3 Forestry

3.1 Utilisation of Wood Resources

Between 1996 and 1998, the industrial use and harvesting of wood reached record levels. The Finnish industries used an average of 63 million cubic metres of wood per annum, out of which total 54 million cubic metres were of domestic origin. The utilisation of wood is expected to increase markedly in 1999 and 2000. Finland’s abundant wood resources will be sufficient to meet industry’s needs. The only exception is birch, whose use exceeds the estimated maximum of sustainable removals by almost 45 per cent.

There are 23 million hectares of forest in Finland, which includes a growing stock of over 1900 million cubic metres, 46 per cent of which is pine, 36 per cent spruce and 18 per cent various broad-leaved species of the total respectively. The annual increment of growing stock is approximately 76 million cubic metres.

An area of 2.5 million hectares, most of it situated in Northern Finland, has been left wholly or partly outside commercial wood production. The total area allotted to forestry is a good 20 million hectares, with a growing stock of slightly over 1800 and an annual increment of 73 million cubic metres.

Sixty-six per cent of Finland’s commercial forest land belongs to private forest owners, twenty per cent to the state, nine per cent to companies and five per cent to other ownership categories. Most of the state-owned forests are situated in the north of the country which explains why their average increment is low compared with forests belonging to the other owner categories. Privately-owned forests account for 75 per cent of the growing stock increment, state-owned for 10 per cent, company-owned for 10 per cent, and other owners’ forests for 5 per cent. Furthermore, privately-owned forests also play a key role in wood supply, since they produce between 70 and 80 per cent of the Finnish wood used by industry. However, if we take imported wood into account, the figure is reduced

![Figure 13. Removals of Industrial Wood and Maximum Sustainable Removals.](image-url)
to 60 or 70 per cent. Between 1996 and 1998, the removals of industrial wood averaged 54 million cubic metres. In 1999 and 2000, this figure is expected to increase by between 4 and 5 million cubic metres.

The calculations of the maximum sustainable removals are based on data concerning the growing stock, its structure and annual increment, as well as the assumption that silvicultural practices be maintained at their present level. These calculations indicate how much removals could be increased without jeopardising future potential removals. The calculation made at the Finnish Forest Research Institute is an optimisation calculation where, among other things, price relationships between different timber assortments affect the structure of potential removals. Due to the continuing increase of growing stock and, at least up until recent years, a relatively strong silvicultural input, sustainable removals have grown steadily. Nevertheless, in the light of the most recent calculations, it seems that their growth has come to a halt. However, with wood consumption at its current level, sustainable removals will in any case increase in the future.

Occasional logging in excess of the sustainable felling potential will not jeopardise future sustainable removals. Finland’s forests allow plenty of scope for silviculturally justifiable adjustments of this kind. This applies to spruce stands in particular. In Southern Finland’s spruce-dominated stands, the average growing stock is 166 cubic metres per hectare, compared with only 98 cubic metres per hectare in pine-dominated stands. Accordingly, spruce removals have been particularly extensive in recent years, and, in consequence, the growing stock in spruce stands may have decreased slightly.

Over the past twenty years, Finland’s forest resources would have allowed removals considerably greater than those actually carried out (Figure 13), but in recent years, cuttings have increased more rapidly than estimated maximum allowable removals. Especially in Southern Finland, the potential removals exceed the actual cut.

Table 9 shows a comparison of the industrial use of wood in relation to the maximum sustainable removals. In addition to the volumes mentioned in the table, industry uses a certain amount of wood where the species is not specified. The use of non-industrial wood is of minimal importance. The comparison has not been presented by timber assortment, since in practice the difference between sawlogs and pulpwood is not always clear: for example, some pulpwood is also produced during sawlog harvesting, the pulp industry uses large volumes of sawmill chips, and so on.

The demand for birch exceeds Finland’s maximum sustainable removals by almost 45 per cent. Consequently, nearly half of the birch pulpwood used by industry is imported. It is perhaps a little surprising that according to Table 9, Finland’s spruce resources are also being exploited to the full (spruce imports are minimal). However, it is possible and silviculturally justifiable to carry out considerably larger removals in spruce stands than indicated by the level used in this comparison, especially as regards spruce sawlogs. According to calculations of potential removals, the volume of sustainable spruce cuttings can already be increased in about ten years from now. Nonetheless, it is clear that the species with the greatest and most readily available potential for increased removals is pine.
3.2 Roundwood Markets

In 1999, Finland’s commercial fellings will remain almost at a record level, viz. 55 million cubic metres, owing to the growth in the demand for forest industry products towards the end of the year. Next year, the industry’s need for roundwood will continue to grow, but because of an increase in the use of imported wood there will only be a slight increase in domestic commercial fellings.

The good sawnwood demand and strengthening export prices of the pulp and paper industry will increase the demand for roundwood and raise sawlog and pulpwood prices in the end of 1999. However, due to price cuts in the beginning of the year, the only ones to rise in comparison with last year will be spruce sawlog stumpage prices. On average, the prices of pine and birch pulpwood will remain between six and seven per cent lower than in 1998.

The slight upward trend in stumpage prices which has begun in the second half of the current year is expected to continue in 2000 and top this year’s prices by one or two per cent. Price rises continue to be curbed by increasing wood imports and the fact that forest industry is conducting more fellings in their own forests instead of buying the wood from domestic non-industrial forest owners.

