



## SUMMARY

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### I FOREST RESOURCES

The forests of Finland form part of the boreal coniferous forest zone. Finland, situated between 60°N and 70°N, is about 1 100 km long. In the southern part of the country, the conditions are ideal for coniferous forests. Towards the north, the climate becomes cooler and more humid. Climatic variation is the main cause behind forest increment significantly varying in different parts of the country (e.g. Table 1.28).

The Finnish Forest Research Institute (Metla) has carried out eight nation-wide forest inventories (NFIs). The first NFI was conducted in 1921–24. The 8th and most recent NFI took place during 1986–94. The field work covered two to three administrative areas (forestry board regions, and since 1996 forestry centre regions) each year, and it took nine years to cover the whole of Finland. Due to the decisive role of non-industrial private forestry, these regions are used in the presentation of the inventory results.

The 9th NFI was launched in 1996. The sampling used is based on systematically distributed clusters. In southern Finland, a cluster consists of 14 temporary sample plots placed at intervals of 250 metres. Angle-count sampling is applied on all the plots (Fig. 1.1).

Despite the 12.8% reduction in the country's forested area in 1944, in the aftermath of World War II, Finland's wood resources are currently more plentiful than in the pre-war years (Fig. 1.2). According to the combined results of the 8th and 9th NFIs, the total growing stock volume at the present time is 2 000 mill. m<sup>3</sup> and the annual increment is 79.4 mill. m<sup>3</sup> for an overall forested area of 23.0 mill. ha. In recent years, the annual volume increment has exceeded drain by about 10 mill. m<sup>3</sup> (Fig. 1.3).

The intensive utilisation of the forest resources in Finland has caused considerable changes in forest structure (Fig. 1.4). The high demand for pulpwood has stimulated silvicultural thinnings. The tree species structure of the growing stock has remained stable for a considerable period of time. The proportion of pine is, however, slowly increasing. According to the combined results of the 8th and 9th NFIs, the tree species distribution is as follows: Scots pine (*Pinus sylvestris*) 46.9% of the total volume, Norway spruce (*Picea abies*) 34.3%, and broadleaved species (mostly birch, *Betula sp.*) 18.8%. In terms of area, pine is the dominant species on 64.7% of all forest land. A large proportion of the pine stands are young. Native species are used almost exclusively when artificial regeneration is employed.

Of the total land area of Finland (30.5 mill. ha), 26.3 mill. ha are forestry land. Forestry land is grouped into three classes according to site productivity:

- *forest land*, where the potential annual increment is at least 1.0 m<sup>3</sup>/ha.
- *scrub land (unproductive forest land)* is mainly exposed bedrock and scree or mires, where the potential annual increment is below 1.0 m<sup>3</sup>/ha but over 0.1 m<sup>3</sup> ha.
- *waste land*, unless naturally treeless, produces less than 0.1 m<sup>3</sup>/ha/year.

The area estimates from the combined 8th and 9th NFIs are as follows:

forest land	20.1 mill. ha
scrub land	2.9 mill. ha
waste land	3.1 mill. ha

Forest roads, timber depots, etc., occupy approx. 0.2 mill. ha of forestry land. These figures include nature conservation areas amounting to 2.7 mill. ha, which are situated almost entirely in northern Finland (Table 1.8). Almost a half of the nature conservation areas consist of waste land (48%). Of the total forested area of 23.0 mill. ha, 1.4 mill. ha (6.1%) are nature conservation areas on which all forestry activities are prohibited.

The new international definition of forest land, as applied in the Global Forest Resources Assessment 2000, sets a canopy cover requirement of 10% as the threshold between forest land and other lands. This means that most of the scrub land in Finland will enter the internationally defined concept of forest land.

### 2 FOREST HEALTH AND BIODIVERSITY

Various factors combine to affect the condition of forests, e.g. climate and soil conditions, age and quality of forest, forest treatment, forest damage, and air-borne pollutants. Tree vitality is being widely studied by estimating defoliation which reflects the combined effect of several stress factors. Trees are regarded to be afflicted by defoliation if their relative foliage loss exceeds 25%. In 2000, it was estimated that 3% of pines, 26% of spruces, and 10% of broad-leaved trees were afflicted by defoliation (Table 2.1). Defoliation in Finland is modest in comparison to that observed elsewhere in Europe (Figure 2.4).

