

COST Action E27

Protected Forest Areas in Europe – Analysis and Harmonisation (PROFOR)

Country Report - Finland

Working Group 1 – Task 1.1.

Description of the historical background that has led to the development of particular national Protected Forest Area frameworks

TARJA TUOMAINEN¹, JARI PARVIAINEN^{2*}

**Corresponding author: jari.parviainen@metla.fi*

¹*Finnish Forest Research Institute (Metla), Vantaa Research Centre, Finland*

²*Finnish Forest Research Institute (Metla), Joensuu Research Centre, Finland*

Abstract. In Finland the protected forest area has increased almost a threefold over the last 30 years. Traditionally, forest protection has been carried out through conservation areas. In recent years the aim has also been to preserve the ecological sustainability in commercially managed forests. One of the objectives of the National Forest Programme 2010 is to attain and preserve a favourable standard of conservation of species and habitats in forests. This is achieved through a combination of conservation areas and ecosystem management in commercial forests.

Forest area under some restrictive provisions is 2.8 million hectares, of which 1.7 million hectares, 12 % of total forest area, are strictly protected. The major types of strictly protected areas are national parks, strict nature reserves and other nature reserves protected under the Nature Conservation Act. Methods for a voluntary basis of forest protection are under development.

Any views or opinions expressed in this document are those of the authors and not necessarily those of any official body within the signatory states.

Keywords: forest protection, history of forest protection, nature conservation, protected forest areas

1. Introduction

Finland is Europe's most forested country, with over 78 % of the land area under forest cover. Also the forest area per inhabitant is the highest in Europe, at 4.25 ha. Forests are the essence of Finnish landscape. The typical Finnish landscape is a mosaic of small patches of forests at different development stages (Figure 1).

The latest Ice Age has shaped the surface of the ground and left features like lakes, ridges and eskers. Ground level is still rising and new land is uncovered from under the sea. On the coastal regions the rate of

rise is about 1 cm per year. This means that Finland's land area increases annually by about 700 hectares. The highest point is 1,324 metres above sea level but generally the altitude is below 200 metres.

Because Finland is over 1,100 kilometers long from south to north, growth conditions vary considerably, with a growing period for trees of five months in southern Finland and about three months in the north. Finland lies across the range of the boreal coniferous forest zone. The narrow southern coastal area which is within the hemiboreal zone, is usually classed with the coniferous forests and small areas of the subalpine zone can be detected in northernmost Lapland.



Figure 1: A typical mosaic forest landscape in the south of Finland. (Photo: Metla/Erkki Oksanen)

The forestry sector still has an essential role in the Finnish economy although its importance has decreased during the past few decades. The share of the forest sector in gross domestic product in 2002 was 7 %, and the forest industry's share of the total export was 25 %. The number of people employed by forestry and forest industries was 143,000, of which the forest industry's share is 85 %. The forestry sector employs 6 % of the total workforce in Finland (Finnish Statistical Yearbook of Forestry 2003).

Administratively Finland is divided into 5 counties and a province of the Åland Islands. With the exception of autonomous Åland, Finland is an administratively and legislatively uniform country. Environment and forestry administration is delivered through 13 regional environment centres and 13 forestry centres deviating from other governmental county administration.

1.1. Forests in Finland

The land area is classified according to land use and land cover into forestry land and non-forestry land. Non-forestry land includes agricultural land, built-

up areas and transport routes. Finland also has a large extent of inland watercourses covering 3 million ha. Forestry land is divided into three classes according to site productivity:

- **Productive forest land** where the mean annual increment of growing stock is at least 1 m³/ha
- **Low productive forest land** where it is less than 1 m³/ha but more than 0.1 m³/ha
- **Unproductive land** where the increment is less than 0.1 m³/ha, typically open bogs and open rocky lands.

The Forest Act applies to forestry land with certain exceptions (see section 1.2). Under the Act, productive forest land and low productivity forest land together are considered forest. But a general sense for forest often means the same as productive forest land. All Finnish forest organisations in practice use the national definition. The FAO definition of forest is applied to international uses like the Forest Resource Assessment of FAO (FRA) and the Ministerial Conference on the Protection of Forests in Europe (MCPFE).

Finland's total land area is 30.5 million ha, of which 76 % has forest cover (Table 1). The area of the productive forest land is 20.2 mill. ha (Table 2). It has

increased by 1.6 million ha since the 1960s as a result of afforestation of agricultural land and drainage of peatlands, and intensive forest improvement of unproductive forest area. The forest area according to the FAO definition is 21.9 mill. ha (Finnish Statistical Yearbook of Forestry 2003, Forest Resources of Europe 2000)

*Table 1:
General information of Finland's forests (Finnish Statistical Yearbook of Forestry 2003).*

Total area	33.8 mill. ha
Total land area	30.5 mill. ha
Forest area (productive and low productive forest land)	23.1 mill. ha
Forest area (FAO)	21.9 mill. ha
Forest area per inhabitant	4.25 ha
Protected forest area	1.8 mill. ha
Total amount of the growing stock	2,024 mill. m ³
Annual increment of growing stock	81.0 mill. m ³
Annual drain of growing stock	68.7 mill. m ³

*Table 2:
Total land area of Finland by land-use classes in accordance with National Forest Inventory (Finnish Statistical Yearbook of Forestry 2003).*

Land use class	South Finland	North Finland	Whole country
	Proportion of total land area, %		
Total forestry land	77.8	95.0	86.3
Productive forest land	72.2	60.5	66.5
Low productive forest land	2.8	15.9	9.2
Unproductive land	2.3	18.1	10.1
Forest roads, depots, etc.	0.6	0.4	0.5
Non-forestry land	22.2	5.0	13.7
Total	100.0	100.0	100.0
Total land area, 1000 ha	15,467	14,992	30,459

A high proportion of peatlands is characteristic of Finland. They have formed on the areas which remained beneath the sea water for a long time after the Ice Age and where the altitude above sea level is low. The peatland area is about 9 mill. ha, of which three quarters is covered by forest and the rest is treeless bogs and fens. Above half of the peatland area is drained to increased wood production (Tomppo 2001).

There are four native conifers and over 20 native deciduous tree species. The most common and also the most economically significant are Scots pine

(*Pinus sylvestris*), Norway spruce (*Picea abies*), and silver and downy birch (*Betula pendula* and *Betula pubescens*) (Table 3). Other naturally occurring tree species are for example juniper, yew, 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.

*Table 3:
Dominant tree-species of the forest land (Finnish Statistical Yearbook of Forestry 2003).*

Dominant tree specie	South Finland	North Finland	Whole Country
	% of productive forest land		
Scots pine	56.6	75.1	64.9
Spruce	30.8	15.3	23.9
Other conifers	0.1	0.1	0.1
Silver birch	4.4	0.2	2.5
Downy birch	5.4	7.9	6.5
Aspen	0.5	0.1	0.3
Alder	0.6	0.0	0.3
Others	0.1	0.0	0.0
Temporarily treeless	1.5	1.3	1.4
Productive forest land total	100.0	100.0	100.0

Finnish forestry is based on the management of native tree species. The management of forests seeks to mimic the natural forest development cycle and respect their natural growth. 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 together with various training and advisory services aim at ensuring that the sustainable management of forests is achieved at the practical level.

Approximately 5.6 million hectares of Finnish forests, nearly 28 %, is artificially regenerated and afterwards seeded or planted with native tree species. Other areas have either been naturally regenerated or reproduced themselves. Even in seeded or planted forests, 20–30 % of the seedlings are natural stocking. Exotic species have been planted experimentally on only about 20,000 hectares. Thinnings constitute an integral part of the management of forests. They are carried out 2 to 3 times during the rotation period of stands. Trees are harvested using the cut-to-length system: trunks are delimitted and cut on site to appropriate length according to their use.

More than half of the forestry land is private owned, and one-third is state-owned (Table 4). The fact that forests have remained in the ownership of

families from one generation to the next shows that Finns have strong roots in the countryside. In some areas, privately owned forests account for up to 80 %. The number of private forest holdings is over 446,000, covering 10.5 million ha of forest land. The average size of the holdings is quite small (26 ha) and this needs to be taken into consideration when discussing the need for additional forest protection and ways to protect forests. Some private forests are in joint ownership. This is why the term “family forestry” is used in Finland, meaning the type of forestry practised by private families in their own forests. The forest ownership structure based on private, non-commercial ownership corresponds to that of most European countries.

About one third of the forestry land is state-owned, located mainly in north Finland. The state enterprise Metsähallitus administers 12.4 mill. ha of state-owned land and water bodies. 3.4 mill. ha of productive forests are managed for forestry purposes and 3.4 mill. ha are protected areas like statutory conservation areas, areas under Conservation Programmes and Wilderness Reserves.

Table 4:
Ownership of forestry land (Finnish Statistical Yearbook of Forestry 2003).

	South Finland	North Finland	Whole Country
	% of the forestry land		
Private	73	37	53
Companies	12	4	8
State	8	55	34
Others	6	4	5

The forest legislation gives forest owners obligations relating to the conservation of biodiversity in commercially managed forests. The important forest habitats, so-called ‘key-biotopes’ should be conserved. Guidance for maintaining and increasing biodiversity are given in forest management guidelines. In addition to the key biotopes the guidelines promote leaving dead wood and certain deciduous tree species in forests, and leaving over-mature trees and young trees in regeneration sites.

The protected forest area has increased almost threefold over the last 30 years. Statutory conservation areas now cover about 3 million hectares. In 2002, 12 % of forests were strictly protected or in restricted use.

1.2. Legislation background

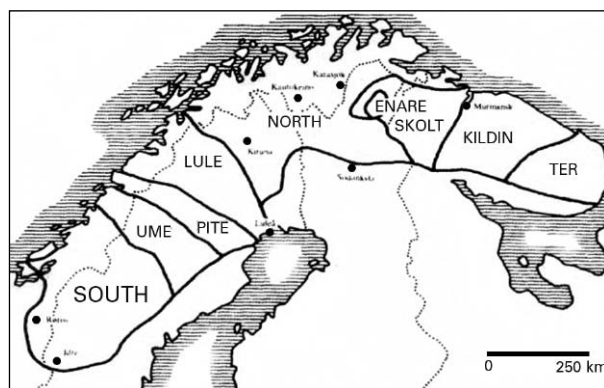
The Forest Act (1093/1996) and the Forest Decree (1200/1996) give provisions on forest utilisation and management. The purpose of the Act and the Decree is to promote economically, ecologically and socially sustainable management and utilisation of forests. The forest legislation applies to forests of all forest owners excluding areas protected under the Nature Conservation Act, areas under the Act on Wilderness Reserves, and areas covered by town, building or shore plans. The Act regulates thinnings and regeneration fellings, and obligate the landowner to ensure regeneration after final felling. The important forest habitats mentioned in the Act should be preserve to maintain biodiversity in forest ecosystem. The Act also orders the Forestry Centres to compose regional forest programmes to harmonise the goals of timber production and the multiple use of forests.

The Nature Conservation Act (1096/1996) and the Decree (160/1997) give provisions on nature and landscape protection. The Act defines the general purpose and methods of nature conservation and the Decree gives more detailed regulations. The aim of the Nature Conservation Act is to:

- maintain biological diversity
- conserve nature’s beauty and scenic values
- promote the sustainable use of natural resources and the natural environment
- promote awareness and general interest in nature and
- promote scientific research.

The status of the Same people in the northernmost Lapland is a considerable factor within forest management and forest protection. The Skolt Act, the Act on Natural Economy Industries and the

Figure 2:
The settlement of Same people (The Sami in Finland 1999).



Reindeer Husbandry Act give provisions to ensure the traditional livelihood of the Same people. Reindeer husbandry and other natural economy industries are permitted also inside protected forest areas. Figure 2 shows the settlement of Same people in the Nordic Countries and Russia.