Demand for Roundwood Continues to Be Keen

The demand for wood will increase towards the end of 1999 and continue on an upward curve throughout 2000. This development is due to construction activity which continues strong in Europe and in Finland, as well as to a strengthening demand for pulp and paper.

The demand for sawlogs will remain steady in 1999 and 2000, because Finland’s sawnwood production is expected to increase by two per cent in both years. This increase is caused by the growth of construction both in Finland and in the euro-11 countries, which constitute an important market for Finnish sawnwood exports. Construction investments are projected to increase by 3 per cent in the euro area this year and by 2.5 per cent the next.

Construction activity will show particularly strong growth in the United Kingdom, and to pick up somewhat in Germany, too. These countries constitute the most important export markets for Finland. Moreover, construction activity is also expected to remain reasonably strong in the United States next year, which, coupled with the recovery of the Asian economies, will reduce the risk of oversupply of sawnwood in the European market.

At the end of July, the forest industry’s inventories of softwood sawlogs were low, which, together with the sound sales of spruce sawnwood, has increased the demand for spruce sawlogs in particular. The demand for pulpwood has also grown from the summer as orders for newsprint and magazine paper have increased. However, because the year began weakly, the output volumes of paper and paperboard will remain slightly smaller than last year. In contrast, the production of pulp will grow by one per cent. Thus, the industry’s need for pulpwood in the current year will remain at last year’s level.

In 2000, economic growth is expected to accelerate from the current year’s level in those European countries that are important to Finland’s forest products exports. In consequence, the production of sawnwood, pulp, paper and paperboard will increase by two per cent, which will raise industry’s need for sawlogs and pulpwood to a record level next year.

Roundwood Supply on the Increase

Forest industry and forest owners could not reach an agreement on roundwood price expectations in the spring of 1999. Furthermore, the Finnish Office of Free Competition decided not to extend the tempo-
Forestry

A temporary permit for price co-operation between forest owners. The lack of a common agreement on price expectations decelerated the roundwood sales somewhat in the early autumn of the current year.

In September and October, however, timber sales have picked up almost in the usual manner. This development has, in particular, been boosted by an increase in spruce sawlog stumpage prices which have soared to record heights along with increasing exports and prices of spruce sawnwood. In addition, the prices of pulpwood have also taken a slight upward turn after the summer.

Nevertheless, the forest industry’s roundwood purchases are currently still lagging slightly behind last year’s level. In early autumn the industry has been able to satisfy its wood needs by increasing the volume of imported wood and using wood from their inventories. Fellings in the forest industry companies’ own forests are also expected to show a marked growth in the current year.

The supply of domestic wood is forecast to remain fairly robust this year and the next, although the lack of a price agreement continues to retard the timber trade in some regions. On the other hand, poor grain crops in Southern Finland and the consequent, relatively low agricultural income will increase timber supply. Also the various guarantee and additional-price schemes devised by buyers, as well as an imminent increase in wood imports are expected to increase the domestic wood supply.

Current and Imminent Imports Curb Pulpwood Price Rise

Towards the end of 1999, Finland’s exports of pine and particularly spruce sawnwood will increase and their prices consolidate. Strong demand will raise the prices of spruce sawlogs in the end of the current year so that the average stumpage price will increase by four per cent compared to last year. The demand and export price development of pine sawnwood and birch plywood have not equalled those of spruce, and in consequence, the average prices of pine and birch sawlogs will remain at last year’s level.
approximately. The price development of birch sawlog is also constricted by strongly increased imports.

In 2000, sawlog prices are projected to rise a little owing to an increase in sawnwood production and strengthening export prices. However, escalating supply in Finland and increasing sawlog imports - especially imminent imports - will reduce the price rises. The average stumpage price of spruce sawlogs is estimated to rise by about two per cent, and that of pine and birch sawlogs by one per cent compared to the current year.

The increase in the Finnish pulp and paper industry’s output and export prices will raise pulpwood prices in the last quarter of 1999. However, owing to price reductions in the beginning of the year, the average stumpage prices of pine and birch pulpwood will show a decline of between six and seven per cent compared to the previous year. The growing output of newsprint and magazine paper will create opportunities for spruce pulpwood demand to continue steadily. Nevertheless, the average price of spruce pulpwood is likely to remain at last year’s level in 1999.

In 2000, pulp and paper production is expected to increase and its export prices rise, but the prices of pine and birch pulpwood will only rise by one per cent. There are, however, significant regional differences: in areas of robust demand in Southern Finland, prices may rise considerably above average, whereas in Northern and also partly in Eastern Finland they may be liable to decline a little. In northern parts of the country, long transportation distances and the small average size of stems reduce stumpage prices, whereas in Eastern Finland the prices are depressed by imported wood from Russia. The prices of pine pulpwood are kept low not only by increased imports but also by the domestic oversupply and abundant felling potential.

An increase in the production and export prices of magazine papers is projected to raise the price of spruce pulpwood by two per cent in 2000. However, spruce price rises are also curbed by the continued growth of imports.