In the course of the two most recent NFIs (1992–2000), it was observed that 17% of the forest lands in Southern Finland were affected by damage, which had reduced the silvicultural quality of the stands (Table 2.2). In Northern Finland, the corresponding figure was higher, 32%. The most frequent damaging agents were fungi and weather factors (Table 2.4).

Maintaining the biodiversity of forest is one of the main goals of the Forest Act. Nature conservation areas form the basis for maintaining natural environments. There are 4.5 mill. ha of land with restrictions on wood production. Strictly protected forests (forest land and scrub land) account for 1.5 mill. ha of this area. Most of these set-aside areas are situated in the northern part of the country (Table 2.7–2.8 and Figure 2.5).

In 2000, threatened fauna and flora were estimated to amount to 1 505 species from the total of some 43 000 species. Of the threatened species, 249 are critically endangered, 452 are endangered, and 804

are vulnerable. Forty-two per cent of all the threatened species inhabit forests and mires (Table 2.11).

### 3 SILVICULTURE

The costs of silvicultural and forest improvement works totalled FIM 1 288 mill. in 2000, i.e. an increase of 5% over the previous year (Figure 3.10 and Table 3.20–3.22). The major part (81%) of the costs were formed in non-industrial private forests, i.e. FIM 1 039 mill. These costs were partly covered by State subsidies. In 2000, State grants and loans totalled FIM 291 mill., leaving FIM 749 mill. to be financed by the private forest owners themselves (Figure 3.11, Tables 3.23–3.25).

The total area subjected to timber fellings in 2000 was 610 000 hectares, which is 16% more than in the previous year (Figure 3.3, Tables 3.3–3.4). The area of thinnings was 328 000 hectares and that of clear fellings 156 000 hectares. In 2000, the area seeded and planted (117 000 hectares) increased by 2% compared to 1999 (Figures 3.4–3.5, Tables 3.7–3.9). Tending of seedling stands and improving young stands was carried out on 223 000 hectares; an increase over the previous year (Figure 3.6, Tables 3.11–3.12). Forest drainage and forest road construction both decreased. The area covered by ditch cleaning and supplementary ditching was 74 000 hectares (Figure 3.8, Tables 3.16–3.17). Nearly 1 400 kilometres of new forest roads were built and 1 400 kilometres were subject to basic improvement works (Figure 3.9, Tables 3.18–3.19).

### 4 ROUNDWOOD MARKETS

Chapter 4 provides a detailed overview of the activities in the roundwood markets. Two subjects are of special interest: roundwood prices (Tables 4.4–4.8) and production (Tables 4.9–4.13). Most of the information refers to 2000 and the first half of 2001. The statistics are generated, mainly on a monthly basis, by Metla.

The year 2000 was again a record year for the Finnish forest industries. This resulted in the roundwood trade being very active throughout the year. The quiet season in the beginning of the year earned itself a place in history in that the trading partners no longer had to wait any more for a common agreement on prices. In 2000, forest industries purchased 38,5 million m<sup>3</sup> of roundwood from private forests.

This was 12% more than in 1999. In 2000, the stumpage price of spruce logs was, on average, 10% higher than in previous year. The price of pine logs rose by 4% and the price of birch logs by 1%. The stumpage price of spruce pulpwood was, on average, 2% higher than in 1999. The stumpage price of pine pulpwood remained at the 1999 level, and the price of birch pulpwood dropped by 1%. The delivery prices followed the stumpage price trend.

In 2000, the total commercial roundwood fellings amounted to 55.9 mill. m<sup>3</sup>. Compared to the preceding year, the amount was 0.6 mill. m<sup>3</sup> higher. Non-industrial, private forests are the main roundwood source for Finland's forest industries, accounting for 48 mill. m<sup>3</sup>, or 86%, of the total roundwood fellings. Timber felling from the forest industries' own forests totalled 3.3 mill. m<sup>3</sup> and felling from state forests for 4.6 mill. m<sup>3</sup>.

