



Finnish Forest Research Institute  
METLA

# FOREST FINLAND

IN BRIEF  
1997





## FOREST FINLAND IN BRIEF

offers a concise description on Finnish forestry and forest industries in an international context from the viewpoint of forest statistics. For a more detailed description I would like to refer you to the Finnish Statistical Yearbook of Forestry with its approximately 200 tables and 60 figures in English.

Ideal growing conditions for conifers, easily workable and valuable tree species, good logging conditions and infrastructure, combined with accessibility to major European markets, have made forests our real source of well-being. And not only in the material sense, for we Finns look upon our forests as a valuable ecological and cultural resource as well.

Finland has firmly committed herself to sustainable forestry in its broader sense, including the biodiversity and social and cultural functions of the forests. The recently reformed forestry and nature-conservation legislation provides a framework to these ends.

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## INTERNATIONAL CONTEXT

### Major producers and traders

Finland, with its 5.1 million people and 23.0 million forest hectares (0.6% of the world total), is an important supplier of forest products to global markets. Finland's boreal coniferous forests, with their good mixture of broadleaves, enable annual fellings of over 60 million m<sup>3</sup> on a sustained basis, and this allowable cut is increasing year by year. The infrastructure for roundwood procurement is good. The Finnish forest industries are highly export-oriented. In many branches of these industries, 70% to 90% of the production goes abroad. Finland is a major exporter of sawn softwood and paper, particularly graphic papers.

### Global roundwood production in 1995

(million m<sup>3</sup> under bark):

Industrial wood	1 489	Softwood	1 121
Fuelwood&charcoal	1 858	Hardwood	2 226
3 347		3 347	

Total value of the global export trade of forest products amounted to USD 140 456 million (f.o.b) in 1995, of which Finland's share was 8.5%. In the following tables, the Russian Federation is included in Europe.

### World production of softwood, 1995

<b>World</b>	<b>1 121</b>	mill. m <sup>3</sup> u.b.
<b>Europe</b>	<b>341</b>	
USA	287	
Canada	158	
China	143	
Russia	85	
Sweden	58	
Brazil	44	
<b>Finland</b>	<b>42</b>	

### World imports of roundwood, 1995

<b>World</b>	<b>143.3</b>	mill. m <sup>3</sup> u.b.
<b>Europe</b>	<b>59.5</b>	
Japan	48.8	
<b>Finland</b>	<b>10.0</b>	
Korea Rep.	9.6	
Sweden	8.4	
Austria	8.1	
Canada	8.0	
China	7.2	



## World production of sawn softwood, 1995

<b>World</b>	<b>303.4</b>	mill. m <sup>3</sup>
<b>Europe</b>	<b>97.8</b>	
USA	76.0	
Canada	59.3	
Japan	21.7	
Russia	21.4	
China	15.5	
Sweden	14.6	
Germany	12.9	
<b>Finland</b>	<b>9.4</b>	

## World exports of sawn softwood, 1995

<b>World</b>	<b>92.7</b>	mill. m <sup>3</sup>
<b>Europe</b>	<b>36.6</b>	
Canada	47.6	
Sweden	10.6	
<b>Finland</b>	<b>7.3</b>	
USA	4.6	
Austria	4.6	
Russia	4.3	
Germany	1.7	
Czech Rep.	1.5	

## World production of paper and paperboard, 1995

<b>World</b>	<b>287.9</b>	mill. metric tons
<b>Europe</b>	<b>82.2</b>	
USA	85.5	
China	33.5	
Japan	29.7	
Canada	18.7	
Germany	14.8	
<b>Finland</b>	<b>10.9</b>	
Sweden	9.2	
France	8.6	

## World exports of paper and paperboard, 1995

<b>World</b>	<b>73.1</b>	mill. m.t.
<b>Europe</b>	<b>42.2</b>	
Canada	13.9	
<b>Finland</b>	<b>9.2</b>	
USA	8.5	
Sweden	6.9	
Germany	6.2	
France	3.3	
Austria	2.6	
Netherlands	2.3	