**Use of Imported Roundwood Continues to Increase**

Roundwood imports will break another record in Finland this year by reaching a volume of 13.8 million cubic metres. This constitutes about one fifth of the country’s total use of roundwood, and is worth about FIM 2.7 billion (about EUR 450 million). If uncertainty continues to grow on the Finnish roundwood market next year, wood imports are likely to exceed this level by a few million cubic metres.

More than half of the birch pulpwood and also one third of birch sawlogs used in Finland in 1999

**Table 11.** Average Stumpage Prices for Non-Industrial Private Forests.

<table>
<thead>
<tr>
<th>Wood assortment</th>
<th>1998 FIM/m³</th>
<th>1999est. FIM/m³</th>
<th>1999est./1998 change, %</th>
<th>2000est./1999est. change, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine sawlogs</td>
<td>273.2</td>
<td>272</td>
<td>0</td>
<td>+1</td>
</tr>
<tr>
<td>Spruce sawlogs</td>
<td>227.5</td>
<td>236</td>
<td>+4</td>
<td>+2</td>
</tr>
<tr>
<td>Birch sawlogs</td>
<td>271.6</td>
<td>269</td>
<td>–1</td>
<td>+1</td>
</tr>
<tr>
<td>Pine pulpwood</td>
<td>94.2</td>
<td>88</td>
<td>–7</td>
<td>+1</td>
</tr>
<tr>
<td>Spruce pulpwood</td>
<td>132.8</td>
<td>132</td>
<td>0</td>
<td>+2</td>
</tr>
<tr>
<td>Birch pulpwood</td>
<td>94.0</td>
<td>88</td>
<td>–6</td>
<td>+1</td>
</tr>
</tbody>
</table>
Both the forest products export price index and the stumpage price index rose in 1998. The forest products export price index, which measures the average change in the real prices of forest products, is forecast to decline by about one per cent in 1999 from last year due to a temporary decline in export prices in the beginning of 1999. The price development of product categories is divided in 1999: the nominal export prices of sawnwood and wood products are expected to rise, whereas the prices of paper and paper products will decline. The real export price index is projected to rise in 2000, if the favourable development in the end of the current year will continue in forest products markets.

In 1998, the stumpage price index measuring the average change in the real-value stumpage prices moved upwards for a fifth consecutive year. However, the growth slowed down. The nominal stumpage prices of sawlogs increased by two to three per cent, whereas the prices of pine and birch pulpwood declined compared to the previous year. In 1998, the stumpage price index rose above the long-term trend between 1978 and 1998. The decline in the trend is mainly due to the deep recession in the Finnish economy during the early 1990’s.

The development of real stumpage prices during the first half of the current year will raise the stumpage price index in 1999, even though the annual increase is smaller than in the previous two years. Therefore, the nominal stumpage prices will develop in the second half of 1999 roughly as they did in the same period last year.

The strengthening demand for domestic roundwood is restricted by the increasing roundwood imports next year. The nominal stumpage prices will rise only moderately in 2000, and consequently the stumpage price index measuring the development of real prices will decrease due to a higher inflation rate.

*Figure. Real stumpage price index, forest product export price index and stumpage price index trend between 1988 and 1998 and forecasts for 1999 and 2000.*
are of foreign origin. The imports of softwood sawlogs and spruce pulpwood have also grown: the imported volumes of spruce and pine sawlogs are record-high this year and almost one in ten logs of spruce pulpwood comes from beyond the Finnish borders.

Whether import volumes will continue to increase depends not only on the Finnish roundwood market situation, but also on the harvesting conditions in Russia, which is the origin of most of the timber imports into Finland. Compared to birch and pine pulpwood, quality requirements are considerably stricter for sawlogs and spruce pulpwood, which has so far limited their imports. However, Russia’s need for foreign currency creates favourable conditions for increasing imports into Finland. Nevertheless, this development can be altered by the political and economic instability in Russia.

3.3 Investments and Profitability of the Non-Industrial Private Forestry

Total investments in timber production will amount to over FIM 1 billion next year in non-industrial private forestry. In real terms this level was last achieved in the early 1990's. In compliance with the National Forest Programme, government subsidies for timber production will increase by about 20 per cent in 2000 compared to the current year. The main emphasis is on the tending of young forests and, in some areas, also on ditch cleaning and supplementary ditching. By increasing the amount of public funding, private forest owners are also encouraged to add their own input in timber production investments.

An increase in the real unit costs will slightly weaken the annual operating margin of forestry this year and the next. The unit cost indexes of forest
regeneration and silviculture, forest improvement works as well as forest road construction increased in 1998. The growth will continue in the current year and the next but at a slowing pace, however. The unit cost increases together with the decreasing stumpage prices will keep the annual operating margin in forestry on the downward trend this year and the rise in the unit costs of timber production is projected to decrease the operating margin also in 2000.

**Forest Owners’ Own Inputs Record-High**

Since 1994, forest owners’ own inputs in timber production have continuously increased in real terms. Last year these inputs amounted to as high as FIM 675 million (EUR 113 million), which in real terms, is the all-time record for private forestry. Private inputs are expected to increase a little in the current year. However, total investments in private forestry will still fall slightly short of FIM 1 billion.

In 2000, statutory forest regeneration obligations and increased public inputs in timber production will continue to increase total investments in private forests. In real terms this means a return to the 1993 level and surpassing FIM 1 billion. Nevertheless, total inputs will not reach the peak levels of the early 1990’s.

