and use preventive biological measures wherever and as far as economically feasible to maintain and enhance the health and vitality of forests. Adequate genetic, species and structural diversity should be encouraged and/or maintained to enhance stability, vitality and resistance capacity of the forests to adverse environmental factors and strengthen natural regulation mechanisms.

b. Appropriate forest management practices such as reforestation and afforestation with tree species and provenances that are suited to the site conditions or the use of tending, harvesting and transport techniques that minimise tree and/or soil damages should be applied. The spillage of oil through forest management operations or the indiscriminate disposal of waste on forest land should be strictly avoided.

c. The use of pesticides and herbicides should be minimised, taking into account appropriate silvicultural alternatives and other biological measures.

d. In case fertilisers are used they should be applied in a controlled manner and with due consideration to the environment.

CRITERION 3.

Maintenance and encouragement of productive functions of forests (wood and non-wood)

3.1 Guidelines for Forest Management Planning

a. Forest management planning should aim to maintain the capability of forests to produce a range of wood and non-wood forest products and services on a sustainable basis.

b. Forest management planning should aim to achieve sound economic performance taking into account possibilities for new markets and economic activities in connection with all relevant goods and services of forests.

c. Forest management plans or their equivalents should take into account the different uses or functions of the managed forest area. Forest management planning should make use of those policy instruments set up to support the production of merchantable and non-merchantable forest goods and services.

3.2 Guidelines for Forest Management Practices

a. Forest management practices should be ensured in quality with a view to maintain and improve the forest resources and to encourage a diversified output of goods and services over the long term.

b. Regeneration, tending and harvesting operations should be carried out in time, and in a way that do not reduce the productive capacity of the site, for example by avoiding damage to retained stands and trees as well as to the forest soil, and by using appropriate systems.

c. Harvesting levels of both wood and non-wood forest products should not exceed a rate that can be sustained in the long term, and optimum use should be made of the harvested forest products, with due regard to nutrient offtake.

d. Adequate infrastructure, such as roads, skid tracks or bridges should be planned, established and maintained to ensure efficient delivery of goods and services while at the same time minimising negative impacts on the environment.

CRITERION 4.

Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems

4.1 Guidelines for Forest Management Planning

a. Forest management planning should aim to maintain, conserve and enhance biodiversity on ecosystem, species and genetic level and, where appropriate, diversity at landscape level.

b. Forest management planning and terrestrial inventory and mapping of forest resources should include ecologically important forest biotopes, taking into account protected, rare, sensitive or representative forest ecosystems such as riparian areas and wetland biotopes, areas containing endemic species and habitats of threatened species, as defined in recognised reference lists, as well as endangered or protected genetic *in situ*

resources.

4.2 Guidelines for Forest Management Practices

a. Natural regeneration should be preferred, provided that the conditions are adequate to ensure the quantity and quality of the forests resources and that the existing provenance is of sufficient quality for the site.
b. For reforestation and afforestation, origins of native species and local provenances that are well adapted to site conditions should be preferred, where appropriate. Only those introduced species, provenances or varieties should be used whose impacts on the ecosystem and on the genetic integrity of native species and local provenances have been evaluated, and if negative impacts can be avoided or minimised.
c. Forest management practices should, where appropriate, promote a diversity of both horizontal and vertical structures such as uneven-aged stands and the diversity of species such as mixed stands. Where appropriate, the practices should also aim to maintain and restore landscape diversity.
d. Traditional management systems that have created valuable ecosystems, such as coppice, on appropriate sites should be supported, when economically feasible.
e. Tending and harvesting operations should be conducted in a way that do not cause lasting damage to ecosystems. Wherever possible, practical measures should be taken to improve or maintain biological diversity.
f. Infrastructure should be planned and constructed in a way that minimises damage to ecosystems, especially to rare, sensitive or representative ecosystems and genetic reserves, and that takes threatened or other key species - in particular their migration patterns - into consideration.
g. With due regard to management objectives, measures should be taken to balance the pressure of animal populations and grazing on forest regeneration and growth as well as on biodiversity.
h. Standing and fallen dead wood, hollow trees, old groves and special rare tree species should be left in quantities and distribution necessary to safeguard biological diversity, taking into account the potential effect on health and stability of forests and on surrounding ecosystems.
i. Special key biotopes in the forest such as water sources, wetlands, rocky outcrops and ravines should be protected or, where appropriate, restored when damaged by forest practices.

