SUMMARY

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1 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 (see p. 29–30). Climatic variation largely causes forest increment to vary significantly 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 inventory was in 1921–24. The 8th and most recent inventory took place during 1986–94. The field work covered two to three administrative areas (forestry board districts, and since 1996 forestry centres) each year, and it took nine years to cover the whole of Finland. Due to the decisive role of private non-industrial forestry, these regional areas are employed in the presentation of the inventory results.

The 9th National Forest Inventory began 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).

In spite of the 12.8% reduction in forested area in 1944 following 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 inventories, the total growing stock volume at the time was 1 960 mill. m³ and the annual increment 78.3 mill. m³ over an overall forested area of 22.9 mill. ha. In recent years, the annual volume increment has exceeded drain by about 10 mill. m³ (Fig. 1.3).

The intensive utilisation of the forest resources in Finland has caused considerable changes in the 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 inventories, the tree species distribution is as follows: Scots pine (Pinus sylvestris) 46.5% of the total volume, Norway spruce (Picea abies) 35.1%, and broadleaved species (mostly birch, Betula sp.) 18.3%. In terms of area, pine is the dominant species on 64.9% 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), 26.2 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 m3/ha.
- *scrub land* (unproductive forest land) is mainly exposed bedrock and scree or mires, where the potential annual increment is below 1.0 m³/ha but over 0.1 m³/ha.
- *waste land*, unless naturally treeless, produces less than 0.1 m³/ha/year.

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

forest land	20.0 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). Most of the nature conservation areas consist of waste land (55%). Of the total forested area of 22.9 mill. ha, 1.2 mill. ha (5.1%) 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 10% canopy cover requirement 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. The vitality of trees 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 1999, it was estimated that 3% of pines, 26% of spruces and 9% of broadleaved trees were afflicted by defoliation (Table 2.1). Defoliation in Finland is modest in comparison to that observed elsewhere in Europe (Figure 2.5).

In the course of the two most recent NFIs (1987–99), it was observed that 16% of the forest lands in Southern Finland was affected by damage which reduced the silvicultural quality of stands (Table 2.2). In Northern Finland, the corresponding figure was higher, 31%. The most frequent damaging agents were fungi and weather factors (Table 2.4).

Maintaining the biodiversity of forest is one 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 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 and Figure 2.6).

In 2000, the 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 total area of timber fellings in 1999 was 525 000 hectares, which is 4% more than in the previous year (Figure 3.3, Tables 3.3–3.4). The area of thinnings was 292 000 hectares and that of clear fellings 130 000 hectares. In 1999, the area seeded and planted (115 000 hectares) increased by 3% compared to 1998 (Figures 3.4–3.5, Tables 3.7–3.9). Tending seedling stands and improving young stands was carried out on 210 000 hectares; an increase over the previous year (Figure 3.6, Tables 3.11–3.12). Forest drainage and forest road construction both increased. The area of ditch cleaning and supplementary ditching was 81 000 hectares (Figure 3.8, Tables 3.16–3.17). Nearly 1 900 kilometres new forest roads were built and 1 400 kilometres were subject to basic improvement works (Figure 3.9, Tables 3.18–3.19).

The costs of silvicultural and forest improvement works totalled FIM 1 221 mill. in 1999, i.e. an increase of 5% over the previous year (Figure 3.10 and Table 3.20–3.21). The proportions of different ownership categories in 1999 were as follows: private non-industrial 82%, State 12% and forest industries 6%. In private non-industrial forests, costs are partly covered by State subsidies. In 1999, State grants and loans totalled FIM 275 mill., leaving FIM 726 mill. to be financed by the private forest owners (Figure 3.11, Tables 3.22–3.24).

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 1999 and the first half of 2000. The statistics are generated, mainly on a monthly basis, by Metla.

In 1999, the roundwood markets were trading without any common agreements on roundwood prices. In Spring, the forest industries and roundwood sellers failed to negotiate a common concept of how prices should develop during 1999. Later in the year, the Finnish Competition Authority announced their rejection of collaboration in the roundwood markets.

The roundwood markets were very active between January and March. After that, due to the lack of the price agreement, followed a quiet period which continued until September. There was active trading during the last quarter of the year. In 1999, forest industries purchased 34,5 million m³ of roundwood from private forests. This was 9 % less than in 1998. In 1999, the stumpage prices of pine and birch logs were, on average, 1 % lower than in 1998. The price of spruce logs rose 5%. The stumpage prices of pine and birch pulpwood were, on average, 6–7% lower than in 1998. The stumpage price of spruce pulpwood remained unchanged from the previous year. The delivery prices followed stumpage price trend.