The traditional Finnish legal concept 'Everyman's rights' allow free access to the land and waterways to every Finnish people and to foreign citizens, with certain exceptions. Access to land is free and e.g. picking berries and mushrooms is possible without landowner's permission. Everyman's rights are limited in some strictly protected areas.

Many other laws issue orders on use of forests and forest protection; the Act on the Financing of Sustainable Forestry, the Forest Insect and Fungi Damage Prevention Act, the Water Act, the Land Use and Building Act, the Hunting Act, the Off-Road Traffic Act, the Act on Wilderness Reserves, the Outdoor Recreation Act and the EU-legislation.

2. History of Protected Forests in Finland

2.1. Forests in Finnish culture

Forest and trees have always been of great importance to Finnish people providing livelihood, shelter, and spiritual encounters. Trees and groves were marked and hallowed in memory of dead people and these forest cemeteries were still common at the end of the 1800s. In the olden days one of the greatest gods was the god of forests, known as Tapio. "Tapio's table", a large eve-topped spruce, was a place for making offerings to Tapio. After a successful hunting trip he was propitiated with sacrifices, and a bear-skull was hung from the tree. There were also sacred trees to promote health and good luck. Near dwelling places were 'house-trees', and trees whose branches were cut to protect the family. In slash-and-burn areas one tree was left to ensure the fertility of the soil (Reunala 1987).

W. Holmberg's painting of 1858 "The Finnish conifer forest", presenting 'a wild pine forest' is seen as the start of the history of forest art (Reitala 1987). The second significant period was in the 1890s during the period of national romanticism. The artists played a role in conservation and studied forests in the far north and Carelian wilderness. At the turn of the century forests and trees had signifi-

cance as national symbols in art, and as pictorial motifs on bank notes and coins. The 19th century national romanticism also had a great effect on Finnish composers who found their spiritual roots in the forests. The work of Kalevala, the Finnish national epic poet, inspired Sibelius to compose *Tapiola* (op. 112) in 1925, his last major work which is an interpretation of strong feelings about nature (Hako 1987).

2.2. Intervention of man on Finnish forests

The first people, the Lapps (Sami) arrived in Finland over 9,000 years ago soon after the last ice age. They migrated from the east and southeast. The Finns arrived from the southeast and south and Germanic tribes came from the west. The first inhabitants were fishermen and hunters. Wooden boats and ships enabled people to settle in the archipelagos along the coast and to move inland up the watercourses.

Hunting, fishing and nomadism changed natural forests. The effect was greatest in the surroundings of permanent settlements. Permanent settlements and clearing forest for fields became widespread in the Iron Age during the first decades of the Christian era. By the end of the 1000-year period before the Birth of Christ, the area permanently settled by the small population extended to around the 62nd latitude. The settlement of central Finland started in the middle of the 16th century reaching northern Finland during the next century. At the end of the 17th century, the Finnish population was around one million.

Early settlements relied heavily on the forest. In addition to buildings, almost all tools, utensils and vehicles were made of wood. Wood was burnt almost continuously in inefficient fireplaces during the wintertime. In coastal areas, wood was used for ship-building, and locally, in southern Finland for the mining industry and iron refining. Tar distilling was widespread and consumed considerable amounts of wood (Figure 3).

Slash-and-burn agriculture allowed the spread of human settlement throughout the country during 1600–1800. In the 16th century, the technique practised in central and eastern Finland was to cut down and burn mature stands of spruce, sometimes very far from the settlements. Areas close to settlements were subjected to shifting cultivation of turnip, barley and rye followed by a fallow period of between 8–30 years depending on the development of the secondary forest. During the intervals between

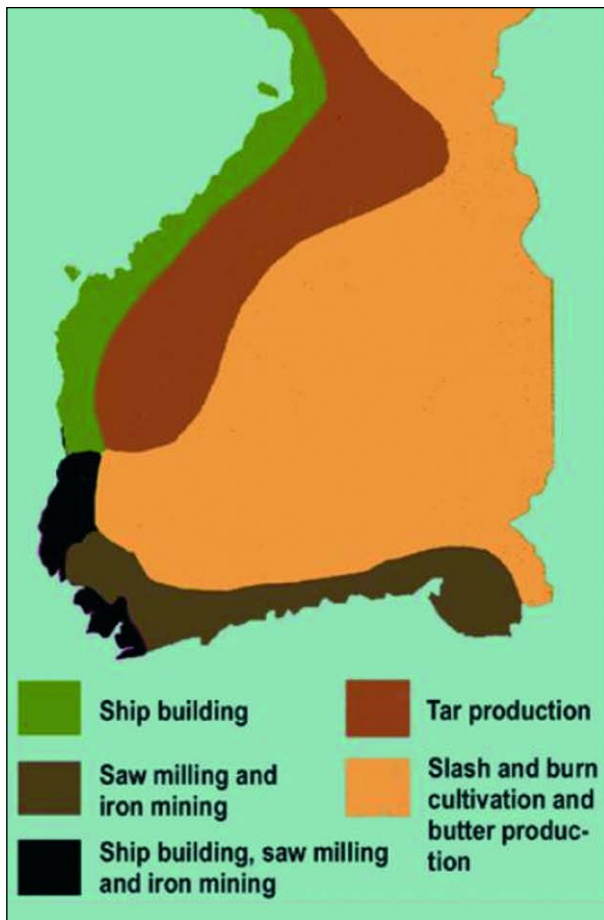
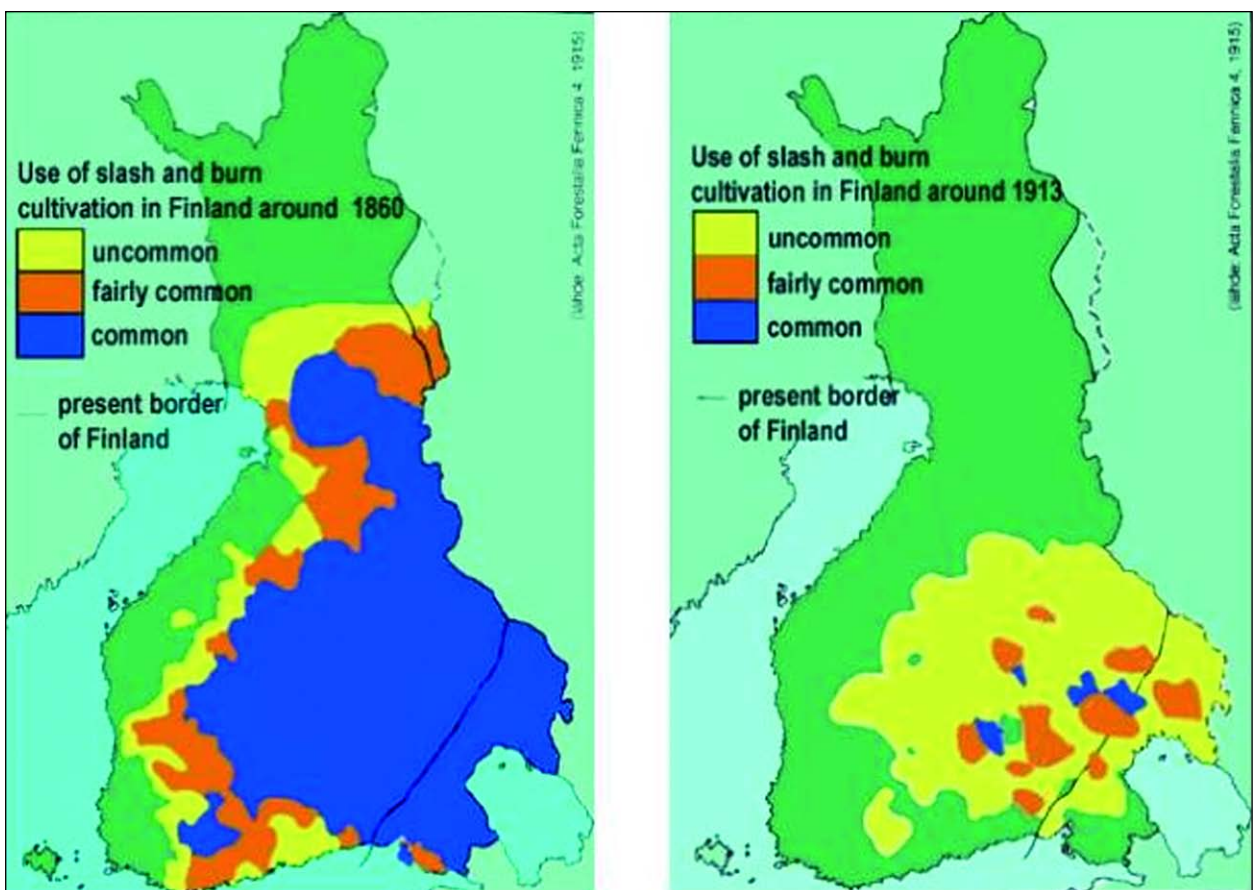


Figure 3: Human impact on forests in South Finland between 1700–1900. (Illustration drawn by J. Parviainen as combined from various historical data sources).

consecutive burning operations, the plots of land would often serve as forest pastures (Vilkuna & Mäkinen 1988, Aarnio 1999).

By the beginning of 20th century, some 50–75 % of Finland’s forest area had been exploited by slash-and-burn cultivation which was practised on more than 4 million hectares per year (Heikinheimo 1915) (Figure 4). While slash and burn cultivation was a necessity for the rural population, the government authorities were worried about the destruction of forests. Already in the 19th century it was feared that the loss of forest cover due to slash and burn agriculture would lead to a cooling of the climate and to Finland becoming unsuitable for human settlement (Leikola 1988). Another, more urgent cause for concern involved the rising economic significance of the forests. Sawn timber and timber for mining were

Figure 4: The relative application of slash-and-burn cultivation in Finland during the years 1860–1913 (Heikinheimo 1915).



more and more important. Slash-and-burn cultivation had already made it difficult to find firewood or timber for building and construction near villages.

In the 18th and 19th centuries Finland was the most important tar producer for the European boat building industry and from the 17th century until the 1830s tar was the most important export product in the Finnish economy. In the middle of the 17th century 10,000 tons were exported, accounting for half of the value of total exports. At its height in the 1860s, the volume of tar export was 30,000 tons, 15 % of total exports.

Tar was distilled in areas where there was enough pine for raw material and from where the tar could easily, and with low costs, be transported to ports. In the 17th century large amounts of tar were distilled in South Finland but, by the next century, almost all the tar was procured from Ostrobothnia. When the road network was improved, the emphasis on tar distilling was moved to the forest-rich Kainuu area. Tar production declined in the middle of the 19th century when wooden shipbuilding stopped in continental Europe. The price of timber also increased enormously and a saw milling industry was newly established.

The first water-driven saws were established in 1533 and they became common during the 1600s. However production didn't expand until the first half of the 19th with the introduction of steam powered saws. The first mechanical pulpwood mill was built in 1860, and the first sulfite pulp mill in 1885. Industrialization really took off when the burning of wood for energy was replaced by imported fuels and hydroelectricity. Wood became the raw material of a diversified forest industry. Industrial utilization gave wood an unprecedented value, and timber harvesting and transportation provided work in all parts of Finland.

The consequences of the Second World War were remarkable for Finland's forests and forestry. The war resulted in the destruction of vast areas of forest and Finland lost about 12 % of its forest area. One third of the war reparations were paid with wood and forest industry products and this led to a considerable increase in the forest industry. Massive areas were clear-cut, especially in northern Finland, and the cuttings exceeded growth in the 1940s.

Sustainable forestry has been under systematic development ever since the Second World War. Several of the State-funded forestry programmes were launched in the 1960s. The aim was to increase forest resources through silvicultural and forest

improvement works such as fertilising, ditching, and improvement of young stands. The State subsidised private forests owners and forest companies. The main method for re-establishment was artificial regeneration: clear-cutting and planting coniferous trees, mainly Scots pine. For the past 40 years the annual growth of trees has exceeded harvesting by 20–30 %.