Source: FAOSTAT Database 1997



## Value of global exports of forest-industries' products, 1995

	USD 1 000 mill.	USD per capita
<b>World</b>	<b>140.5</b>	<b>25</b>
<b>Europe</b>	<b>65.3</b>	<b>90</b>
Canada	27.8	938
USA	18.1	69
<b>Finland</b>	<b>12.0</b>	<b>2 340</b>
Sweden	10.9	1 229
Germany	7.8	95
France	5.9	101
Indonesia	4.7	24

Source: FAOSTAT  
Database 1997

## Eurasian boreal forest zone

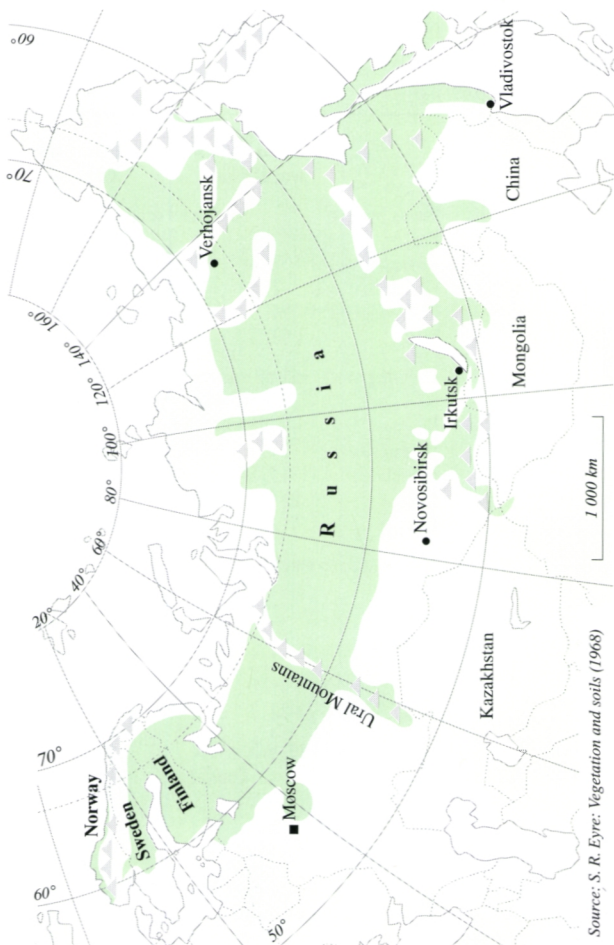
The Eurasian boreal forest zone extends from the Atlantic coast of Norway to the Russian Pacific coast, a distance of about 9 000 km. In the Nordic countries, the width of the zone is about 1 000 km (60–70° N); eastwards it gradually spreads out more to the south, reaching 50° N in eastern Siberia and then again narrowing to lie between 60–70° N.

This huge coniferous forest zone of about 1 000 million hectares in area is one of the most important providers of roudwood in the world. In the European part and West Siberia, pine and spruce dominate. In East Siberia, Siberian larch, and in the Russian Far East, Dahurian larch are the most important species. In the mountainous Far East the forests are, however, mostly inaccessible.

About 78% of the forests of Norway and Sweden, and 98% of those of Finland and 85% of the former Soviet Union belong to the boreal coniferous forest zone proper. All boreal forests of the former Soviet Union are within the present Russian Federation. However, due to the restricted availability of comparable regional forestry information solely on boreal forests, the figures in the next table are nationwide.



## Eurasian boreal forest zone



Source: S. R. Eyre: *Vegetation and soils* (1968)