### 5 HARVESTING AND TRANSPORTATION OF ROUNDWOOD

Chapter 5 consists of a report on the forestry machines used in wood harvesting and data on the volumes and costs incurred in the harvesting and transportation of roundwood.

Since the mid-1980s, mechanisation in forestry has dramatically increased. The share of mechanised fellings in the standing sales of commercial roundwood amounted to 95% in 2000 (Fig 5.3). The degree of mechanisation in regeneration fellings was as high as 97% and in thinnings 89%.

Intense mechanisation has helped the forest industries to reduce their unit costs in harvesting. In 2000, the unit costs of harvesting in standing sales amounted FIM 47 per m<sup>3</sup>. The share of standing sales was about 84% of commercial roundwood production. The unit costs of harvesting were much higher in delivery sales; they totalled FIM 79 per m<sup>3</sup> (Table 5.0). The degree of mechanisation in delivery sales is much lower than in standing sales.

In Finland, road transportation by lorry is the dominant method used in the long-distance transportation of roundwood; 80% of domestic roundwood was transported by road to mill in 2000. The average distance from stand to mill was 101 km. In the rail transportation sequence, the average distance was longer, 294 km, and in water transportation sequence it was 255 km. The share of road transportation has been increasing for quite a long time, and at the same

time the share of water transportation has decreased. The unit costs of long-distance transportation were FIM 34 per m<sup>3</sup> on the average (Table 5.3).

### 6 MULTIPLE-USE FORESTRY

Multiple-use forestry includes the products and services in addition to wood provided by forests. In this chapter, the multiple-use of forests is divided into the following sub-categories: recreation, collecting of wild berries, edible mushrooms and lichen, hunting, and reindeer husbandry. Finally, the chapter provides information on peat resources and peat production.

Outdoor recreation is an integral part of the Finnish way of life. Annually, 97% of Finnish people participate in outdoor activities. The areas used for outdoor recreation are usually situated near the home (Table 6.2). Recreation activities mainly take place on private lands (applying the age-old public right of access) or in municipal areas (Table 6.1).

The amount of commercial wild berries and edible commercial mushrooms collected from the forests in 2000 was 6.8 mill. kg and their value totalled FIM 53 mill. (Tables 6.2–6.3). The value of lichen exports amounted to FIM 8.3 mill. (Table 6.4).

The overall value of the catch in hunting was estimated to be FIM 349 mill. in 2000 (Table 6.5–6.6). The foremost game species in Finland is the moose (Table 6.7). Reindeer husbandry is practised in Northern Finland. The winter herd 2000/2001 was reconed to amount to 186 000 (Table 6.9). Its annual slaughter income is approx. FIM 67 mill.

### 7 FOREST SECTOR'S LABOUR FORCE

In 2000, forestry and forest industries employed 96 000 people. This amounts to approximately 4% of the total employed workforce in Finland (Table 7.2). Two-thirds of the employees worked for the forest industries (Table 7.7). The share of the Finnish forest sector of the total value of exports from Finland in 2000 was 27% (Table 10.9) and its share of the gross domestic product was over 8% (Table 11.6).

The unemployment rate in the forest sector in 2000 decreased slightly compared to the preceding year (Table 7.8). In 2000, the overall unemployment rate in the forest industries was approximately 5%, significantly less than the average unemployment rate for all branches of industry (10%). Despite the decreased unemployment in forestry since 1999

(approximately 4 percentage units), the unemployment rate in forestry was still higher (11%) than the average unemployment rate for all branches of industry.

The labour force in forestry has decreased by more than 70% since the beginning of the 1970s (Table 7.2). This declining trend is mainly due to mechanisation in wood harvesting (see Figure 5.3 in Chapter 5). In the forest industries, too, total employment has fallen (from 120 000 in 1980 to 72 000 in 2000) due to increased automation. This has led to physical work being focused more on control activities.

In 2000, the average daily earnings of forest workers in motor-manual logging amounted to FIM 535 (piece rate, incl. tool costs). The corresponding earnings in silvicultural works were FIM 410 (piece rate, excl. tool costs). There was no significant increase in the average daily earnings compared to the preceding year (Table 7.9). The average earnings per hour in the wood-products industries (FIM 68.20) and in the pulp and paper industries (FIM 85.10) increased by approximately 5% compared to the preceding year.