By the 1960s, conservationists had already started to criticise the forestry measures as being too production-oriented and the large clear-cut areas came in for a lot of criticism. Ecological aspects were taken into consideration in forest management guidelines and activities in the 1980s (Metsätalous ja ympäristö 1994). At the same time active measures were taken to increase multipurpose forestry and the recreational use of forests.

2.3. History of legislation on forests and forest protection

Finland has been an independent state since 1917. From the end of the 13th century until 1809 Finland was a part of the Swedish realm, and from 1809 to 1917 a partly autonomous region of Russia, the Grand Duchy of Finland (although the eastern parts of present Finland were already a part of Russia before 1809). During the period of Swedish rule its legislation was applied in Finland. In the time of the Grand Duchy the Swedish laws were in force until Finland got legislation of its own in 1851 (Laitakari 1960, Tasanen 2004).

The first written regulation concerning Finland was the common land law for the Swedish realm in 1374. This law prohibited ordinary people from hunting in the King's hunting parks. The only King's hunting park in Finland was the Åland Islands. In 1569 Åland had a list of trees and animals to be protected. Oak, beech, apple, hazel, ash, bird cherry and deer were preserved. Several regulations prohibited felling of fruit-bearing trees and especially oak and beech which were needed for shipbuilding. In the 16th century, as fears of forest product scarcity grew, the government started to control the use of forests. The King's declaration that uninhabited wildernesses belong to "God, the King and the Crown", was meant to promote settlement and the establishment of new farms in the wildernesses. Hunting, slash-and-burn cultivation, cattle pastures, and the household and agricultural consumption of wood were the major forms of forest use. (Laitakari 1960, Tasanen 2004).

In 1664 three laws; the first forest decree, the decree concerning fruit-bearing trees, and the hunting decree (all enacted in 1647), were renewed and also published in Finnish. The forest decree provided for the ownership of forests, instructions for forest use and punishments for illegal use. Regulations for the prevention of forest fires and a requirement to save valuable trees and forests were also given. In the 18th century the governors of Finland's provinces tried to restrict the devastation of forests through the forest decree. Domestic firewood was still the most important use of wood.

In the beginning of the 1800s the exploitative use of forests continued. The mining industry in particular blamed slash-and-burn agriculture, tar production and the sawmill industry for the devastation of the forest and demanded new forest legislation. At the same time the structure of forest ownership changed, with areas of commonly owned forests parcelled-out to private owners. After ten years of preparation a new forest act came into force in 1851. State-owned forest was clearly distinguished from private land. Slash-and-burn agriculture was prohibited on state land and restricted on private land. Also the production of sawmills was limited.

A provisional forest administration was organised under The Board of Land Survey and Forestry and, in 1859 a permanent forest administration was established. The need for professional foresters led to the establishment of the Evo Forest Institution a couple of years later and active silvicultural measures and forest management planning started in the state forests (Laitakari 1960).

Concerns over forest resource scarcity resulted in forest inventories and the compilation of forest statistics. In 1850, C. W. Gylden published a map of the condition of Finland's forest based on information collected by land surveyors. The German, Edmund von Berg evaluated Finland's forests in 1854 and in the late 1800s several surveys were made of the state forests. The results demonstrated the need for a review of forest law and regulations. In 1866, the Forest Act made the devastation of forests illegal (Laitakari 1960, Tasanen 2004).

At the beginning of the 19th century scenic nature sights and beautiful landscapes were popular tourist attractions. The ruler of Russia, Alexander I, liked the beauty of the Punkaharju area and decided, in 1802, that the forests of the beautiful esker area should not be cut. Thus the first protected forest area was established in Finland. Later, in 1840, while the general parcelling-out of land was going on, the Punkaharju

area was transferred to private ownership. To protect the area from cutting, the Senate decided to buy back the area for the State. At the end of 1800s and beginning of the 1900s the State bought several areas famous for their scenic values in different parts of Finland (Laitakari 1960, Roiko-Jokela 1997, Kakkuri & Piri 1996).

Ideas of nature conservation reached Finland towards the end of the 1800s mainly from Germany and North America. The explorer and geologist A. E. Nordenskiöld proposed in 1880 that state-founded parks should be established in Nordic Countries. His opinion was that distant, low-value state-owned areas should be protected as nature conservation areas. Ten years later the botanist R. Hultin stated scientific and forestry management reasons for the establishment of national parks. The collective debate started with national parks and then widened, with demands for smaller conservation areas on private land as well (Roiko-Jokela 1997).

At the same time silvicultural activities increased and reduced the area of natural forests, especially in North Finland. Metsähallitus, the state forest land agency recognised the situation and established its own nature reserves, natural parks and primeval forests. It also gave regulations on cautious management in high areas and poorly productive lands (Laitakari 1960).

Finland became independent in 1917 and the first nature conservation act came into force in 1923. It took 15 years before Finland got the first statutory nature conservation areas, most of which were the same areas Metsähallitus had preserved earlier. Ten conservation areas, national parks and strict nature reserves, were established in 1938. Five of these were lost in the cession of territories after the Second World War. The nature conservation legislation was amended several times and in 1956 the Act on National Parks and Strict Nature Reserves was passed (Laitakari 1960).

The aim of the Forest Decree (1917) was to ensure the good use of young coniferous forest, and this was practically the first forest law applied to private forest. The Private Forest Act was enacted in 1928. These two laws renewed the forest administration and provided Metsähallitus with powers of law enforcement. Heavy cuttings together with severe climate conditions in northernmost Finland fuelled fears of the retreat of timberline. The Act on Protection Forest (1922) and the Decree on Protection Forests, defined the allowed fellings and the boundaries of protection forests.

At the end of the 20th century both the nature conservation legislation and the forest legislation were out of date. Pressure for change came from EU legislation, the EU Bird and Habitat Directives and other international agreement and commitments, including the Convention on Biological Diversity (CBD), the UN Conference on Environment and Sustainable Development (UNCED), the United Nations Forum on Forests (UNFF) and the Ministerial Conference on the Protection of Forests in Europe (MCPFE). A new Nature Conservation Act and Decree, and Forest Act and Decree were passed in 1996 and came into force in 1997.

3. Current state

3.1. Main types of PFA, responsible organisations and procedures

3.1.1 Legislation for forest protection

Nature conservation legislation

The Nature Conservation Act (1996) specifies four types of nature reserves: national parks, strict nature reserves, nature reserves on state-owned land, and nature reserves on private land. The general prerequisites for the designation of a nature reserve are: that it is host to an endangered or rare species, population or ecosystem, or one that is becoming scarce; there is a special or rare natural formation; it is a site of outstanding natural beauty; the area includes a natural heritage type; the reserve is necessary for attaining or maintaining the favourable conservation status of a natural habitat or species; or the site is otherwise so representative, typical or valuable that conservation of its biological diversity or natural beauty is necessary. The Act prescribes the general restrictions and the cases where derogation from restrictions is permissible. The designation of nature reserves and the responsible authorities depends on the type, the size and the owner of the nature reserve. The designation decision sets out the protection provisions and the boundaries of the nature reserve. After designation, nature reserve signs and boundaries are marked on the ground. The designation of a new nature reserve is entered in the Real Estate Register.

The Nature Conservation Act also lays down provisions on protected natural monuments, the conservation of natural habitats, landscape conserva-

tion, protection of species and special provisions of the EU Natura 2000 Network. The Act is also applied to commercially managed forests where it concerns the protection of species.

The means of planning for nature conservation through a nature conservation programme is described in the Act. The Ministry of the Environment is the responsible administration for the planning, and the Council of State designates the areas under the programme.

Protected areas established on the basis of the Act are called nature reserves. The group 'nature reserves on state-owned land' is often divided into four sub-groups in the accordance with the purpose of the conservation: mire conservation areas, herb-rich forest areas, old-growth forest areas and other conservation areas on state-owned land. This grouping is used in this report.

Forest legislation

The Forest Act (1996) orders that forests shall be managed and utilised in such a way that overall prerequisites for the preservation of habitats characteristic of biological diversity of the forests are ensured. Habitats referred to by the Act shall be in a natural state, or resemble a natural state, and are clearly distinguishable from the surroundings. The habitats shall be managed in a manner that preserves their special features.

The Act lays down provisions for protection forests and protection zones. Protection forests are designated to preserve forest to prevent retreat of the timberline in the region of Lapland. Fellings are permitted only in accordance with a felling and regeneration plan approved by the Forestry Centre. Protection zones are forests preserved for the protection of settlements or cultivated areas, to prevent landslides, or to protect areas highly exposed to the wind.

3.1.2 Classification of protected forest areas in Finland

In Finland there are numerous types of protected forest with different aims and levels of protection. In the 1990s a debate over the actual proportion of protected forests started up the classification work and the compilation of statistics on protected forests. The work was carried out in co-operation with forestry and environment organisations and non-governmental organisations. The nature, restrictions and designation procedure were found out for each PFA type. The principles of the classification and the

content of the categories are revised when necessary (Metsien suojelupinta-alat 1999).

Forestry land is classified according to protection status into three categories: 1) strictly protected forests; 2) other valuable forests in terms of nature conservation; and 3) commercially managed forests. Class 2 is further divided into two subcategories: 2a) protected areas, where restricted forest management is possible; and 2b) forests with felling restrictions.

Strictly protected forests (class 1) and forests where restricted forest management is possible (class 2a) are counted as protected forests. The main activity on these areas is nature protection and generally the protection bases on a law. Finland's land area under these protection categories in 2002 is presented in Table 5. The statistics on protected forest areas presented in this report are compiled for this classification work and are published in the report "The working group for the harmonization of the classification and statistics on forest protection" (2002).

habitats but also the most valuable and unique habitats of Finnish nature. Along with protecting the biological diversity of nature, national parks are established to protect natural views (river rapids, canyons, esker formations), and Finnish history (cultural landscape, slash and burn agriculture, old meadows). Every national park has its own special regimes and management plans. Commercial forest management is not allowed. Trees may be felled and habitats are restored according to the management plan. In principle hunting is forbidden, but in Northern Finland residents may hunt within their own municipality. Reindeer husbandry is allowed in national parks. National parks have also been established for recreational use. Visitors have free access except to certain closed areas. Outdoor activities are directed to marked hiking and skiing trails. National park information centres have educational resources to increase people's environmental awareness and

*Table 5:
The areas of the protected forests and forests with felling restrictions (The working group for the harmonisation of the classification and statistics on forest protection 2002).*

	Forest land	Low productive forest land	Total Forest	Other land for forestry	Other land classes	Total land area
1,000 ha						
Class 1: Strictly protected forests	834	831	1,665	1,606	32	3,306
Class 2a: Protected areas where restricted forest management is possible	79	19	98	16	2	116
Protected forests: Classes 1 and 2a total	912	850	1,762	1,622	34	3,422
Class 2b: Forests with felling restrictions	652	386	1 038	246	24	1 308
All classes total	1,565	1,236	2,801	1,868	58	4,730

3.1.3 Main types of Protected Forest Areas

The main source material in the descriptions of the protected areas have been the Nature Conservation Act (1996), the Forest Act (1996), the final report of Working Group 1 (Bücking et al. 2000) and the Country Report (Parviainen et al. 1999) for COST Action E4, the Principles of protected area management in Finland (2000), the report of The working group for the harmonisation of the classification and statistics on forest protection (2002) as well several reports and decisions on protected areas.

National park

A national park (*kansallispuisto*) is established by a law on state-owned land under the Nature Conservation Act. The law prescribes the designation and objectives. National parks preserve the most typical

knowledge about nature. National parks are used for scientific research.

The Finnish Forest Research Institute manages one national park (Koli), and Metsähallitus all the others (34). The minimum area is 1,000 ha, but 4 national parks smaller than that were established before 1997, when the new Nature Conservation Act entered into force. The total land area within national parks is 698,047 ha, of which 513,822 ha is forest. The total area varies from 400 ha to 285,900 ha. Since January 2002 two new parks have been established with a total area of 4,400 ha. A further national park is under preparation.