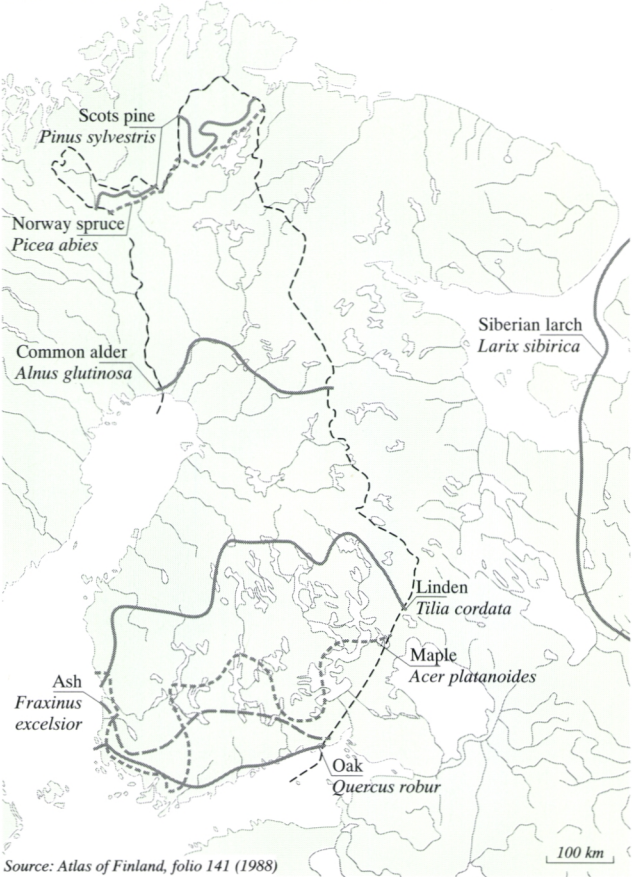
## Forest resources of the countries within the Eurasian boreal forest zone at the end of the 1980s

	Forest and other wooded land		Exploitable forest land	
Areas, mill. ha	% of land area			
Norway	9.6	31	6.6	
Sweden	28.0	69	22.0	
Finland	23.4	77	19.5	
USSR	941.5	44	414.0	
Total	1 002.5	45	462.1	
<b>Growing stock, mill. m<sup>3</sup> over bark</b>				
	Conifers, %		Conifers, %	
Norway	621	80	571	82
Sweden	2 721	84	2 471	85
Finland	1 773	82	1 679	82
USSR	85 919	82	50 310	74
Total	91 034	82	55 031	75
<b>Net annual increment, mill. m<sup>3</sup> o.b.</b>				
	Conifers, %		Conifers, %	
Norway	18.5	78	17.6	80
Sweden	96.7	82	91.0	83
Finland	72.5	77	69.7	77
USSR	1 017.0	63	699.9	56
Total	1 204.7	66	878.2	61
<b>Removals in 1989, mill. m<sup>3</sup> o.b.</b>				
	Conifers, %		Conifers, %	
Norway	12.0	92	11.1	97
Sweden	56.9	83	54.5	83
Finland	52.0	80	50.7	81
USSR	516.8	65	465.2	67
Total	637.7	68	581.5	70

Source: The UN-ECE/  
FAO 1990 Forest  
Resource Assessment



**Northern limits of selected tree species in Finland  
and western limit of Siberian larch**



Source: Atlas of Finland, folio 141 (1988)



## Combined deposition of sulphur and nitrogen in the Nordic and the Baltic countries in 1995, in eq/ha/yr



Source: Finnish Meteorological Institute,  
Norwegian Meteorological Institute

The depositions are combined as equivalent in relation to their potentially acidifying effect. For example, 500 eq/ha/yr is equivalent to 8 kg (S)/ha/yr.



The European Union, a member of which Finland herself has been since 1995, is the most important customer region for Finnish forest-industries' products; its share is 75 % of sawn goods and 65 % of paper and paperboard exports. Customer-orientation has also led to large Finnish investments in forest-product manufacturing in the region. The capacity of the Finnish-owned paper and paperboard industries in EU countries other than Finland is about five million tonnes.

The forest resources of the European Union roughly doubled in 1995 when forest-rich Finland, Sweden and Austria joined the EU.

## The European Union

### Forest resources of the European Union. Exploitable forests.

Country	Forest area mill. ha	Growing stock mill. m <sup>3</sup>	of which conif., %	Increment at end of 80s mill. m <sup>3</sup> /yr	Removals mill. m <sup>3</sup> /yr
Austria	3.3	953	83	22.0	16.5
Belgium	0.6	90	60	4.5	3.4
Denmark	0.5	54	54	3.5	2.0
Finland	19.5	1 679	82	69.7	50.7
France	12.5	1 742	38	65.9	48.0
Germany	9.9	2 674	68	63.1	42.6
Greece	2.3	149	52	3.3	2.9
Ireland	0.4	30	87	3.5	1.6
Italy	4.4	743	36	13.6	7.6
Luxembourg	0.1	20	18	0.7	0.3
Netherlands	0.3	52	56	2.4	1.3
Portugal	2.3	167	66	11.3	10.5
Spain	6.5	450	61	27.8	14.9
Sweden	22.0	2 471	85	91.0	54.5
United Kingdom	2.2	203	55	11.1	7.3
<b>Total</b>	<b>86.8</b>	<b>11 477</b>	<b>67</b>	<b>393.4</b>	<b>264.1</b>