In 1999, the total commercial roundwood fellings amounted to 55,3 million m³. This was narrowly a new record. Compared to the preceding year, the amount was only 0,2 million m³ higher. Non-industrial, private forests are the main roundwood source for Finland's forest industries, accounting for 86 % of the total roundwood fellings in 1999. Timber felling from the forest industries' own forests totalled 3.1 million m³ and felling from state forests 4.4 million m³.

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. The information presented refers mainly to 1999. The statistics of removals and flows of commercial roundwood from felling districts to utilisation districts are included. This data refers to year 1997.

Since the mid-1980s, the mechanisation of forestry has increased dramatically. The mechanised share of commercial roundwood fellings (both standing and delivery sales included) was estimated to be 86%. The mechanised share of felling in the standing sales of wood amounted to 94% in 1999 (Fig. 5.3). In 1999, there were, on average, 1 430 harvesters in use in Finnish forests (Table 5.1).

Road transportation by lorry is the dominant method used in the long-distance transportation of roundwood (accounting for 64% of the total transport volume in 1999). The share of water transportation has decreased since the 1970s (Table 5.4). The increased proportion of mechanised felling has helped the forest industries to reduce their harvesting costs (Table 5.6); and the same trend also applies to the long-distance transportation of roundwood.

6 Multiple-use forestry

Multiple-use forestry includes the products and services provided by forests in addition to wood. In this chapter, the multiple-use of forests is divided into 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.

There were approximately 8 000 special outdoor recreation sites in Finland in 2000 (Table 6.1). Most of them were local and maintained by municipalities. The amount of commercial wild berries and edible commercial mushrooms collected from the forests in 1999 was 5.9 mill. kg and their value totalled FIM 39 mill. (Tables 6.2–6.3). Lichen exports amounted to FIM 8.3 mill. (Table 6.4).

The value of hunting was estimated at FIM 301 mill. in 1999 (Table 6.5–6.6). The foremost game species is the moose (Table 6.7). Reindeer husbandry is practised in Northern Finland and its annual economic value for the region is approximately FIM 200 mill. The winter herd amounts to approx. 203 000 (Table 6.9).

7 Forest sector's labour force

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, unemployment and labour input by branch of industry. The methods applied in the labour-force survey were renewed in 1997–98 to meet the new definitions of ILO and the EU. Thus, the data presented in the corresponding tables have been updated since 1989 to meet the new definitions. Statistics Finland is mainly also responsible for collecting and compiling data on index of real earnings (Table 7.9), salaries (Tables 7.10–7.11), labour disputes (Table 7.12), accidents (Table 7.13) and education (Tables 7.14–7.15) in the forest sector.

In 1999, 95 000 people were employed by forestry and forest industries. This amounts to approximately 4% of the total number of people employed in Finland (Table 7.2, Figure 7.1). Two thirds, or 72 000, of the employees worked for the forest industries (Table 7.7). The share of Finnish forest sector of the total value of export in 1999 was 29 % (Table 10.13) and of gross domestic product less than 8% (Table 11.6).

The unemployment rate in the forest sector in 1999 decreased slightly compared to the preceding year. In 1999, the overall unemployment rate in the forest industries was approximately 6%, which was significantly less than the average unemployment rate for all branches of industry. The unemployment rate in forestry was, however, larger: approximately 15% of the total labour force of the branch (Table 7.8).

The labour force in forestry has decreased by more than 60% since the beginning of the 1980s (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, total employment has also fallen (from 120 000 in 1980 to 72 000 in 1999) due to increased automation, which has led to physical work being focused more on control activities.

In 1999, the average annual earnings of forest workers amounted to more than FIM 115 000, being thus nominally on the same level than in the preceding year (Table 7.10). There is no significant increase in the average annual earnings in the wood-products industries, FIM 136 000, compared to 1998 (Table 7.11). In the pulp and paper industries, the average annual earnings were FIM 200 000, a rise of approximately 4% compared to the preceding year.