**Government Subsidies Primarily Concentrated on the Tending of Young Forests**

In its budget proposal for 2000, Finland has reserved almost FIM 370 million for silvicultural and forest improvement works with the aim to safeguard sustainable timber production in private forests. The sum exceeds this year’s budgetary allocation by almost FIM 60 million. As regards the implementation of the budgeted works, the emphasis is on the tending and improvement of young forests; into this purpose has been allocated FIM 135 million, which almost equals the combined funding reserved for other silvicultural works. In addition, the budget proposal includes FIM 90 million for planning, supervision, forest communication, etc.

The Finnish government’s financial support clearly reflects the commitment of the Ministry of Agriculture and Forestry to the Tending of Young Forests campaign (1998–2002). Last year’s public funding covered the treatment of 115 000 hectares of young forests. In the current year, the size of the area will amount to about 130 000 hectares. Furthermore, the funding reserved for 2000 will enable the treatment of as many as 150 000 hectares of young forests. Together with the treatment areas financed entirely by forest owners themselves, the total area of young forests to be treated will be almost 200 000 hectares next year.

**The National Forest Programme Sets Extensive Objectives for Private Input**

Finland’s National Forest Programme, reaching up to 2010, was finalised in the current year. In addition to Finland’s needs, the programme also aims to meet new challenges in international forest policy. The implementation of the Forest Programme will begin next year with the co-operation of the various parties involved. The government will play an important role in the implementation, follow-up, development, and financing of the programme.

The budget proposal for 2000 shows a considerable increase in the appropriations intended for the promotion and supervising of private forestry compared with the current year. The grounds for this increase can be found in the objectives stipulated in the National Forest Programme. State financing of silvicultural and forest improvement works is to grow by 20 per cent. Because grants and loans will be transferred from previous years, it will be possible to increase the public input to meet the targets set in the Forest Programme.
What is the Optimal Forest Road Density in Finland?

A recent study by the Finnish Forest Research Institute (Metla) shows that using the current cost level of road construction and timber forest haulage, the optimal density of forest roads in Southern Finland would be 10.5 metres per hectare. However, the Ministry of Agriculture and Forestry as well as Forestry Development Centre Tapio have for some time considered the average target to be 15 metres of forest road per hectare in Southern Finland. The latter figure exceeds the optimum calculated in the new study by more than one third.

The optimisation calculations conducted in Metla took into consideration the two most important benefits of forest roads: the reduction of forest haulage distances as well as silvicultural and forest improvement costs. Other benefits offered by forest roads for, e.g., recreational purposes or local traffic were not included in the calculations, since it would require an extensive, separate study to analyse and appraise them. Moreover, the calculations also excluded the activating effect of forest roads on timber supply and silvicultural operations.

Particular emphasis should be laid on the results of the sensitivity analysis, which indicate that road density may deviate considerably from the computed optimum without causing significant economic losses. The total costs in Southern Finland will increase by more than ten per cent only when the density is below 7 or over 16 metres per hectare. The optimum solution is not particularly sensitive to changes in other calculation factors, either. For example, a 20-per-cent decrease in road construction costs or an equally large escalation in timber forest haulage costs would increase the optimum density only by one metre.

A Lack of Calculations on Additional Advantages

A high road density objective has been justified by its additional advantages to timber procurement logistics and the multiple use of forests. A dense forest road network has also been claimed to reduce harvesting damages caused by forwarders, to make timber harvesting easier to organise, and to promote consideration of environmental values by improving the profitability of small-scale forest management.

In practice the benefits derived from these factors have been estimated to equal the actual shortening of distances of timber haulage in the forest. However, there are no reliable calculations concerning this. For example, the utility of exceeding the optimal road density in order to facilitate the multiple use of forests is questionable. Moreover, the justifications tendered for dense road network fail to take the potential damages to the ecosystem or landscape into consideration.

The construction of new forest roads is often also justified with the claim that a sufficient road network is an indispensable prerequisite for modern forestry. This is true, no doubt, but in order to determine the importance of forest roads, a distinction should be made between the benefits derived from the existing network as opposed to new roads. From an economic point of view it is clear that on the national level the marginal utilities of forest roads are on a downward curve, meaning that each new road benefits the society less than the previous one.

The construction of additional forest roads has also been justified by their profitability for private forest owners. However, since this subject has not been studied, it is difficult to make any strong assumptions about it. Moreover, it must be noted that although a new forest road may be profitable for a private forest owner, it is not necessarily so for the society.

Forest-Road Construction Volumes have Exceeded the Objectives Set in the Forest 2000 Programmes

In the National Forest Programme road construction is still one of the main areas of emphasis for public subsidies. The construction of new roads is reckoned to taper off from the current level of 2000 kilometres a year to about 1000, but there will be a corresponding increase in the basic improvement of old roads. However, the programme gives no clear justifica-
tions for the construction of new roads.

Against this background it is interesting to see to what extent the forest-road construction objectives of the Forest 2000 Programme, which was drawn up in the mid 1980’s, have been realised. The adjoining graph shows that the targets set in the Forest 2000 Programme for the period between 1990 and 1995 were exceeded by almost 40 per cent. In contrast, all other forestry-related works failed to meet their objectives during the same period.