Strict nature reserve

Strict nature reserves (*luonnonpuisto*) are state-owned protected areas, which owing to their great

scientific value are to be permanently preserved, undisturbed, in as close to their natural state as possible. Strict nature reserves have a significant role in guaranteeing the continuation of natural succession. The restrictions are stricter than in national parks. Public access is not generally allowed without special written permission although some strict nature reserves have nature trails open to the public. In Lapland, inhabitants have some privileges in strict nature reserves near their domiciles.

Strict nature reserves are established by statute within the Nature Conservation Act. If the area is more than 1,000 ha it is enacted in the law, otherwise by decree. There are 19 strict nature reserves of which Metsähallitus manages 17 and the Finnish Forest Research Institute, two. The total land area is 150,000 ha of which 68,560 ha is forest. The smallest strict nature reserves (100 ha) are in Southern Finland, and the largest, Kevo Strict Nature Reserve (71,200 ha), is in Lapland.

Mire conservation areas

Mire conservation areas (*soidensuojelualue*) consist of state-owned designated conservation areas included in the National Mire Conservation Programme. The basis of protection is the Nature Conservation Act. Areas over 100 ha are designated, and the protection bylaws approved, by the Ministry of the Environment enacting a decree. All measures impacting on the mire's natural water balance and natural vegetation composition are forbidden. Theoretically this means that normal forest management like felling and soil cultivation would be allowed inside the conservation area on mineral soils. In practice however Metsähallitus has decided to leave the mineral soil stands untouched. Generally there is free access to mire conservation areas and hunting is allowed. Exceptions are made for stricter protected sub-areas like bird wetlands and habitats of threatened species.

One third of Finland's land area once consisted of mires. About half of the original mires have been artificially drained to increase timber production and to change land use e.g. to farmland and peat extraction. The aim of mire conservation areas is to ensure rich mire habitats and ecosystems. The forested land area of the 173 mire reserves is 172,000 ha.

Protected herb-rich forest areas

The aim of protected herb-rich forests areas (*lehtojensuojelualue*) is to preserve their unique flora and fauna in every herb-rich vegetation zone in the whole of

Finland. Herb-rich forests are more fertile and richer in species than the typical heath forest, covering only one percent of the Finland's forested area. The designation and restrictions are similar to those for mire conservation areas. Management activities needed in herb-rich forests are typically the felling of spruce, to give space for more sunlight demanding plants, live-stock grazing and mowing. Fifty-three protected herb-rich forest areas were established in state-owned land in 1992, and their forested area is 1,200 ha.

Protected old-growth forests areas

In 1994 protected old-growth forest areas (*vanhojen metsien suojelualue*) were designated by the Decree on the Protection of Old-Growth Forests. The aim of the 92 areas is to preserve old natural forest, their ecological systems, and related species. They also serve for nature and environmental research and instruction. The Finnish Forest Research Institute manages 3 of these reserves and the others are managed by Metsähallitus. All protected old-growth areas are located in South Finland. The total area is 10,000 ha, of which 8,300 ha are covered by forests.

Nature reserves on state-owned land

The nature reserves on state-owned land, referred to above, are established on the basis of the Nature Conservation Act. If the reserve is larger than 1,000 ha, the provisions on the designation are prescribed by decree. The Ministry of the Environment is authorized to establish smaller nature reserves. These areas vary considerably with regard to size, character, the aim of preservation, and management activities. There are 63 such 'other' nature reserves on state-owned land and the forested area is about 31,000 ha.

Nature reserves on private land

The regional environment centres can designate a nature reserve (*luonnonsuojelualue*) on private land on the application of the landowner. The designation decision includes the necessary provisions on protection and management and mentions if free access is prohibited or restricted. The landowner and the regional environment centre should agree on the protection provisions and the landowner's compensation before the decision is issued. The protection can be permanent or the complete nature reserve or parts of it can be protected temporarily for not more than 20 years. The regional environment centre may designate a nature reserve on private land without the landowner's application, if lands are within the adopted nature conservation programme. There are

about 3,400 nature reserves on private land. The total area is 122,000 ha including water areas.

Wilderness reserves

Wilderness reserves (*erämaa-alueet*) are established under the Act on Wilderness Reserves (1991). They are located in northernmost Lapland and the aim is to preserve the wilderness character of these areas, safeguard the Sami culture, nature-based forms of livelihood, and to make more versatile use of wilderness areas. Wilderness reserves are divided into two zones: strictly protected areas and areas where nature-imitating forest management is carried out. They are closely connected to nature reserves and create an extensive network of protected areas in Lapland. Wilderness reserves are state-owned and managed by Metsähallitus. The Act provides for a management plan for each area which the Ministry of the Environment approves. The number of wilderness reserves is 12 and the total land area is 1,376,900 ha. The total land area of strictly protected zones is 1,335,600 ha, and the forested area is 454,400 ha. The total area of land managed in a nature-imitating way is 41,300 ha, all of which is forest.

Protected areas under nature conservation programmes

Nature conservation programmes (*luonnonsuojeluohtjelma*) are the legislative procedure to engage areas for protection. The Ministry of the Environment is responsible for their drafting and the Council of State adopts the programmes and designates the areas. A committee or working group has been appointed for each nature conservation programme, consisting of scientists, state officials, local governments, representatives of landowners, forest workers, and nature conservation associations etc. The assignment of the committee is to determine the present situation and the conservation needs of the subject at issue. It also sets out the criteria to be used, organises the compilation of data and, after selection, proposes the areas to be protected. Each programme has its own specific aims and selection criteria derived from research work and background information such as the National Forest Inventory and other research and studies. Areas are inventoried during the selection process, or existing information is used. The decision made by the Council of State sets out the adopted areas, and the maps of each area are appended.

The Nature Conservation Act incorporates seven nature conservation programmes adopted earlier.

The realisation status of programmes is referred to January 1, 2004.

- 1) The Programme for Development of National Parks and Nature Reserves. This programme was adopted in 1978, and supplemented in 1980, 1985, and 1988. The aim is to complement the network of national parks and strict nature reserves taking into consideration the regional representativity, the representativity of vegetation zones, and the international recommendations. This programme is almost completed, only 1 % of the area is not yet established as a national park.
- 2) Mire Conservation Programme (1979, 1981). The aim is to preserve adequate quantity of mire complexes in a natural state. 73 % of the area of the programme is established as a mire conservation area.
- 3) Waterfowl Habitats Conservation Programme (1982). The aim is to preserve wetlands in a natural state and to protect valuable areas for waterfowl and other birds. 26 % of the programme is fulfilled.
- 4) Herb-Rich Forests Conservation Programme (1989). The aim is to preserve representative samples of typical herb-rich forests of various vegetation zones. Protection will be achieved by establishing a nature conservation area. 44 % of the area of the programme is established as a protected herb-rich forest area.
- 5) Decision on the Protection of the Mikkeliinsaaret (1989). The intention is to protect the area establishing several nature reserves on state-owned land and on private land under the Nature Conservation Act. The aim is to preserve the culture, the fishery, and the unique nature of archipelago. The area is mainly covered by sea. The forest area is 1,000 ha. The management and utilisation plan is currently being considered for approval. The areas contributes to the Natura 2000 Network.
- 6) Shore Conservation Programme (1990). The aim is to preserve shoreline areas in their natural state, and to protect the shores and islands valuable in terms of nature conservation and landscape. Construction is prevented. Protection of some areas has been decided while in some cases the process is incomplete. The regimes developed differ in the ways in which conservation will be achieved. The realisation degree of the programme is 18 %.
- 7) Programme for the Protection of Old-Growth Forests (1996). The aim is to preserve old natural

forest, ecological complexes and species related to natural forests. Hitherto 4 % of the area of this programme is established as a protected old-growth forest area.

In 1984 The Council of State adopted the Eskers Conservation Programme. The aim is to protect geological formations like eskers and ridges. This programme differs from the other conservation programmes in that it is implemented under the Land Extraction Act and Decree. The restrictions to forestry are therefore insignificant. However if the site has vegetation characteristic to eskers, and is host to endangered or threatened species, the site will be preserved.

The protected areas created under the nature conservation programmes are playing a very important role. The State's right to expropriate the land area effectively limits the use of the areas for functions other than conservation and all actions which jeopardise the conservation objectives of the site, are prohibited. In practice the protected areas on state-owned land are managed with the same prohibitions as nature reserves. The programmes will be implemented through the Nature Conservation Act, establishing nature reserves on both private and state-owned land. The State allocates funds every year for land purchases from private owners and all nature conservation programmes should be finished by 2007.

Protected forest habitats

Natural habitat types preserved on the basis of the Nature Conservation Act. Nine natural habitat types (three shore types, three cultural landscapes, and three forest types) are mentioned in the Nature Conservation Act for protection. Under the Act it is prohibited to alter areas of the natural habitat types. The Finnish Environment Institute co-ordinates inventories of these habitats and the Ministry of the Environment provides the funding. The regional environment centres carry out inventories of potential sites and inform landowners of proposed sites. Landowners and others concerned in the process are consulted before the site is designated. The regional environment centre set the boundaries of the natural habitat to be protected and notify the landowner of the decision. Landowners are entitled to compensation if they apply for a derogation from the prohibition and the regional environment centre declines the application.

The Finnish Environment Institute and the Ministry of the Environment have given detailed descrip-

tions of prohibited and permitted activities for each forested natural habitat type. The inventories are not complete in all regions, but the objective is to finish the work in 2004. To date about 950 natural habitat sites have been found covering 1,750 ha; 429 forest sites have been designated covering 789 ha. The size of forested habitats (broad-leaved woods, hazel woods and black alder swamps) ranges from 0.5 ha to a few hectares.

Habitats of special importance referred to in the Forest Act. Habitats referred to the Forest Act (1996) are:

- 1) the immediate surroundings of springs, streams, wet hollows in the permanent beds of streams, and small pools,
- 2) herb-rich and grassy hardwood-spruce swamps, ferny hardwood-spruce swamps, eutrophic paludal hardwood-spruce swamps, and eutrophic fens located to the south of the Province of Lapland,
- 3) fertile patches of herb-rich forest,
- 4) heathland forest islets in undrained wetlands,
- 5) gorges and ravines,
- 6) steep bluffs and the underlying forest, and
- 7) sandy soils, exposed bedrock, boulder fields, wetlands with sparse tree stands and flood meadows, which are less productive than nutrient-poor heathland forests.

The Forest Decree describes the characteristics of the habitats and the interpretation of their natural state. The Decision of the Ministry of Agriculture and Forestry gives instructions for the management of the habitats, and penal provisions are provided if a habitat of special importance is destroyed. The total area of habitats of special importance is 78,900 ha.

Habitats preserved on the basis of the Act on Financing of Sustainable Forestry (1996). In accordance with the Forest Act a landowner maintaining the biological diversity of forest can apply for support from State funds. Other habitats, not mentioned in the Act, which can be taken into consideration are old coniferous and mixed tree forests, old broad-leaved forests, important habitats of esker formations, sumps, grass-grown mires, pastures and forest meadows.

Special Areas under Landscape Ecological Planning. In 1996–2000 Metsähallitus applied the Landscape Ecological Planning (LEP) system. The aim is to maintain and enhance biodiversity in managed forests and preserve valuable landscapes and cultural sites. The valuable habitats, ecological links and the

biodiversity enhancement areas complement the nature conservation areas, which are the core areas of the ecological network. Subject to the character of the site all forest management activities are prohibited or restricted (Karvonen 2000, Korhonen & Savonmäki 1997).

Protected forests of Metsähallitus

These are protected forests (*suojelumetsät*) that Metsähallitus preserve through internal decision. On these sites commercial forest management has ceased and all activities aim to maintain or enhance biodiversity. On old forest reserves and peatland reserves the restrictions and prohibitions are very strict, but on areas allocated for nature conservation, the restoration activities may be very intensive. In future, in 5–20 years, these areas are to be established as nature reserves and management activities are undertaken to that end. The total area of Metsähallitus' protected forests is 17,000 ha.