Statistics on the forest sector's labour force are primarily based on the labour-force survey compiled by Statistics Finland (Tables 7.1–7.4 and 7.6–7.8). Among other things, the survey provides information on employment, working hours, unemployment, and labour input by branch of industry. Statistics Finland is mainly also responsible for collecting and compiling data on salaries (Tables 7.9–7.10), the index of real earnings (Table 7.11), labour disputes (Table 7.12), accidents (Table 7.13), and education and training (Tables 7.14–7.15) in the forest sector.

### 8 WOOD CONSUMPTION

The total wood consumption in 2000 in Finland exceeded 70 mill. m<sup>3</sup>, including imports and exports, for the fourth year in succession. Industrial wood consumption amounted to 70.8 mill. m<sup>3</sup>. In 2000, imported roundwood accounted for 18% of the industrial wood consumption (Table 8.2). Recycled fibre accounted for 5% of the fibre supply for the paper and paperboard industries.

For decades, total wood consumption in Finland has remained rather stable despite considerable increases in wood pulp production (Fig. 8.1). This has been mainly due to numerous structural changes, such as diminished non-industrial use of wood, reduction in roundwood exports, increased use of in-

dustrial wood residues, and the increased share of mechanical pulping and of products containing less wood than before. Industrial wood consumption is showing a strong upward trend, and since the mid-1990s the total wood consumption has rapidly reached new levels.

### 9 FOREST INDUSTRIES

In 2000, a record of 13.4 million cubic metres of sawn goods were produced. Industrial sawmills worked at 98% capacity. New plywood capacity has been built, and plywood production is increasing. The paper industries had record production in 2000, with a 4% rise over the previous year (Table 9.4). The Finnish paper industries are among the major global producers of graphic papers. In the first half of 2001, the wood-products industries produced 0–3% more, and the paper industries 2% less than in the corresponding period in 2000. Domestic investments by the forest industries totalled FIM 7.1 billion, i.e. 7.0% of their annual turnover (Table 9.8).

The domestic demand for sawn goods has been increasing in recent years. As regards domestic paper consumption, more realistic estimates have been made by the Finnish Forest Industries Federation. The calculation method starts from domestic deliveries of paper and takes into account net exports of printed products, wrappings for exported products, and other indirect exports (Table 9.6).

### 10 FOREIGN TRADE BY FOREST INDUSTRIES

In 2000, Finnish forest industries imported 12.9 mill. m<sup>3</sup> roundwood and wood residues (Table 10.2). Nearly all imported wood is classified as roundwood; only 3% of the volume consists of wood residues. In 2000, the imports of wood were only 2% less than in the record year 1999 (Table 10.6).

During the first half of 2001, the amount of wood imported to Finland reached new record levels and it looks like the old record will be beaten. The imports during the first six months totalled 8 mill. m<sup>3</sup>. This is even more than Finland imported annually in the early 1990s.

Over 80% of imported wood came from Russia, 11% from Estonia, and 3% from Latvia (Table 10.4). Approximately 50% of imported roundwood is comprised of birch (6.4 mill. m<sup>3</sup>), and 97% of this was

pulpwood. The imports of softwood totalled 5.7 mill. m<sup>3</sup>, and half of it was pulpwood.

Finland is a net importer of wood. The amount of exported wood has usually been less than 1 mill. m<sup>3</sup>. In 2000, it totalled 0.9 mill. m<sup>3</sup> (Table 10.1).

The exports of forest industry products have increased continuously in the past few years. Records have been exceeded every year since 1997. In 2000, the value of exports of forest-industry products amounted again to an all-time high of FIM 79 billion. The total value of exports of all goods from Finland was FIM 294 billion, and of this the proportion of forest-industry products was 27% (Table 10.11). The foremost product group was paper, with slightly over 50% of forest industries' export incomes being earned from paper (Table 10.8).

Western Europe constitutes the major market region for Finnish forest-industry products. The most important customers were Germany (19% of total value of forest-based products), the United Kingdom (15%), France (7%), and the United States (6%) (Table 10.7).