The results do not change if we view the objectives of the updated Forest 2000 Programme as a basis for comparison. For example, ditch cleaning and supplementary drainage only reached 50 per cent of its target level, whereas forest road construction surpassed it by 22 per cent.

The question is, has the appropriation of public funds for various forestry works served its purpose in the 1990’s? In 1997, changes were made to the conditions for obtaining different subsidies but it remains to be seen whether the changes were sufficient or whether the objectives of forest road construction will still be exceeded in the future.

Sources:

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**Figure. Realisation of the Objectives of the Forest 2000 Programme by Work Category, %.


The state grants to promotion and supervision organisations in forestry will also be increased by almost 20 per cent. The additional grants will be concentrated on advisory services for forest owners and on forest planning. However, the Regional Forestry Centres will not meet the objectives of the National Forest Programme since these services will not yet be activated in 2000. Moreover, there will be no increase in the state grants to promotion of sustainable forestry as yet next year.

The total objective for silvicultural and forest improvement works within the National Forest Programme was set at FIM 1.5 billion per year. The sum includes the government’s and the forest industry’s inputs in timber production. Over the previous years, the combined timber production investments in forests belonging to the state and the forest industry have amounted to between FIM 150 and 200 million. The Forest Programme’s suggestions for silvicultural works do not apply to these owner categories. Therefore, it must be presumed that the additional input required to reach the target level has to be found from private forest owners.

In 2000, the total timber production investments in non-industrial private forests are projected to rise to just under FIM 1.1 billion. In practice, this indicates that the Forest Programme will fall short of the stipulated target level by between FIM 200 and 300 million in its first year. In the future, therefore, private forest owners should increase their own input from last years level of a good FIM 600 million to approximately FIM 900 to 1000 million so that the Forest Programme’s total investment level could be reached.

**The Lapland Law Extended**

The regeneration of Lapland’s low-yielding forests with the aid of the so-called Lapland law expired in the end of 1998. However, at the time of the law’s expiry, there were so many authorised projects that Parliament sanctioned an extension to the financing until the end of 2002. This way Northern Finland’s
low-yielding regeneration sites are still guaranteed a special financing arrangement.

The need of funding for targets covered by the Lapland law amounts to approximately FIM 30 million. In addition, regeneration projects approved under the previous forest improvement law were granted a period of transition until the end of 2002 providing this that the financing decision has been made by the end of this year. In this respect, too, the decision concerns mainly Northern Finland. The need for government funding for the aforementioned regeneration works adds up to an average total of FIM 100 million.

**Investment Rate in Private Forestry Rising**

In 1998, stumpage earnings from non-industrial private forests rose to FIM 9.4 billion. Fellings have continued to concentrate on sawlogs in the current year. The stumpage price index will fall a little and the volume of commercial fellings will drop by about four per cent from the previous year, which means that gross stumpage earnings will amount to a little over FIM 9 billion this year. In 2000, earnings will escalate to FIM 9.4 billion again, owing mainly to a rise in the stumpage price level. It seems that total investments in private forestry are increasing their share of gross stumpage earnings this year and the next, ending up at 11 or 12 per cent.

**Net Earnings in Forestry Increased while Operating Margins Fell**

The average nominal net earnings per hectare of forest land (gross stumpage income + government subsidies - variable and fixed costs of timber production excluding loan interest and forest tax) grew about six percent in 1998 from FIM 580 achieved in 1997. This increase of per hectare net earnings was mainly due to the record-high nominal stumpage earnings in Finland during 1998. Net earnings are expected to fall in the current year but to grow again next year back to the 1998 level. The decrease of net earnings this year is due to the increased investment rate in forestry whereas the increase in 2000 is caused by more than proportional growth in the gross incomes with respect to the total costs.

The profitability of forestry, measured in terms of annual operating margins, is projected to remain below the 1998 level both this year and the next. The annual operating margin is calculated by deducting variable and fixed costs of forestry (with the exception of interest on loans and forest tax) from the sum of gross stumpage earnings and public subsidies. The annual operating margin measures the percentage share of net earnings from total gross earnings.

The index of real value unit cost in timber production increased both this year and the last mainly due to the increasing demand for investment inputs for forest regeneration and silvicultural improvement. Also the demand for ditching and forest road construction promoted by the expanded public sub-
The increased total demand of inputs in forestry will increase the unit cost index this year and the next if the total supply of these inputs remains unchanged.

**Forest Regeneration and Silviculture Unit Costs Going Up**

The total area of forest land regenerated in 1998 did not change from that of the previous year despite the large removals and stumpage earnings. This together with the large commercial fellings this year will increase the total hectares to be regenerated in 1999 and 2000. The silvicultural cost index, which include the unit cost categories of forest regeneration and silvicultural investments, respectively, rose by approximately five percent last year. The increased public subsidies for year 2000 proposed in the National Forest Programme, will consolidate the demand for silvicultural investments.

**Unit Costs of Forest Improvement Investments Increasing in 2000**

The unit cost index of forest improvement had a downward sloping trend from the early 1990’s up to last year. The trend was due to the tight competition among the contractors caused by shrinking demand for ditching, the most important work category in the unit cost index. Index is expected to grow this year and the next due to the additional public financing for ditch cleaning and supplementary drainage which will increase the total demand for these activities.