3.1.4 Natura 2000 sites

The Natura 2000 network in Finland consists of 1,806 sites covering a total of 4.90 million hectares, with a land area of 3.59 million hectares. There are Habitat-Directive sites (SCI) covering 4.77 million ha (14 % of Finland's total area). The 453 bird sanctuaries (SPA) cover 2.7 million ha. SPAs and SCIs overlap in some areas.

About 95 % of the area of Natura 2000 sites is already protected as nature reserves, Wilderness Reserves, adopted conservation programmes, or other protected areas. The restrictions due to the Natura 2000 regulations may be stricter than they otherwise would be. New Natura 2000 sites are protected on the basis of the Nature Conservation Act, the Forest Act, the Outdoor Recreation Act, the Land Extraction Act, the Water Act, the Environmental Protection Act, or other laws (Natura 2000 -alueiden hoito ja käyttö 2002). Such protection under the Nature Conservation Act has been implemented over 76,700 ha, of which 46,100 ha is forest, establishing nature reserves on state-owned land or private land. Areas protected under the Forest Act that need less strict restriction cover 70,000 ha of which 42,200 ha is forest.

Most of Finland's Natura 2000 sites are located in the boreal biogeographic region. The European Commission has approved the proposal within the boreal region in 2005. The sites in the alpine biogeographic region were already approved in 2004.

3.1.5 Responsible organisations

The Ministry of the Environment controls and enforces the nature conservation laws. It has responsibility for the Finnish Environment Institute, the 13 regional environment centres and it supervises and funds the nature conservation activities of Metsähallitus and the Finnish Forest Research Institute. The Ministry of the Environment is responsible for strategic planning, leadership, legislation, and budgeting for nature and landscape conservation. The Ministry of Agriculture and Forestry enforce the forest laws and regulations. Metsähallitus, the Finnish Forest Research Institute, 13 forestry centres, and the Forestry Development Centre Tapio are subordinated to the Ministry of Agriculture and Forestry.

The Finnish Environment Institute (SYKE) is a national centre for environmental research and development. One of its tasks is to monitor and assess the status and changes of Finland's flora, fauna, and natural habitats. SYKE has started a project to evaluate the status of habitats that may be threatened in Finland. The Ministry of the Environment has authorized the Institute to administer the digitised boundary information of state-owned and private-owned nature conservation areas.

Regional environment centres are responsible for carrying out the nature conservation programmes. The centres acquire land for the state through exchange and purchase. They are the authority that designates the nature conservation areas on private land, and also pay compensation to landowners for conservation. The regional environment centres preserve biodiversity by monitoring, protecting and managing valuable and threatened habitats and species.

Metsähallitus is a multi-sectional state-owned enterprise. Metsähallitus administers 9.0 million hectares of state-owned land, of which 15 % is statutorily protected, 7 % is under nature conservation programmes, and 15 % is Wilderness Reserves. Metsähallitus is responsible for the State's outdoor recreation areas and for the protection and care of endangered species. Metsähallitus carries out nature conservation programmes acquiring land for the state by exchange and purchase for nature conservation. Metsähallitus can establish, by its own decision, areas smaller than 100 ha as nature conservation areas under the Nature Conservation Act.

The Finnish Forest Research Institute (Metla) is an independent research organisation for forests and forestry. The Forest Research Institute manages one

national park, two strict nature reserves and some other smaller nature conservation areas. The nature conservation areas are used for research purposes in such a way as not to endanger the conservation targets.

The Forestry Centres advise and assist forest owners to manage their forests in accordance with the forestry legislation and orders. The forestry centres offer services like forest management planning, training for forest owners and forestry professionals, assistance with applying for government support for forestry work and compensation for nature preservation. The forestry centres supervise

the implementation of the Forest Act within their areas.

The Forestry Development Centre Tapio offers forestry centres (and other organisations) training courses, materials, and expert services. It has published directions and guidelines on sustainable forest management and silviculture, and the guidebook on identifying and managing valuable habitats of forest nature.

Several committees and working groups have been set up for forest protection since the 1960s with appropriate members representing nature conservation and forest administration, local government,

Table 6: Responsible organisations.

Name of Organization	Responsibility for PFAs	Web link
Governmental		
The Ministry of the Environment	The major authority on nature conservation, controls and enforces legislation, supervises the funds and the organizations administering nature conservation.	http://www.ymparisto.fi/
The Ministry of Agriculture and Forestry	The Ministry of Agriculture and Forestry enforces forest laws and regulations. The major authority on forestry administration.	http://www.mmm.fi
The Finnish Environment Institute (SYKE)	SYKE is the centre for environmental research. It monitors and assesses the status and changes of species and natural habitats.	http://www.ymparisto.fi/
Regional Environment Centres	Local authorities on environmental administration. Centres select areas for nature conservation, monitor these areas and purchase land for protection. They also carry out some surveys and studies on protected areas.	http://www.ymparisto.fi/
Metsähallitus	Administers and manages state-owned land and forests, both commercially managed and protected areas. Metsähallitus carries out nature protection by selecting areas for protection, land exchanges and buying land for preservation.	http://www.metsa.fi
The Finnish Forest Research Institute (Metla)	Metla is an independent research organisation. Research themes are related to forests and forestry. Metla carries out many-sided research on forest biodiversity and protection, and it manages one national park, two strict nature reserves and some other smaller nature conservation areas.	http://www.metla.fi
Forestry Centres	The Forestry Centres advise and assist private forest owners to manage their forests in accordance with the forestry legislation and orders. The forestry centres offer services like forest management planning, training for forest owners and forestry professionals, assistance with applying for government support for forestry work and compensation for nature preservation.	http://www.metsakeskus.fi
The Forestry Development Centre Tapio	The Forestry Development Centre Tapio offers forestry centres (and other organisations) training courses, materials, and expert services. It has published directions and guidelines on sustainable forest management and silviculture, and the guidebook on identifying and managing valuable habitats of forest nature.	http://www.tapio.net
Non-Governmental		
The Central Union of Agricultural Producers and Forest Owners (MTK)	MTK takes care of various interests and living conditions of farmers, forest owners, rural entrepreneurs and rural people.	http://www.mtk.fi
Municipalities, provinces	Lobbying for local occupations and livelihood.	
Suomen luonnonsuojeluliitto, Luontoliitto, Natur och Miljö, WWF, BirdLife, Greenpeace	National and international nature conservation associations lobbying for additional protection of forests.	
Forestry companies	Lobbying for sufficient supply of raw material.	

forest and environmental research institutes, universities, Metsähallitus, organisations for forest owners and forest workers, nature conservation associations, and other involved parties. Committees have been designated for the selection and planning of nature conservation areas and to assess the state of forest protection and additional needs.

Non-governmental organisations take part in discussions about the status of nature conservation and the measures required. Working groups designated by governmental organisations have representatives of NGOs that are consulted on affairs concerning nature conservation. The associations for forest owners and nature conservation are the most important participants and they have a notable role providing information to the public. Some organisations have a history of support for the selection of areas for conservation. At the end of 1960s the Finnish Nature Conservation Society and the Finnish Peatland Society started the programme for peatland conservation on state-owned land. Nationwide and regional nature conservation associations and local district associations engage in the restoration of protected areas, especially the cultural sites. The responsibilities of different organisations are summarised in Table 6.

3.2. Selection criteria and representativity

3.2.1 Selection criteria

Finland has a tradition of using broad-based scientific working groups and committees in the selection of PFAs. In each case the latest ecological and biological research results and the results of the National Forest Inventory are used as a basis for investigating the state of protection and the need for more. Surveys and inventories are undertaken in likely areas and the collected data used in the evaluation. The value of each criterion is scored, and areas ranked for final selection. Selected areas have to meet the set minimum score. See Table 7 for general information on selection criteria.

National parks and strict nature reserves were established to preserve specific natural and landscape values. In 1970s it was recognised that modern land-use practises threaten some ecosystems, and various national programmes were initiated to protect the main ecosystems. The protected areas were selected using large-scale methodological inventories cover-

ring both state-owned and private-owned land. The aim has been that different types of conservation areas would form a representative network to protect all types of natural habitats in Finland.

Sites selected for national nature conservation programmes have passed criteria set for each programme. The features and characters of the sites have been assessed in field inventories in accordance with the given guidelines. Examples of the criteria used for the herb-rich forest programme and wilderness reserves are depicted.

For the herb-rich forest conservation programme assessed over 1,500 sites. The most important selection criteria were the vegetation and the diversity and quality of the flora (Lehtojen suojelutyöryhmän mietintö 1988). The representativity at national level was also used in the selection. About third of the proposed sites were approved in the final programme. The areas included in such programmes will be evaluated again before the area is designated a nature conservation reserve.

The set criteria for wilderness reserves were (Erämaakomitean mietintö 1988):

- 1) The area is at least 15,000 hectares and generally the width of the area is over 10 kilometres.
- 2) The wilderness area is as diverse as possible and functional with undivided biomes and water areas. It has to be mainly in the natural state, though naturally managed areas may be included. Human activities have to integrate with natural processes so that the characteristics of wilderness area are not destroyed.
- 3) Generally there are no roads in a wilderness area.
- 4) The landscape of the area is in a natural state and harmonious. Where there are man-made constructions they have to integrate with the landscape.

Natura 2000 sites are selected using the guide of Natura 2000 habitats (Airaksinen & Karttunen 2001). All Directive habitats existing in Finland are described in the guide using descriptions, where applicable, from the Interpretation Manual of European Union Habitats 1996. The Guide gives detailed descriptions of the habitats, the characteristic species and some practical information. The classification on representativity and the state of naturalness is defined for each habitat together with the distribution and the abundance of the habitats within Finland and the EU.

Table 7:

Main selection criteria for PFA dedicated to conservation and scientific purposes. The following grading is used for criteria importance: (1) primary importance, (2) incidental importance and (3) not taken into consideration.