Source: The UN-ECE/FAO 1990 Forest Resource Assessment



## Duration of the growing season in Europe

Average periods in days (1961-90) during which daily mean temperatures are above +5 °C





# Forest Map of Europe

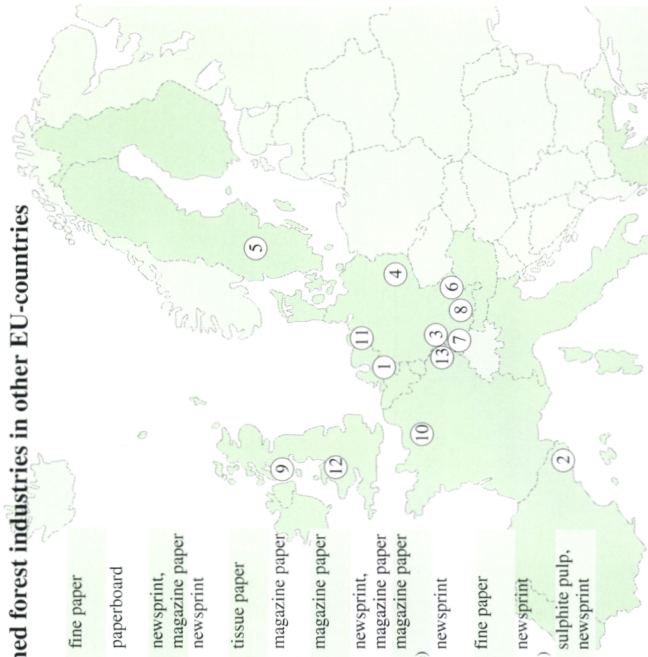




## Some major Finnish-owned forest industries in other EU-countries

1. <i>Berghuizer Papierfabriek</i> , Netherlands (Enso)	fine paper
2. <i>Enso Española</i> , Spain (Enso)	paperboard
3. <i>E. Holtzmann &amp; Cie</i> , Germany (Enso)	newsprint, magazine paper
4. <i>Sachsen Papier Eilenburg</i> , Germany (Enso)	newsprint
5. <i>Metsä-Serla</i> , Sweden (Metsä-Serla)	tissue paper
6. <i>MD Papier</i> , Germany (Metsä-Serla/Myllykoski)	magazine paper
7. <i>Papierfabrik Albbbruck</i> , Germany (Metsä-Serla/Myllykoski)	magazine paper
8. <i>Gebrüder Lang</i> , Germany (Metsä-Serla)	newsprint, magazine paper
9. <i>Caledonian Paper</i> , United Kingdom (UPM-Kymmene)	magazine paper
10. <i>Chapelle Darblay</i> , France (UPM-Kymmene)	newsprint
11. <i>Nordland Papier</i> , Germany (UPM-Kymmene)	fine paper
12. <i>Shotton Paper</i> , United Kingdom (UPM-Kymmene)	newsprint
13. <i>Stracel</i> , France (UPM-Kymmene)	sulphite pulp, newsprint

Source: *The Finnish Timber and Paper Directory 1996-97*





## Finnish exports of forest industries' products to the European Union, 1996

	Sawn goods 1000 m <sup>3</sup>	Plywood and veneer	Particle board	Fibre board 1000 m.t.	Wood Pulp	Paper and paperboard
Austria	93	20	-	-	26	91
Belgium—Luxemb.	163	18	0	1	28	592
Denmark	580	46	23	2	0	248
France	723	71	-	0	162	684
Germany	935	198	1	5	627	1 534
Greece	94	2	-	2	3	96
Ireland	142	10	4	2	2	62
Italy	213	35	-	1	74	196
Netherlands	740	100	1	5	56	404
Portugal	2	5	-	-	47	53
Spain	82	14	-	-	24	551
Sweden	46	74	56	3	36	223
United Kingdom	1 286	94	117	27	268	1 602
<b>EU, total</b>	<b>5 106</b>	<b>688</b>	<b>201</b>	<b>48</b>	<b>1 354</b>	<b>6 369</b>
% of total exports	73	80	84	88	88	67

Source: National Board of Customs



## FINNISH FORESTRY AND FOREST INDUSTRIES

### National economy, forestry and the forest industries

With a goal of achieving economic growth in post-war Finland, investments in pulp and paper industries doubled the production between 1955 and 1965. This trend has continued, and not only in the forest industries, but also in the metal industries and more recently in the high-tech electronic industry.