The decrease in the unit costs of fertilization and pruning in 1998 was not visible in the unit cost index since they account together for less than one fifth of the value of the investments counted to forest improvement. The unit cost from the construction of permanent forest roads rose by over five percent in 1998. The construction of main haulage roads as well as arterial forest roads were reduced both in number and in share of total kilometers last year.

<table>
<thead>
<tr>
<th>Type of Work</th>
<th>Share from the variable costs 1997–98, %</th>
<th>Change 1997–98, %</th>
<th>Forecast for the change 1998–99est., %</th>
<th>1999est.–2000est. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest regeneration and silviculture</td>
<td>76</td>
<td>4.6</td>
<td>1.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Forest improvement</td>
<td>11</td>
<td>4.0</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Construction of forest roads</td>
<td>13</td>
<td>5.4</td>
<td>1.1</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Table 12. Changes in Real Unit Costs in Timber Production.
year. The construction of new roads and the improvement of the old ones are expected increase in 2000. The unit costs will grow next year without increased supply of entrepreneur services.

3.4 Labour Force in Forestry

In 1999, employment in forestry is expected to drop by about four per cent. Unemployment figures will remain at last year’s level of approximately 15 per cent. The workforce is showing a downward trend mainly in the numbers of harvesting workers and the forest owner’s own labour input. In 2000, employment in forestry is expected to remain at the current year’s level.

Workforce Continues to Diminish

In 1999, according to a labour study by Statistics Finland, the workforce employed in forestry will shrink by approximately 1000 man-years from last year and stand at about 23,000 man-years. On average, the labour input by salaried employees will remain at last year’s level of 7000 man-years, whereas the labour input of entrepreneurs and their family members will drop from 7000 man-years to 6000 in 1999. Wage earners labour input in forestry will remain at the average level of 10,000 man-years, but the emphasis of employment will shift from harvesting to silviculture.

Employment in forestry continues to decline in spite of a generally improving trend in unemployment figures. The timber removals are expected to stay at last year’s level in 1999 and they are not forecast to show any significant increase next year, either. However, since the productivity of timber harvesting continues to improve, employment in forestry will depend on the development of the demand for labour in silviculture and other work categories.

An upswing in Finland’s national employment rate will not affect unemployment in forestry. Measured by the figures based on preliminary data provided by Statistics Finland, the latter seems to be remaining at the 1998 level of 15 per cent in the current year. The average national unemployment figures are estimated to improve by one per cent this year, i.e. drop to ten per cent, and continue their fall to nine per cent in 2000. The number of unemployed forestry workers is slightly over 4000.

Silviculture Employs More People than Harvesting

In 1999, wage earners labour input in forestry is expected to remain at the same level as last year, i.e. at approximately 10,000 man years. However, in the light of preliminary data, work input demand in harvesting will decline by ten per cent on average in 1999. Even though removal volumes will remain at last year’s level, the work is becoming increasingly mechanised and more productive in consequence. In 1999, the number of harvesters will amount to 1200, which is 100 machines more than last year. The increased number of machines is probably due to the fact that compared to last year, this year has seen more timber harvests in company-owned forests, where the proportion of mechanical harvesting is higher than in non-industrial private forests. The number of forwarders has also increased a little in timber harvesting, while the use of tractors in forestry work has, correspondingly, decreased.

By way of compensation, the labour input of silvicultural and other work is likely to grow by about ten per cent in 1999, so that the total number of wage earners in forestry will remain at its former level. In 1999, for the first time, more than half (55 per cent) of the labour input by forestry wage earners will consist of silvicultural and other work, and less than half of harvesting work, most of which is now mechanised. The increased number of jobs in silviculture is probably partly due to the Tending of
Young Forests campaign and the slightly increased use of wood for energy production.

Forest drainage and forest road construction are considered to belong to the field of land and water construction, but, in practice, they are forestry jobs. According to an estimate by the Association of Forest Machine Entrepreneurs, forest drainage and the construction of forest roads employ between 500 and 700 people on average, three in four of whom are entrepreneurs. Should the amount of work in these categories be doubled, as stipulated in the National Forest Programme, they would increase employment by an average of 500 man-years.

According to preliminary data by Statistics Finland, the labour input of entrepreneurs and their family members seems to be on a downward curve from last year’s 7000 man-years to 6000 in the current year. As harvesters and forwarders grow more numerous in harvesting, the work input of machine entrepreneurs is not likely be reduced. Thus the decrease in entrepreneur input is probably due to a shrinking input from the forest owners themselves. In 1999, the increased fellings in company-owned forests may affect the situation somewhat, but there is also a distinct declining trend in the number of forest owners with professional qualifications for and ability to perform forestry work.

In 2000, attempts will be made to increase the total area of treated young stands as well as the use of wood for energy production. Should the demand for forest improvement work also grow in accordance with the objectives of the National Forest Programme, employment may increase in the field of silviculture and other work categories. Consequently, the labour input of Finland’s forestry as a whole may at least remain at the current year’s level in 2000.
Price Uncertainty and Roundwood Trade

A stumpage price negotiation system to stabilise roundwood market fluctuations has been a long tradition in Finland. Negotiations between sellers and buyers have been seen necessary to secure a sufficient supply of raw wood in the market, where structural and informational asymmetry existed between highly concentrated forest industry and large number of individual non-industrial forest owners. Unlike in most European countries, private forest owners account for about 80 per cent of total domestic harvests.