	Importance	Method for quantitative assesment (incl. Important literature references)
1/ Composition		
1A. Habitat representativity	1-3	Representativity with respect to vegetation zones and at regional and geographic scales. - Kansallispuistokomitean mietintö. 1976. - Virkkala et al. 2000. Metsien ja soiden suojelutilanne metsä- ja suokasvillisuusvyöhykkeittäin valtakunnan metsien 8. inventoinnin perusteella. - Metsien suojelun tarve Etelä-Suomessa ja Pohjanmaalla. 2000.
1B. Threatened habitats	1-2	Threatened habitats are of primary importance in selecting areas for protection. The habitat as a proportion of all forests and as a proportion of protected forests are used to assess the need for protection. - Lehtojensuojelutyöryhmän mietintö. 1988. - Kumpulainen et al. 1997. Pohjois-Suomen vanhojen metsien inventointimenetelmä. Important habitats: The rareness of each habitat from region to region effects the selection. - Meriluoto & Soininen. 1998. Metsäluonnon arvokkaat elinympäristöt. - Airaksinen & Karttunen. 2001. Natura 2000 -luontotyyppiopas.
1C. Phytocoenotic integrity	1-3	Natural vegetation characteristics of habitats is described e.g. in the guidelines of herb-rich forests, old-growth forests, natural habitats, and habitats of special importance. - Lehtojensuojelutyöryhmän mietintö. 1988. - Vanhojen metsien suojelu Pohjois-Suomessa. 1996. - Meriluoto & Soininen. 1998 Metsäluonnon arvokkaat elinympäristöt.
1D. Presence of signal species	1-3	Some fungi and butterflies favour certain rare tree species (<i>Quercus</i> sp.). The habitats of these rare tree species are protected. - Lehtojensuojelutyöryhmän mietintö. 1988. - Vanhojen metsien suojelu Pohjois-Suomessa. 1996.
1E. Presence of red listed species	1-2	Threatened and rare species are very important selection criteria for all PFAs. The known hosts of threatened species are considered in selection and new hosts are documented in field inventories. - Rassi et al. 2001. Suomen lajien uhanalaisuus 2000. - Rautainen et al. 2002. Putkilokasvien uhanalaisuuden arviointi.
2/ Structure/functioning		
2A. Vertical and age structure	1-3	Different stages of natural succession and older trees of former generations give additional value to the area. Existing data from management plans and field inventories are used.
2B. Natural regeneration	1-3	Different stages are needed to maintain the natural succession. Assessed in field inventories.
2C. Old-growth stages	1-3	Existing data from management plans and field inventories are used. - Kumpulainen et al. 1997. Pohjois-Suomen vanhojen metsien inventointimenetelmä.
2D. Soil and hydrology integrity	1-3	Signs of ditching, drainage and cultivation of soil are observed. Maps, old management plans, other documents, aerial photos and field inventory are used.
3/ Landscape ecological context		
3A. Forest cover continuity over time	1-3	The old-growth forests in particular are selected so that forest cover continuity is taken into consideration. Information data sources are the history of the area and the field assessments.
3B. Old-growth continuity over time	1-3	The continuity of dead wood is evaluated by tree species (aspen, pine, spruce). - Kumpulainen et al. 1997. Pohjois-Suomen vanhojen metsien inventointimenetelmä.
3C. Minimal area for PFA designation	1-3	All protected areas are marked on 1:20,000 maps, and the boundaries of nature reserves and nature programmes are digitized. - The Nature Conservation Act 1096/1996. - Erämaakomitean mietintö 1988. - Kumpulainen et al. 1997. Pohjois-Suomen vanhojen metsien inventointimenetelmä.
3D. PFA environment and buffer area	1-3	If the surroundings of the potential PFA are already protected areas, it gives more value to the area. The smaller the area the more important the surroundings and the buffer area. Criteria are also set for the buffer zones of certain important forest habitats (the Forest Act): surroundings of springs, brooks and rivulets, and cliffs and the forests adjacent to them. - Meriluoto & Soininen. 1998. Metsäluonnon arvokkaat elinympäristöt.
3E. Habitat diversity within PFA	1-3	The area is more valuable if it contains different habitat types. The earlier compiled information and filed inventories are used to assess habitat types. - Kansallispuistokomitean mietintö. 1976. - Lehtojensuojelutyöryhmän mietintö. 1988. - Kumpulainen et al. 1997. Pohjois-Suomen vanhojen metsien inventointimenetelmä.
3F. Landform and topography	2-3	-

3.2.2 Representativity

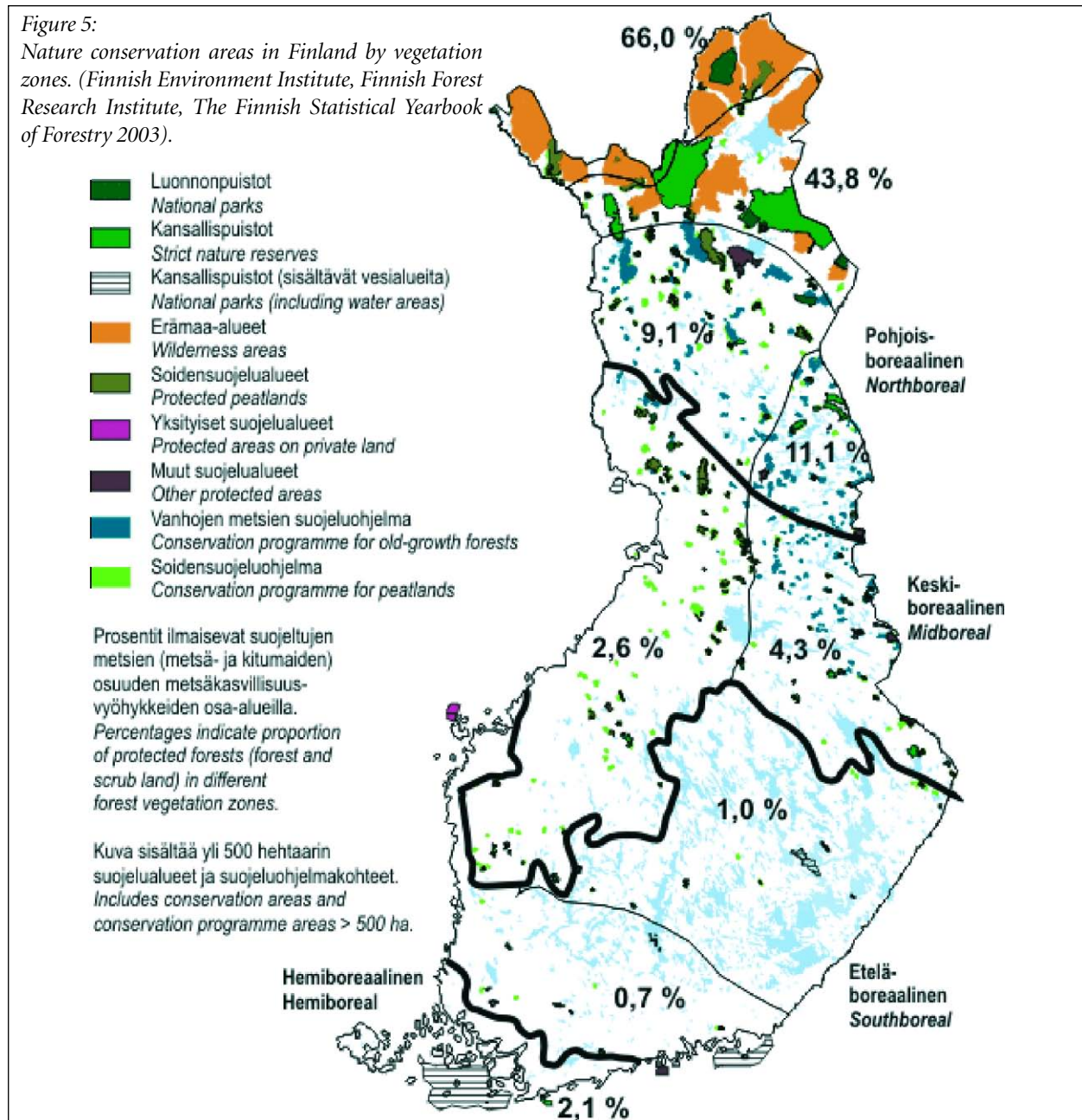
A large part of the protected forest area is located in North Finland, where about 20 % of the land is strictly protected and 27 % is protected or restricted to some extent (Figure 5). The corresponding figures in South Finland are 1.5 % and 3 %. The representativity with respect to the forest and mire vegetation zones, geographical and regional areas has been the subject of several studies. Special attention has been given to the protection of forests in southern Finland (Aapala 2001, Virkkala et al. 2000).

In 2000 the scientific working group on the 'Need for forest protection in southern Finland and Ostrobothnia' presented results on the state of forest

protection in Finland and the need for additional forest protection. All types of protected areas were included in the research, and studies were made by habitat types, site types, and age-classes. The proportion of protected forests and protected mires in vegetation zones and different parts of Finland was considered based on the National Forest Inventory. The report concluded that the existing network of protected areas in southern Finland and Ostrobothnia is not adequate for the protection of threatened forest species and forest species with declining populations whose natural distribution is concentrated in the hemi-boreal, south-boreal or mid-boreal zones (Metsien suojelun tarve Etelä-Suomessa ja Pohjanmaalla 2000).

Figure 5:

Nature conservation areas in Finland by vegetation zones. (Finnish Environment Institute, Finnish Forest Research Institute, The Finnish Statistical Yearbook of Forestry 2003).



3.3. Inventories and monitoring

The most extensive inventory in Finland is the National Forest Inventory (NFI) carried out by the Finnish Forest Research Institute. The first inventory was carried out in 1921–1924 and the latest (9th) inventory in 1996–2003. The NFI is a countrywide sample-based inventory covering all land-use classes and land of all owner groups. The grid of clustered sample plots systematically covers both the commercially managed forests and the protected forests areas. The tasks of the NFI are to produce national and regional information concerning forest resources, land use structure, forest health and the biological diversity of forests, and on forest carbon stocks and sinks. The results based on the field measurements are reliable for areas larger than 200,000 ha. The multi-source inventory method (MS-NFI) is used to estimate results for smaller areas. The MS-NFI method exploits NFI's field information, satellite image data, digital map data, and digital elevation models. Forest resource maps can be

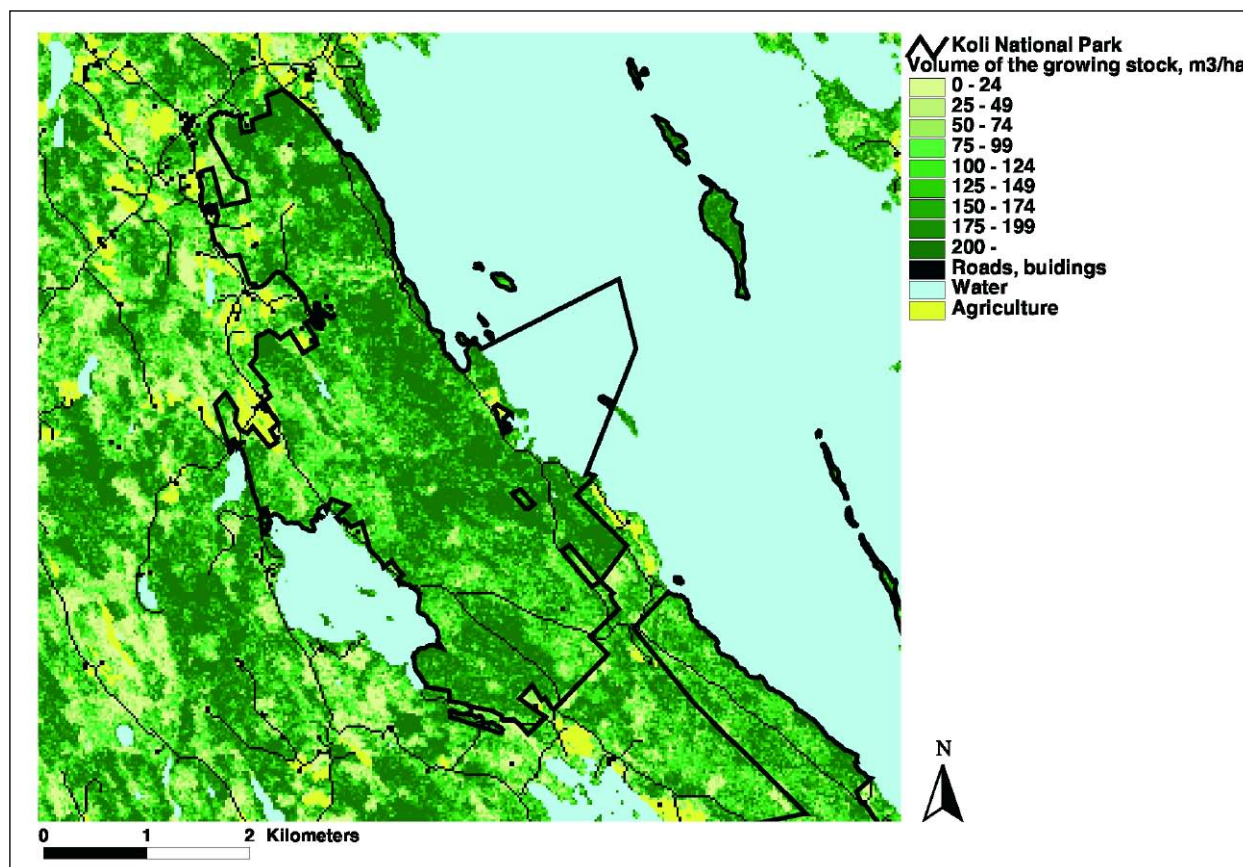
produced combining digital boundary data of a PFA with the MS-NFI data (Figure 6).