In 1960, roundwood and forest-industries' products represented 75% of the value of the total exports; their share was 30% in 1996. The same diversification of production is, of course, to be seen in the structure of the gross domestic product. In 1960, the share of forestry of the GDP was 8.7%, and that of forest industries, 7.1%. The corresponding figures for the year 1996 were 2.4% and 5.3%. In employment, forestry accounted for 6.6% and forest industries for 5.2% in 1960. In 1996, the corresponding figures were 1.2% and 3.5% respectively.

It is worth noting that flourishing engineering and service industries have developed around Finnish forestry and forest industries. Strong mutual connections have contributed to the success of the whole. Finnish companies are in a strong position globally, e.g. in the manufacturing of timber harvesters, paper machines and in providing consultant services.

### Forestry and forest industries in the Finnish national economy, 1996

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<b>Gross domestic product</b>	<b>FIM 574 780 million</b>
of which forestry	2.4 %
forest industries	5.3 %
<b>Total employment</b>	<b>2.10 million persons</b>
of which forestry	1.2 %
forest industries	3.5 %
<b>Total exports of goods</b>	<b>FIM 186 334 million</b>
of which forestry	0.2 %
forest industries	29.6 %

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FIM 1.0 = USD 0.22  
Source: Statistics  
Finland



Finland is among the major suppliers of forest-related products to the world markets, particularly in printing and writing paper, and one of the biggest importers of roundwood. In 1996, the total value of forest-industries' products exports was FIM 56 000 million (about USD 12 000 million). Germany, the United Kingdom and France are the foremost importers of Finnish forest-industries' products, together accounting for 42% of the total.

## Forest industries: production and exports

### Finnish forest industries' production 1994–96

Product	Unit 1 000	1994	1995	1996
Sawn goods	m <sup>3</sup>	9 780	9 480	9 370
Plywood	"	700	778	869
Particle board	"	477	485	498
Fibreboard	m.t.	86	79	77
Mechanical pulp	"	4 118	4 306	3 957
Chemical pulp	"	5 844	5 782	5 719
Pulp, total	"	9 962	10 088	9 676
Newsprint	"	1 446	1 425	1 327
Other graphic papers	"	6 096	6 314	5 837
Kraft paper	"	504	484	462
Other paper	"	500	372	397
Paper, total	"	8 546	8 595	8 023
Paperboard	"	2 363	2 346	2 419
Paper and paperboard	"	10 909	10 942	10 442

Source: Finnish Forest Industries Federation



## Finnish forest industries' exports, 1994–96

Product	Unit 1 000	1994	1995	1996
Sawn goods	m <sup>3</sup>	7 181	7 361	7 057
Plywood	"	627	667	794
Particle board	"	200	223	238
Fibreboard	m.t.	60	53	55
Mechanical pulp	"	72	67	69
Chemical pulp	"	1 420	1 239	1 475
Newsprint	"	1 252	1 099	1 051
Other graphic papers	"	5 833	5 991	5 497
Kraft paper	"	356	321	278
Other paper	"	325	271	291
Paper, total	"	7 766	7 683	7 117
Paperboard	"	1 986	1 911	1 942
Converted paper products	"	369	381	415
<b>Total paper and paperboard</b>	"	<b>10 122</b>	<b>9 975</b>	<b>9 474</b>