In 1994 the Finnish Office of Free Competition restricted the negotiation system of price recommendation and volume agreements. It was seen as a barrier to competition in roundwood trade. EU Commission, however, allowed for a modified price negotiation system in 1997 for 5 years. In this system, individual wood buying companies and the representatives of sellers searched a common view on the expectations as to price development.

The Finnish Office of Free Competition denied also these negotiations in autumn 1999. The Central Union of Agricultural Producers and Forest Owners appealed and the final decision on the continuity of the negotiation system will be made by the Competition Council during the autumn 1999. A negative decision could increase uncertainty, that may with high probability change the trade patterns of individual timber sellers and the domestic supply of roundwood.

Timber Trade and Stumpage Price Recommendations

Target prices and detailed guidelines for the pricing of timber items were decided in the contracts of stumpage price recommendations made in the 1980’s. These contracts, that covered the whole country and all timber species declared timber buyers’ and sellers’ joint forecasts on future development of roundwood trade in the domestic market. The contracts, normally signed during the first quarter of year, registered the price recommendations for the rest of the contract period. The recommendations were quickly adopted by the market and stumpage prices stabilised relatively well during the years 1987–1990. The more stable market meant that timber sellers could choose the timing of trade without price risks. An average of 60 per cent of the trade of standing timber units was sold during the autumn months (September- December).

Competition Increases

The Finnish Office of Commercial Competition concluded in the early 1990’s that price recommendation contracts were against domestic and international legislation because they limit market competition. Roundwood market turned market driven for the years 1991 to 1993. The price contracting returned temporarily in 1994 but only in the form of loose, regional price level contracts. The release from tight rules in roundwood pricing changed the trade patterns. The annual distribution of timber trade became more even and at the same time the nominal timber prices were the lowest during the months. During years 1991–1995 only an average of 44 per cent of the trade of standing timber units was sold during the autumn months.

Figure 1. Monthly percentage shares of standing timber trade from private non-industrial forests.1)

The Officer of Commercial Competition in the EU took in 1996 a positive stand to the contracting between the individual forest industry firms and the delegations of forest owners. The Finnish Office of Commercial Competition granted a temporary permission for this type of contracting until 1998. Contracts stated only a common view on the future development of the market and gave a starting point for price negotiations in individual trade. This also meant that regional roundwood market turned more market driven. The annual distribution of timber trade regained the old pattern where the majority of timber trade took place during the autumn months.

Structural Changes of Domestic Roundwood Market

Fundamental changes in the competition of domestic roundwood market can be anticipated during the next coming years. The growth of roundwood import into Finland together with the general internationalisation of roundwood trade will make independent expert forecasts on domestic and international market valuable.

If the share of imported roundwood in companies’ wood procurement in the spring and summer months keeps increasing, and if the domestic sales are permanently concentrated in the autumn months, the roundwood procurement of the winter, spring and summer months will continue to consist mainly of supplementary purchases. These purchases depend, e.g., on harvesting and market conditions. In a market pattern of this kind, the average prices of roundwood in the spring and summer seasons are affected by special factors, and therefore do not lend themselves to being used as a basis for the price forecast of the coming autumn.

Information Needed in Domestic Roundwood Market

If the negotiations for price expectations are given up, they should be replaced with the forecasts of some independent expert organisations. Both buyers and sellers will benefit from independently produced market forecasts, because market information is essential to the economic interests of both forestry associations and wood-buying companies. Moreover, information on changes in local competition is also needed to complement market reviews and export market forecasts.

Figure 2. Four month averages of nominal stumpage price index (January–April, May–August, September–December).

1) The curves delineating the monthly mean values of roundwood standing sales and the nominal stumpage price index between a) 1987 and 1990, b) 1991 and 1995, c) 1996 and 1998 have been computed on the basis of data from the METINFO information system of the Forest Research Institute. METINFO is based on an information system designed by the Wood Market Committee in 1985.
Funding Alternatives and Valuation of Public Land Recreation Services

Over the past few years, Finland has had to face the question as to whether the basic services in national parks and hiking areas can be maintained free of charge, or whether they are to be made chargeable. In what follows, we focus on two questions: how much do Finns appreciate these services, and what are the visitors’ attitudes towards budget funding vs. user fees?

Public Recreation Services and their Funding

State-owned land areas, managed by the Finnish Forest and Park Service and the Forest Research Institute (Metla), are widely used and they offer a variety of facilities. This makes these areas particularly important as providers of recreation opportunities; it is estimated that they host more than two million visits annually. The government-funded, public lands include statutory nature conservation areas, wilderness areas and national hiking areas, for example.

Hiking areas and national parks offer facilities such as nature centres, huts, shelters, campfire sites, fishing grounds, etc. The basic infrastructure of these areas, such as paths and campfire sites with firewood, enhance the recreation opportunities and reduce the erosion of nature. These basic facilities are available free of charge as part of public welfare services.