The 10th inventory was launched in 2004 and a new inventory system will be applied. One fifth of the sample plots in the entire country are measured each year. A quarter of the field plots are measured as permanent sample plots and the rest as temporary plots. Two kinds of information are gathered; stand level information and more detailed plot-level information on trees and soil. On the permanent plots the biological diversity is assessed measuring the amount of dead wood and assessing the important forest habitats.

The inventory method has changed over time but the continuation enables time series e.g. for area of land-uses, for volume of growing stock and increment, and for age-classes of forest areas. Time series and other results are presented as tables, graphs, and maps. In Figure 7 the maps illustrate the change in area of forests over 120 years old as a proportion of forest land area according to NFI3 (1951–1953) and NFI8 (1989–1994) (Tomppo 2001).

Figure 6:

Volume of growing stock by dominant tree species in the northern part of the Koli National Park. (© Finnish Forest Research Institute /NFI 2004. Map data: © National Land and Survey of Finland, permission 6/MYY04).



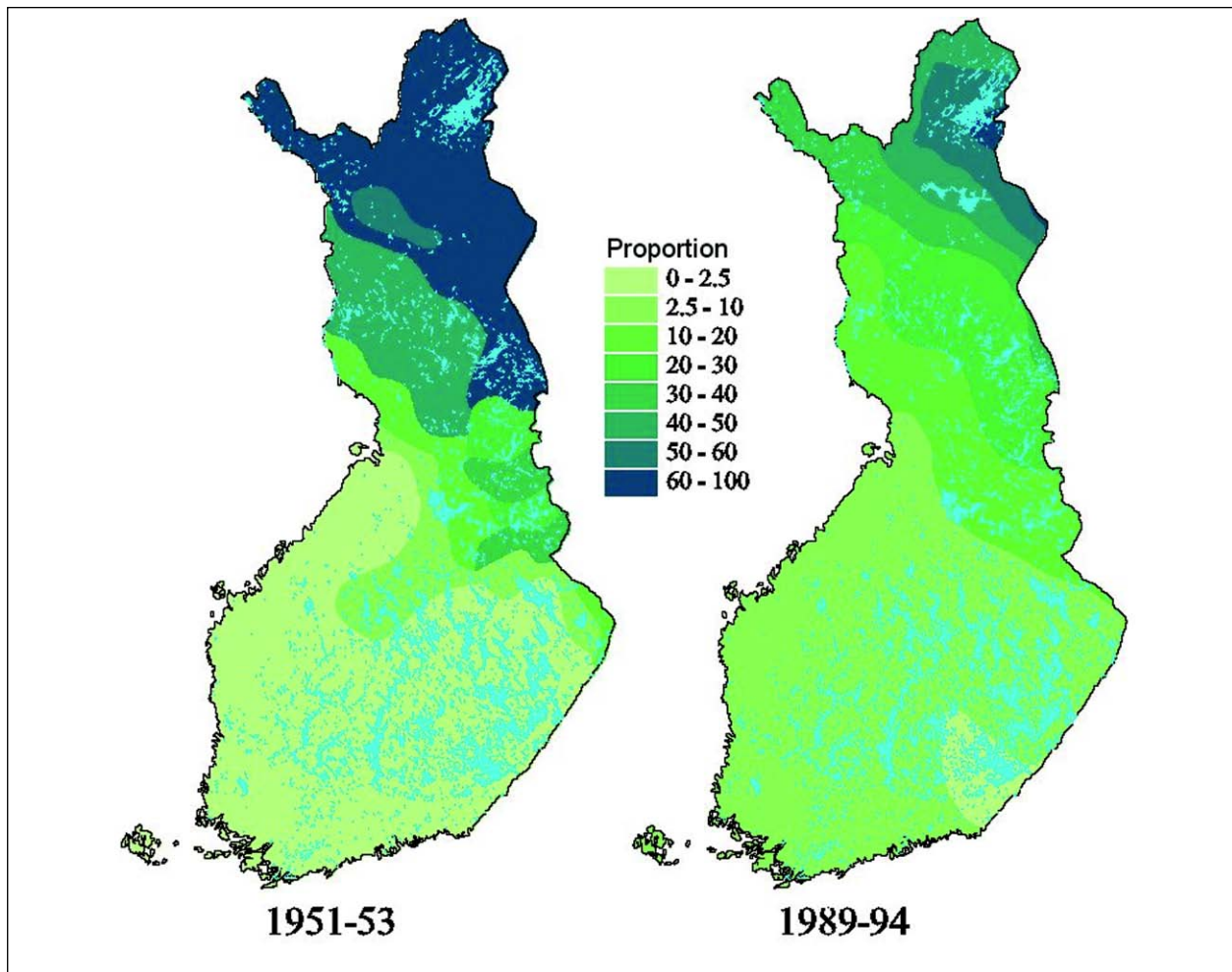


Figure 7:

Forests over 120 years old as a proportion of the forest land area in 1951–53 and in 1989–94. (Tomppo 2001.)

The Finnish Forest Research Institute also keeps up the network of 3,000 permanent sample plots. This network was established to monitor the forest condition in 1985–86. The measurements included traditional NFI-measurements but also vegetation mapping and the collection of soil and heavy metal samples. The network is re-measured in 1990 and 1995. The ICP Forests/Forest Focus Level I and Level II plots have been selected from this network of permanent sample plots.

The Forestry Centres carry out inventories on private forests at an estate or regional level. The plan is voluntary, but encouraged by state subsidies. A stand-based inventory method is used. Forest protection is taken into consideration mapping the important habitats. Endangered species and threatened habitats are included in the planning, only if the forest owner wishes it.

Metsähallitus has adopted Natural Resources Planning (NRP) and Landscape Ecological Planning (LEP). The NRP is a long term planning system covering both commercially managed and protected forests and it provides a framework for the LEP, which covers the commercially managed forests. Special sites, like important habitats mentioned in the Nature Conservation Act and the Forest Act, are mapped and the wider connection to the nature conservation network is taken into consideration.

The Finnish Environment Institute is starting the monitoring of natural habitats. In Finland there are 69 natural habitat types consistent with the Habitats Directive's Annex I, for which Finland have to report to the EU. The monitoring of these habitats is considered to be most urgent. Table 8 summaries information on inventories.

Table 8:

Inventories carried out in Finland, the responsible organisation and the assessment of protected forest areas.

Name of inventory	Description of what is recorded	Reference area (i.e. whole country, district etc., restricted biotopes etc.)	Treatment of PFAs	Spatial data (i.e. is it GIS linked?)	Based on sampling in a national grid	Are permanent plots monitored?	Responsible organisation	Date of first survey	Frequency of repeat survey	Are published maps of the data available?	Reference or web link
National Forest Inventory	Stand-level data on: - land use, soil, - structure of tree storeys - treatments - important habitats On the plots are measured: - living trees - dead trees	Country-wide	Yes	Yes	Yes	Yes	Finnish Forest Research Institute	1921-1924	8-10 years, since 2004 every year	Yes	http://www.metsa.fi/ohjelma/vmi/nfi.htm
Network of 3000 permanent sample plots	Stand-level information: - land use, soil, tree storeys - treatments Sample plots: tree measurements, dead wood measurements, vegetation survey Other: samples of soil and humus layer, samples for heavy metal research	Country-wide	Yes	Yes	Yes	Yes, all plots are permanent	Finnish Forest Research Institute	1985-1986	5 - 10 years, remeasured 1990-1995	Yes	
Landscape Ecological Planning	Site assessment in filed inventories of LEP: - land use - structural features of terrain and habitats - important habitats, threatened species - data on biodiversity indicator species - dead wood - data on living trees	State-owned lands managed by Metsähallitus	No	Yes	No	No	Metsähallitus	1996-2000	Continual updating	Yes	www.metsa.fi
Forest Management Planning	Stand-level inventory, assessment of - soil, structure of trees storeys - amount of growing stock - needed treatments - important habitats - dead wood	Private lands	No	Yes	No	No	Forestry Centres, other organisations		10 - 15 years	No	

3.4. Landscape, spatial and other considerations

Forest protection in Finland started with the protection of beautiful landscapes. The best examples of landscape-scale protection are the national parks, strict nature reserves and wilderness reserves. These areas are large enough to cover nationally important landscapes. The size varies greatly, but in most cases they are several thousands of hectares, up to 500,000 hectares. Water areas are included in many protected areas. Lakes, lakeside, seaside, and archipelagos are very typical Finnish landscapes and the protection of these landscape types is considered of great importance.

The Ministry of the Environment promotes the protection of valuable landscapes through the Nature Conservation Act and the Land Use and Building Act. One nationally significant landscape conservation area is designated under the Nature Conservation Act, but several areas are under planning. Before the Act in force the Finnish Government defined 156 nationally valuable landscapes in 1995, and 27 national landscapes were designated in 1992. In addition 1,772 nationally important cultural historical environments and three national urban parks have been designated. Metsähallitus carries out landscape-scale protection through the Landscape Ecological Planning system in state's forests (see chapter 3.1.3).

Formerly protected areas may be included into planning process of new PFAs. For example about 95 % of the Natura 2000 sites overlap with other PFA types. However double counting of areas is avoided using geographic information system, and in these cases areas are classed according to the stricter protection status.

Some conflicts have occurred when the Natura regulations define stricter restrictions than they otherwise would be. The selection of Natura 2000 sites has created a lot of criticism and some forest owners have taken the decision to court. Conflicts also have arisen when new areas have been selected for protection. In southern Finland the forest estates are quite small and mainly privately owned. Owners may feel that their situation is uncertain and that their opinion is not taken into consideration when decisions are made.

Legislation describes the procedure for the establishment of protected areas. Landowners are informed if protection areas are planned on their land. When it concerns a nature conservation area on private land, the decision is not made unless the

owner accepts the protection and the preservation regulations. Metsähallitus uses participatory planning in Landscape Ecological Planning. It aims for transparent and multi-directional co-operation with local residents and interest groups.

One of the objectives of the Finland's National Forest Programme 2010 (1999) is that ecological sustainability will be secured. This is formulated as follows:

“The aim of the National Forest Programme is to achieve and preserve a favourable standard of conservation of species and habitats in the forests by a combination of conservation areas and ecosystem management in the commercial forests.”

The Programme also proposes that

- the development of forest conservation in southern Finland will be strengthened by appointing a large committee of experts,
- conceptual definitions of forests and conservation will be brought into accord and conservation statistics will be developed,
- biodiversity in commercial forests should be secured.

3.5. Future developments

In 1996 a financial programme was agreed to complete all nature conservation programmes by 2007. Finance is allocated for implementation costs, land acquired by the state, and for compensation to private landowners. The implementation is on schedule. New nature conservation programmes are not being planned.

In October 2002 the Finnish Government decided that the National Forest Programme 2010 would be supplemented with an action plan that relates to biological diversity. In July 2002 the Finnish Government Commission for the Protection of Forests in Southern Finland proposed an action plan to improve the protection of biological diversity in forests. The Commission suggested that the network of protection areas should be improved in southern Finland by creating better ecological connections and by extending too small nature conservation areas. The restoration and management of the existing nature conservation areas was also seen as important. Areas that have been changed by human activities should be helped to revert to as close to their natural state as possible. The voluntary support

of landowners has been seen as an important means to increase the protected area. As the Commission suggested, pilot projects have started to test functioning of these new mechanisms for protection.

The Forest Biodiversity Programme for Southern Finland, called METSO, is a new kind of forest conservation programme. Its operation period is 2002–2007, and it is co-ordinated by the Ministry of Agriculture and Forestry and the Ministry of the Environment. Forest-owners, the forest industry, forest workers' associations and environmental organisations were involved in preparing the programme. The implementation is planned on a voluntary basis, through agreements under which forest-owners are compensated for any economic losses. An extensive forest biodiversity research programme (MOSSE) examines the ecological, economical and social impacts of conservation of biodiversity in forests.