CRITERION 5.

Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)

5.1 Guidelines for Forest Management Planning

a. Forest management planning should aim to maintain and enhance protective functions of forests for society, such as protection of infrastructure, protection from soil erosion, protection of water resources and from adverse impacts of water such as floods or avalanches.
b. Areas that fulfil specific and recognised protective functions for society should be registered and mapped, and forest management plans or their equivalents should take full account of these areas.

5.2 Guidelines for Forest Management Practices

a. Special care should be given to silvicultural operations on sensitive soils and erosion-prone areas as well as on areas where operations might lead to excessive erosion of soil into watercourses. Inappropriate techniques such as deep soil tillage and use of unsuitable machinery should be avoided on such areas. Special measures to minimise the pressure of animal population on forests should be taken.
b. Special care should be given to forest management practices on forest areas with water protection function to avoid adverse effects on the quality and quantity of water resources. Inappropriate use of chemicals or other harmful substances or inappropriate silvicultural practices influencing water quality in a harmful way should be avoided.
c. Construction of roads, bridges and other infrastructure should be carried out in a manner that minimises bare soil exposure, avoids the introduction of soil into watercourses and that preserve the natural level and function of water courses and river beds. Proper road drainage facilities should be installed and maintained.

CRITERION 6.

Maintenance of other socio-economic functions and conditions

6.1 Guidelines for Forest Management Planning

a. Forest management planning should aim to respect the multiple functions of forests to society, have due regard to the role of forestry in rural development, and especially consider new opportunities for employment in connection with the socio-economic functions of forests.
b. Property rights and land tenure arrangements should be clearly defined, documented and established for the relevant forest area. Likewise, legal, customary and traditional rights related to the forest land should be clarified, recognised and respected.
c. Adequate public access to forests for the purpose of recreation should be provided taking into account the respect for ownership rights and the rights of others, the effects on forest resources and ecosystems, as well as the compatibility with other functions of the forest.
d. Sites with recognised specific historical, cultural or spiritual significance should be protected or managed in a way that takes due regard of the significance of the site.

e. Forest managers, contractors, employees and forest owners should be provided with sufficient information and encouraged to keep up to date through continuous training in relation to sustainable forest management.

6.2 Guidelines for Forest Management Practices

a. Forest management practices should make the best use of local forest related experience and knowledge, such as of local communities, forest owners, NGOs and local people.

b. Working conditions should be safe, and guidance and training in safe working practice should be provided.

c. Forest management operations should take into account all socio-economic functions, especially the recreational function and aesthetic values of forests by maintaining for example varied forest structures, and by encouraging attractive trees, groves and other features such as colours, flowers and fruits. This should be done, however, in a way and to an extent that does not lead to serious negative effects on forest resources, and forest land.

1 UNCED: United Nations Conference on Environment and Development

2 UNGASS: United Nations General Assembly Special Session

3 CBD: Convention on Biological Diversity

4 UN/FCCC: United Nations Framework Convention on Climate Change

5 CCD: United Nations Convention to Combat Desertification

6 H2: Helsinki Resolution 2 "General Guidelines for the Conservation of the Biodiversity of European Forests"

7 FAO: Food and Agriculture Organisation of the United Nations

8 UN/ECE: United Nations Economic Commission for Europe

9 UNEP: United Nations Environment Programme

10 ILO: International Labour Organisation

11 NGO's: Non-Governmental Organisations

12 Forest Principles – "Non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests"

13 'Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual human needs of present and future generations'

14 '*Sustainable management* means the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage to other ecosystems'

15 FAO – Food and Agriculture Organisation of the United Nations, ECE – United Nations Economic Commission for Europe and ILO – International Labour Organisation

16 UN/ECE: United Nations Economic Commission for Europe

17 FAO: Food and Agriculture Organisation of the United Nations

18 UNEP: United Nations Environment Programme

19 United Nations Conference on Environment and Development, Rio de Janeiro, 1992.

20 **Criteria** characterise or define the essential elements or set of conditions or processes by which sustainable forest management may be assessed. The direction of change within each criterion is shown by periodically measured **indicators**.