Imports of forest-industry products are quite insignificant, and their value in 2000 amounted only to FIM 6 billion (Table 10.14).

The data on foreign trade in Finland is collected by the National Board of Customs. The basic data are classified according to the Combined Nomenclature (CN), which is the classification system for goods traded within the European union. All official foreign trade statistics in Finland are aggregated from this data.

### 11 FOREST SECTOR IN FINLAND'S NATIONAL ECONOMY

Throughout the year 2000, the Finnish economy was characterised by powerful economic growth. Finland's gross domestic product (GDP) at market prices amounted to FIM 783 billion, indicating an increase of 6% over the previous year. The forest sector (i.e. forestry and forest industries combined) accounted for 8% of the total GDP. Within the sector, the pulp and paper industries played the dominant role, producing more than 80% of the total value added in the Finnish forest industries (Tables 11.4–11.6). During the period 1975–2000, multi-factor productivity in the forest industries increased at an average rate of 5% per year, while the annual average for all branches of the economy was less than 2% (Table 11.8).

In non-industrial private forestry, the year 2000 was a peak season. Primarily due to the rise in both the volumes sold and prices of spruce logs, gross stumpage earnings in private forests rose by 6%, to FIM 9.8 billion. As expenses remained stable, the net earnings per hectare increased by about FIM 40 (Tables 11.2 and 11.14).

The data in Chapter 11 are mainly based on Finnish national accounts compiled by Statistics Finland. The accounts have been revised to fully comply with the European System of Accounts, as applied in the European Union.

### 12 INTERNATIONAL FOREST STATISTICS

The latest results of the Global Forest Resources Assessment (*FRA-2000*) were published in 2001 by FAO (Tables 12.1 and 12.2). According to the data, there are about 3.9 billion hectares of forest in the world, which makes up about one-third of the total land area. The total volume of the global growing stock is 386 billion cubic meters. Countries with the largest forest cover are, in order of greatness in this respect: Russia, Brazil, Canada, the United States, and China. In the 1990s, the forest area of the world has diminished by about 9 mill. hectares (0.2%) per year, and this loss has mainly taken place in Africa and Latin America.

In 1999, the world's roundwood production was approximately 3.3 billion m<sup>3</sup> (Table 12.3, Fig. 12.2). The largest countrywise volume, 0.5 billion m<sup>3</sup>, was produced in the United States. Globally, more than a half of the roundwood produced was fuelwood, the largest producers being Africa, Asia, and Latin America.

The world's production of paper and paperboard continued to grow (Tables 12.5–12.6, Fig. 12.3). According to the FAO, paper and paperboard produced in 1999 amounted to 317 mill. metric tonnes, which was approximately 6% more than in the previous year. In 2000, the production is expected to exceed 320 mill. metric tonnes.

According to the data for 1999, Finland ranks 3rd in the world as regards the value of exports of forest-related products, representing thus approximately 8% of the world total (Table 12.13). The two biggest exporters were Canada and the United States. Finland's position as a significant paper and paperboard exporter is based on the country's leading position as

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an exporter of printing and writing paper, its share being 22% (Table 12.11).

The comparison by country of roundwood price data as presented in Tables 12.16–12.22 should be viewed with caution. Countries tend to differ as regards trade practices, measuring units, assortments, tree species, and measurement and quality requirements. Therefore, the price data presented by country should be used only to monitor the internal price development of each country.

The aid grants for Finnish forest-sector-related development projects carried out in different countries totalled FIM 106 mill. in 2000, approximately 5% less than in the previous year (Table 12.23). Their

share was about 4% of the total Finnish development-aid spending.

The data on global forest resources assessment is compiled jointly by the FAO/ECE Secretariat, Geneva (Forest resources of industrialized temperate/boreal countries, acronym *TBFRA-2000*) and FAO, Rome (Tropical countries and global summary). The tables referring to the production of and foreign trade in roundwood and forest-industry products originate from FAO's FAOSTAT forestry on-line database (Tables 12.3–12.5 and 12.7–12.15), which includes country-specific forest statistics information since 1961.