However, nowadays the Forest and Park Service is only required to provide public recreation services to the extent that the government’s budget funding implies. The Committee on the recreational use of state lands in 1996 recommended that admission to the areas and normal use of their basic facilities be kept free of charge. The Committee proposed that the Forest and Park Service would be allowed to collect voluntary payments for firewood and wilderness huts, for example. However, this is not possible subject to current legislation.

In practice, the budget funding allotted to visitor services has become insufficient with the increased number of services provided. During the next few years, it has to be decided whether the basic recreation services on public lands can still be offered free of charge in the future – which might mean cutbacks in facilities – or whether they should be subject to a charge on the beneficiary-pays principle.

Visitors’ Attitudes to Funding Alternatives

It is taken for granted that charges are made for additional facilities such as fishing rights, cabins and boats, but charging for admission to public areas and the use of their basic services is a complex issue. After all, state-owned land is public property which should be equally accessible to all citizens. Therefore, public approval can be regarded as an important decision-making criterion. We asked visitors to the national parks of Nuuksio and Seitseminen, as well as to the hiking areas of Evo and Teijo, about their attitudes towards the funding alternatives.

Every second respondent fully agreed that the basic services should be maintained with tax revenues and remain free of charge. Only about one in ten clearly supported the introduction of user fees to maintain the current level of facilities. This option

<table>
<thead>
<tr>
<th>Propositions (% of respondents)</th>
<th>Fully agree</th>
<th>Partly agree</th>
<th>Cannot say</th>
<th>Partly disagree</th>
<th>Fully disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic services should be maintained with tax money and remain free of charge</td>
<td>50</td>
<td>34</td>
<td>5</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Service facilities can be cut down, but their use should remain free of charge</td>
<td>15</td>
<td>25</td>
<td>13</td>
<td>28</td>
<td>19</td>
</tr>
<tr>
<td>Services should be financed with user fees to maintain current level of facilities</td>
<td>9</td>
<td>33</td>
<td>11</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>
also met with the most resistance: nearly one in four fully disagreed. The beneficiary-pays principle clearly received less support than the current practice, even taking into account those who partly agreed.

The most acceptable specific fee was the charge for firewood, approved of by almost every third respondent. The least popular fees included lump-sum charges for parking, firewood and waste management. Only 15 per cent of the respondents unreservedly approved of one-off admission fees or a mandatory recreation pass entitling the holder to enter all national parks and hiking areas.

Recreation Services Are Appreciated, and their Value Can be Measured

Public recreation opportunities, like those based on the everyman’s right, constitute non-marketed, unpriced goods. Since the benefits are not observable in terms of tangible cash flows, such unpriced services may, from the fiscal point of view, appear as a cost item only. However, following methods used in environmental economics, a monetary value can be assigned to nonmarket goods.

We used the contingent valuation method to study the value of national parks and hiking areas. The commodity was defined as admission to all such areas including the use of their basic facilities, and the payment vehicle was taxation. An additional question was used to distinguish between the real zero bids and so-called protest bids which were excluded.

Table 2. The valuation of national parks and hiking areas (National Outdoor Recreation Assessment [LVVI], preliminary results).

<table>
<thead>
<tr>
<th>Valuation of services, FIM/person/a.</th>
<th>% of respondents (protest bids excluded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>zero</td>
<td>24</td>
</tr>
<tr>
<td>50</td>
<td>26</td>
</tr>
<tr>
<td>100</td>
<td>27</td>
</tr>
<tr>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>300</td>
<td>6</td>
</tr>
<tr>
<td>500 or more</td>
<td>7</td>
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</tbody>
</table>

About a quarter of the respondents of the population-wide survey had visited a hiking area or national park during the last 12 months. Almost 60 per cent had used these services at some point, and two-thirds thought it likely they would do so in the future.

Three out of four considered the possibility to use the areas to be worth at least FIM 50 per annum. The most common motive for willingness-to-pay was preserving cultural and natural values for future generations, or protecting undisturbed nature (60 per cent). The principal motive of the remaining 40 per cent was recreation, but most of them emphasised the value of recreation opportunities for all citizens rather than personal use. On average, the possibility to use the areas was valued at FIM 110–120 per person per annum.

The Future Course for Development and Funding?

According to the above visitors’ opinions, the beneficiary-pays principle and admission fees lack general approval. Visitor attitudes were rather consistent with the results of a previous population-wide study. From the perspective of social sustainability (existing property rights, public approval, equality), it seems that user fees are not the primary solution to current funding problems. Due to the costs involved in administering and collecting the fees, the net revenue could be small. Also, the visitor numbers in Finland are relatively low so that admission fees are not needed to limit the use of the areas.

The beneficiary-pays principle would turn visitors into paying customers. This might have repercussions for visitors’ behaviour: a paying customer may not have the same feeling of responsibility for the resource as a visitor with a sense of ownership. This viewpoint is particularly important in the case of national parks where the compatibility of recreational use with nature conservation is essential.

Based on the economic valuation results, the current levels of budget funding would seem to be easily justifiable. The possibility to use the state-owned areas for recreation was valued at more than FIM 100 per person per annum. With an adult population of almost four million, the aggregate recreation benefits are manifold to the annual budget funding of FIM 70–80 million used for the visitor services.