ANNEX 8

The Working Group Steering the Further Development of Criteria and Indicators for Sustainable Forest Management

On September 24, 1998, the Ministry of Agriculture and Forestry appointed a working group charged with directing the further development of the national criteria and indicators for sustainable forestry and promoting their use.

The chair appointed to the group was **Taina Veltheim,** Senior Adviser with the Ministry of Agriculture and Forestry.

The appointed members of the group were

- **Jouni Suoheimo,** Senior Adviser, Ministry of Agriculture and Forestry
- Leena **Karjalainen,** Counsellor, Ministry of the Environment
- **Paula Nybergh,** Industrial Counsellor, Ministry of Trade and Industry
- **Kirsi-Marja Korhonen,** District Manager, Finnish Forest and Park Service
- **Jari Parviainen,** Research Centre Director, Finnish Forest Research Institute (Metla)
- **Hannu Niemelä,** Head of Quality Control Systems, Forestry Development Centre Tapio
- **Jukka-Pekka Jäppinen,** Senior Scientist, Finnish Environment Institute
- **Kari Heliövaara,** Professor, University of Helsinki
- **Timo Nyrhinen,** Assistant Manager, Central Union of Agricultural Producers and Forest Owners (MTK)
- **Suvi Raivio,** Biodiversity Specialist, Finnish Forest Industries Federation
- **Kalevi Väisänen,** Secretary, Wood and Allied Workers' Union
- **Anju Asunta,** Forest Manager, the World Wildlife Fund (WWF) Finland
- **Janne Lampolahti,** Environmental Consultant, Finnish Nature Conservation Union.

On July 1, 1999, the Ministry of Agriculture and Forestry granted leave to the chair Taina Veltheim, and to Paula Nybergh and Kalevi Väisänen. Jouni Suoheimo was appointed as the new chair of the group, and Jari Parviainen as the deputy chair.

New members appointed to the group were

- **Marjukka Mähönen,** Senior Adviser, Ministry of Agriculture and Forestry (on leave of absence from June 15, 2000)
- **Esa Hyvärinen,** Senior Adviser, and his deputy, Reima Sutinen, Project Manager, both from the Ministry of Trade and Industry
- **Lauri Ainasto,** Secretary with the Wood and Allied Workers' Union.

The secretaries of the working group were **Anne Vehviläinen,** Senior Adviser (September 24, 1998 to December 31, 1999) and **Jaana Kaipainen,** Senior Adviser (January 1 to May 31, 2000), both from the Ministry of Agriculture and Forestry.

Researcher **Heli Mikkelä** and Research Assistant **Susanna Sampo,** both from the Finnish Forest Research Institute (Metla), were responsible for compiling the data and editing the report. **Jaana Kaipainen,** from the Ministry of Agriculture and Forestry, provided expert assistance in the preparation of the report.

Publications of the Ministry of Agriculture and Forestry in Finland 2000:

1/2000 Metsät ilmastosopimuksessa ja Kioton pöytäkirjassa
ISBN 952-453-008-2

2/2000 Metsätalouden kehittämiskeskus Tapion arviointi
ISBN 952-453-015-5

3/2000 Ranskan maaseutusopimus (CTE) -seminaari Helsingissä 8.9.2000
ISBN 952-453-017-1

4/2000 Cadmium in Fertilizers – risks to human health and the environment
ISBN 952-453-020-1

5/2000 Suomen metsätalouden tila 2000 – kestävän metsätalouden kriteerit ja indikaattorit
ISBN 952-453-024-4

MINISTRY OF AGRICULTURE AND FORESTRY

P.O. Box 30, FIN-00023 Government

ISSN 1238-2531
ISBN 952-453-024-4

http://www.mmm.fi/
Price EUR 16.82 + vat