8 Wood consumption

The total wood consumption in Finland exceeded 70 mill. m³, including imports and exports, for the third year in succession in 1999. Industrial wood consumption amounted to 68.8 mill. m³. In 1999, imported roundwood accounted for 17% of 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 remained rather stable despite considerable increases in wood pulp production (Fig. 8.1). This was mainly due to numerous structural changes, such as diminished non-industrial use of wood, reduction in roundwood exports, increased use of industrial wood residues, and the increased share of mechanical pulping and less wood-containing products. 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 1999, a record of 12.8 million cubic metres of sawn goods were produced. Industrial sawmills worked at 96% capacity. New plywood capacity has been built, and plywood production is increasing. The paper industries had record production in 1999, with a 2% 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 2000, the wood-products industries produced

7–10% more, and the paper industries 5–6% more than in the corresponding period in 1999. Domestic investments by the forest industries totalled FIM 4.5 billion, i.e. 5.0% of their annual turnover (Table 9.7).

The domestic demand for sawn goods has been increasing in recent years. As regards domestic paper consumption, new, 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 of exported products and other indirect exports (Table 9.6).

10 Foreign trade by forest industries

Chapter 10 provides data on the foreign trade in roundwood and forest industry products. The primary statistics are produced by the National Board of Customs. The main groups of goods presented in this chapter are based on what are called Combined Nomenclature (abbr. CN). The CN classification is a standard within the European Union for compiling statistics on foreign trade.

Finland is a net importer of roundwood. Imports of roundwood and wood residues, mainly from Russia, reached a new record in 1999, totalling 13,2 mill. m³. The volume of roundwood and wood residues exported from Finland was 1.0 mill. m³. (Tables 10.1–10.7).

Detailed data on the foreign trade in forest industry products are presented for 1999 (Tables 10.1, 10.8–10.11 and 10.16). In addition, time series information is presented for the major product groups. In 1999, the value of forest industry exports amounted to an all-time high of FIM 67.8 billion. This accounted for 29% of the total value of all exports from Finland. The forest industry products' share of all exports has, however, gradually decreased.

Western Europe forms the major markets for Finnish forest industry products. In 1999, the three most important customers were Germany, the United Kingdom and France, which accounted for 42% of the total value of forest-based products exported from Finland.

11 Forest sector in the national economy

Chapter 11 deals with the forest sector (i.e. forestry and forest industries together) from the perspective of national economics. The primary data are mainly produced by Statistics Finland.

Finnish national accounts have been revised to fully comply with the European System of Accounts, as applied in the EU. The branch titled 'forestry' consists of forest regeneration, silviculture, harvesting of roundwood, other forestry activities, and forestry related service activities (i.e. mainly activities performed by local forest management associations). The forest industries can be divided into wood-products industries, and pulp and paper industries.

In 1999, Finland's gross domestic product at market prices amounted to FIM 724 billion. This was an increase of 4% over the previous year. The forest sector accounted for 8% of the total GDP. The pulp and paper industries play a dominant role, producing close to 80% of the total value added in the Finnish forest industries (Tables 11.4–11.6). During the period 1975–99, multi-factor productivity in the forest industries has increased at an average rate of 5% per year (Table 11.8).

Tables 11.9 and 11.10, produced mainly by Metla, deal with the profitability of non-industrial, private forestry during 1989–99. Due primarily to record-high removals, stumpage earnings of private forest owners have increased significantly over the last few years. Finally, Tables 11.11 to 11.14 present input-output tables of the effects of an increase in demand for final products on domestic output, value added and employment.

12 International forest statistics

This chapter is primarily concerned with information on forest resources, and production of, and foreign trade in roundwood and forest industry products from the international point of view. Statistics on these issues are mainly based on statistics produced by FAO. A set of annual roundwood price data for some European countries is also presented.

Since the 1950s, global forest resource assessments have been carried out at approximately 10-year intervals. The data of the last published global assessment, implemented jointly by the FAO and the FAO/ECE Secretariat, refer to 1990 (FRA-1990, Table 12.1). In this Yearbook, the data on the forest resources of industrialised temperate/boreal countries are based on a new forest resources assessment, acronym TBFRA-2000 (Tables 12.2 and 12.3). The aim of the new assessment is i.e. to standardise the information collected in order to make the countries internationally more comparable.

Tables referring to the production and foreign trade of roundwood and forest-industry products originate from FAO's FAOSTAT forestry on-line database (Tables 12.4–12.6 and 12.8–12.14), which includes countrywise forest statistics information since 1961. According to the data for 1998, Finland ranks 3rd in the world, as regards the value of exports of forest-related products (Table 12.14). This amounts to approximately 8% of the world total in 1998. The two largest exporters were Canada and the USA. Finland's position among the leading producers and exporters of some major forest-industry products in 1998 is shown in Fig. 12.4. Finland's position as a significant paper and paperboard exporter is based on the country's leading position as an exporter of printing and writing paper, its share being 21% (Table 12.12).