The annual compilation of statistics on protected forest areas started in 2004. The Finnish Forest Research Institute is responsible for the collection of data from different organisations. The system to be developed should provide adequate and updated information on forest protection. Development of classification continues and it will be harmonised with international classifications.

The ongoing research project on Assessment of the Conservation Area Network (SAVA) assesses the existing preserved areas, while the Research Programme for Biodiversity studies habitat changes, the occurrence and habitat demands of species, and analyses factors that threaten biodiversity. Both projects involve co-operation between several research institutes and organisations; the Finnish Environment Institute is the co-ordinator. The results of these projects are used to evaluate the state of conservation areas and the state of nature conservation in Finland, and to develop measures for the protection and management of biodiversity.

4. References

- AAPALA, K. (Ed.), 2001: Soidensuojelualueverkon arviointi. Suomen ympäristö 490. Luonto ja luonnonvarat. Suomen ympäristökeskus. Helsinki. 285 p. [Assessment of the network of protected mires in Finland. The Finnish Environment 490. Nature and natural resources. The Finnish Environment Institute.]
- AARNIO, J., 1999: Kaskiviljelystä metsätöihin. Tutkimus Pielisjärven kruununmetsistä ja kruununmetsätöppareista vuoteen 1910. Joensuun yliopisto. Maantieteen laitoksen julkaisuja 4. Joensuu. 202 p.
- AIRAKSINEN, O. & KARTTUNEN, K., 2001: Natura 2000 - luontotyyppiopas. Ympäristöopas 46. 2. painos. Luonto ja luonnonvarat. Suomen ympäristökeskus Helsinki. 194 p. [Natura 2000 - habitats manual. Environment Guide 46. 2nd rev. ed. Nature and natural resources. The Finnish Environment Institute. Helsinki.]
- BÜCKING, W., AL, E., FALCONE, P., LATHAM, J. & SOHLBERG, S., 2000: Working Group 1: "Strict Forest Reserves in Europe and Forest Left to Free Development in Other Categories of Protection". Definitions and Terminology. Characteristics of Existing Reserves. In: COST Action E4. Forest reserves research network. European Commission. Directorate-General for Research. EUR 19550. pp. 39–134.
- ERÄMAAKOMITEAN MIETINTÖ, 1988: Komiteamietintö 1988:39. Valtion painatuskeskus. 238 p. + map.
- FINLAND'S NATIONAL FOREST PROGRAMME, 2010: Ministry of Agriculture and Forestry. 2/1999. 102p. Available in the Internet: <http://www.mmm.fi/kmo/english/2010en.pdf>
- FINNISH STATISTICAL YEARBOOK OF FORESTRY, 2003: SVT, agriculture, forestry and fishery 2003:45. Finnish Forest Research Institute. Helsinki. 388 p.
- FOREST ACT, 1093/1996: An unofficial translation of the Act: <http://www.finlex.fi/en/laki/kaannokset/>
- FOREST RESOURCES OF EUROPE, CIS, NORTH AMERICA, AUSTRALIA, JAPAN AND NEW ZEALAND, 2000: UNECE/FAO Contribution to the Global Forest Resource Assessment 2000. United Nations, New York and Geneva.
- HAKO, P., 1987: Musiikki, metsä ja ihminen. Summary: Music, forest and man. *Silva Fennica* 21(4):475–480.
- HEIKINHEIMO, O., 1915: Kaskiviljelyn vaikutus Suomen metsiin. Referat: Der Einfluss der Brandwirtschaft auf die Wälder Finnlandes. *Acta Forestalia Fennica* 4 (1915):1–264, 1–149 (app.).
- KAKKURI, E. & PIRI, E., 1996: Luonnonpuistoista luonnonsäästöiksi. Metsätutkimuslaitoksen tiedonantoja 616. 46 p.
- KANSALLISPUISTOKOMITEN MIETINTÖ, 1976: Komiteamietintö 1976:88.
- KARVONEN, L., 2000: Guidelines for Landscape Ecological Planning. Forestry publications of Metsähallitus 36. Metsähallitus. Vantaa. 46 p. + map.
- KORHONEN, K-M. & SAVONMÄKI, S., (Ed.). 1997: Metsätalouden ympäristöopas. Metsähallitus. Helsinki. 130 p.
- KUMPULAINEN, K., ITKONEN, P., JÄKÄLÄNIEMI, A., LEIVO, A., MERIRUOKO, A. & TIKKANEN, E., 1997: Pohjois-Suomen vanhojen metsien inventointimenetelmä. Metsähallituksen luonnonsuojelujulkaisuja. Sarja A 72. Metsähallitus. 107 p. [Abstract in English: Northern Finland's old forest inventory programme.]
- LAITAKARI, E., 1960: Metsähallinnon vuosisataistaival 1859–1959. *Silva Fennica* 107. Helsinki. 447 p. + 4 maps.

- LEHTOJEN SUOJELUTYÖRYHMÄN MIETINTÖ, 1988: Komiteamietintö B, 1988:16. Ympäristöministeriö & Valtion painatuskeskus. Helsinki. 279 p.
- LEIKOLA, M., 1988: "Esipuhe" In: von Berg, E.: Kertomus Suomenmaan metsistä 1859. Helsingin yliopiston metsänhoitotieteen laitoksen tiedonantoja No. 63.
- MERILUOTO, M. & SOININEN, T., 1998: Metsäluonnon arvokkaat elinympäristöt. Metsätalouden kehittämisskeskus Tapio. Metsälehti kustannus. Helsinki. 192 p.
- METSIEN SUOJELUN TARVE ETELÄ-SUOMESSA JA POHJANMAALLA, 2000: Etelä-Suomen ja Pohjanmaan metsien suojelun tarve -työryhmän mietintö. Suomen ympäristö 437. Luonto ja luonnonvarat. Edita. Helsinki. 284 p. [Working group on the need for forest protection in southern Finland and Ostrobothnia. The Finnish Environment 437. Nature and Natural Resources. Ministry of the Environment. Helsinki.]
- METSIEN SUOJELUN LUOKITTELUN JA TILASTOINNIN YHTENÄISTÄMISTYÖRYHMÄ, 2002: Työryhmämuistio MMM 2002:15. Maa- ja metsätalousministeriö. 71 p. [The working group for the harmonisation of the classification and statistics on forest protection].
- METSIEN SUOJELUPINTA-ALAT, 1999: Suojelupinta-alaprojektin raportti. Suomen ympäristö 300. Ympäristöministeriö, alueiden käytön osasto. Helsinki. 43 p.
- METSÄTALOUS JA YMPÄRISTÖ, METSÄTALOUDEN YMPÄRISTÖOHJELMATYÖRYHMÄN MIETINTÖ, 1994: 3. Osa I Nykytilanteen kuvaus. Osa II Ehdotus metsätalouden ympäristöohjelmaksi. Painatuskeskus. Helsinki. 101 p.
- NATURE CONSERVATION ACT 1096/1996: An unofficial translation of the Act:
<http://www.finlex.fi/en/laki/kaannokset/>
- NATURA 2000 -ALUEIDEN HOITO JA KÄYTTÖ, 2002: Työryhmän mietintö. Suomen ympäristö 597. Luonto ja luonnonvarat. Ympäristöministeriö. Helsinki. 88 p. [Management and use of Natura 2000 sites. 2002. Working group for the management and use of Natura 2000 sites. The Finnish Environment 597. Nature and Natural resources. Ministry of the Environment. Helsinki.]
- PARVIAINEN, J., PÄIVINEN, R., UUTTERA, J., & VARMOLA, M., 1999: National report. In: Parviainen, J., Little, D., Doyle, M., O'Sullivan, A., Kettunen, M., & Korhonen, M. (eds.) 1999. Research in Forest Reserves and Natural Forests in European Countries - Country Reports for the COST Action E4: Forest Reserves Research Network. EFI Proceedings No. 16. Europea Forest Institute. Joensuu. 304 p.
- THE PRINCIPLES OF PROTECTED AREA MANAGEMENT IN FINLAND, 2000: Guidelines on the aims, function and management of state-owned protected areas. Nature protection publications of the Finnish Forest and Park Service. Series B No. 54 (2nd ed.). Metsähallitus. Vantaa. 49 p.
- RASSI, P., ALANEN, A., KANERVA, T. & MANNERKOSKI, I. (Eds.), 2001: Suomen lajien uhanalaisuus 2000. Ympäristöministeriö & Suomen ympäristökeskus. Helsinki. Edita. 432 p.
- RAUTIAINEN, V-P., RYTTÄRI, T., KURTTO, A. & VÄRE, H. (Eds.), 2002: Putkilokasvien uhanalaisuuden arviointi. Suomen ympäristö 593. Luonto ja luonnonvarat. Suomen ympäristö keskus. 194 p. [Summary: Threat assessment of vascular plants in Finland - the species documentation. The Finnish Environment 593. Nature and natural resources. Summary in English.]
- REITALA, A., 1987: Metsä suomalaisessa kuvataiteessa. *Silva Fennica* 21(4):436–444. [Summary: Forests in Finnish art.]
- REUNALA, A., 1987: Metsä arkkityyppinä. *Silva Fennica* 21(4):415–426. [Summary: Forests as an archetype.]
- ROIKO-JOKELA, H. (Ed.), 1997: Luonnon ehdoilla vai ihmisen arvoilla? Polemiikka metsien suojelusta 1850-luvulta 1990-luvulle. Atena Kustannus. Jyväskylä. 294 p.
- THE SAMI IN FINLAND, 1999: Publications by Sami Parliament. Lapin painotuote Oy. Kemijärvi. 12 p.
- TASANEN, T., 2004: Läksi puut ylenemään. Metsien hoidon historia Suomessa keskiajalta metsäteollisuuden läpimurtoon 1870-luvulla. Metsäntutkimuslaitoksen tiedonantoja 920. Metsäntutkimuslaitos. 443 p. [Summary: The History of Silviculture in Finland from the Mediaeval to the Breakthrough of Forest Industry in 1870s.]
- TOMPPU, E., 2001: Kasvupaikat ja puusto. pp. 62–83. In: Reinikainen, A., Mäkipää, R., Vanha-Majamaa, I. & Hotanen, J-P. (Eds.) Kasvit muuttuvassa metsäluonnonssa. Kustannusosakeyhtiö Tammi. Helsinki. 2nd ed. 384 p. [Summary: Changes in the frequency and abundance of forest and mire plants in Finland since 1950.]
- VANHOJEN METSIEN SUOJELU POHJOIS-SUOMESSA, 1996: Vanhojen metsien suojelutyöryhmän osamietintö III. Suomen ympäristö 30. Luonto ja luonnonvarat. Suomen ympäristökeskus. Helsinki. 108 p. [Summary: Protection of old-growth forests in northern Finland; report III by the working group for protection of old-growth forests.]
- VILKUNA, K. & MÄKINEN, E. ISIEN TYÖ, 1988: 10. painos. Otava. Keuruu. 359 p.
- VIRKKALA, R., KORHONEN, K. T., HAAPANEN, R., & AAPALA, K., 2000: Metsien ja soiden suojelutilanne metsä- ja suokasvillisuusvyöhykkeittäin valtakunnan metsien 8. inventoinnin perusteella. Suomen ympäristö 395. Suomen ympäristökeskus. Helsinki. 49 p. [Protected forests and mires in forest and mire vegetation zones in Finland based on the 8th National Forest Inventory. Finnish Environment Institute & Forest Research Institute. Nature and natural resources. The Finnish Environment 395.]

authors: Tarja Tuomainen
The Finnish Forest Research Institute
Vantaa Research Centre, Helsinki Unit
Unioninkatu 40 A, 00170 Helsinki
E-Mail: Tarja.Tuomainen@metla.fi

Jari Parviainen
The Finnish Forest Research Institute
Joensuu Research Centre
PL 68, 80101 Joensuu
E-Mail: Jari.Parviainen@metla.fi