*Source: National Board  
of Customs*



## Value of Finnish forest industries' exports, 1996

Country	Sawn goods	Wood-based panels, other wood products	Pulp	Paper, paper-board, converted products	FIM mill. For. ind. exports, total
Austria	91	177	54	386	708
Belgium-Luxembourg	124	106	64	2 280	2 574
Denmark	629	254	0	1 054	1 937
France	639	231	371	2 895	4 135
Germany	946	1 466	1 421	6 255	10 107
Greece	86	10	6	355	458
Ireland	129	36	5	262	432
Italy	246	138	152	749	1 284
Netherlands	621	285	128	1 705	2 738
Portugal	2	18	102	221	343
Spain	70	76	44	2 068	2 258
Sweden	53	574	74	1 212	1 919
United Kingdom	1 344	536	621	6 638	9 147
EU total	4 986	3 907	3 042	26 202	38 170
Other Europe	211	1 229	156	4 030	5 630
<b>Europe total</b>	<b>5 197</b>	<b>5 136</b>	<b>3 198</b>	<b>30 232</b>	<b>43 800</b>
Asia	787	455	221	4 199	5 666
Africa	690	8	5	546	1 251
North America	22	133	29	2 568	2 753
Latin America	-	1	1	884	886
Oceania	17	5	0	825	848
<b>Grand total</b>	<b>6 714</b>	<b>5 738</b>	<b>3 455</b>	<b>39 254</b>	<b>55 203</b>

FIM 1.0 = USD 0.22

Source: National Board of Customs

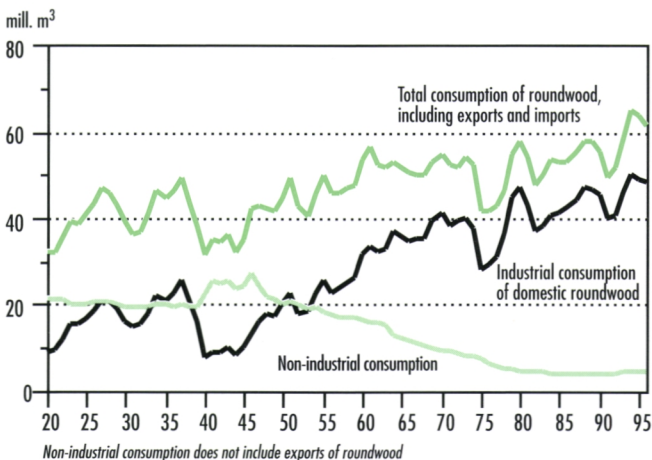


## Wood consumption

Total wood consumption in Finland has remained roughly at the same level during the past 35 years, despite a multiple increase in wood pulp production. However, the years 1994 to 1996 were the first when wood consumption exceeded 60 million m<sup>3</sup>. Many structural changes, such as reductions in fuelwood consumption and roundwood exports, as well as the increased use of industrial wood residues, have contributed to rather modest increases in total wood consumption. Industrial wood consumption, nevertheless, shows a strong upward trend.

In 1996, total roundwood consumption reached 61.7 million m<sup>3</sup>, including imports and exports. Industrial wood consumption was 56.2 mill. m<sup>3</sup>. Imported roundwood (8.0 mill. m<sup>3</sup>) accounted for 14 % of industrial wood consumption.

### Roundwood consumption in Finland, 1920–96



Source: The Finnish Forest Research Institute



## Roundwood consumption during 5 -year periods, 1985–96

Consumption category	1985–89	1990–94	mill. m <sup>3</sup> /yr 1995–96
Exports	1.3	1.0	1.0
Industrial roundwood	44.4	44.4	48.8
sawmills and panel industries	20.3	20.0	24.3
pulp industries	24.1	24.4	24.5
Fuelwood and other	3.9	4.1	4.6
Domestic roundwood total	49.6	49.5	54.4
Imported wood	6.1	6.8	8.5
<b>Total consumption</b>	<b>55.7</b>	<b>56.3</b>	<b>62.9</b>

*Source: Finnish Forest  
Research Institute*



## Roundwood consumption and roundwood exports, 1994–96

Consumption category	1994	1995	mill. m <sup>3</sup> 1996
<b>Total consumption in Finland</b>	<b>63.2</b>	<b>62.9</b>	<b>60.9</b>
Pine	22.4	23.1	21.9
Spruce	24.7	24.8	23.8
Hardwood	15.4	14.4	14.5
Unspecified	0.7	0.7	0.7
Domestic roundwood	54.7	54.0	52.9
Pine	20.7	21.1	20.0
Spruce	24.2	24.4	23.2
Hardwood	9.7	8.6	9.7
Imported wood	8.5	9.0	8.0
Pine	1.7	2.0	1.9
Spruce	0.5	0.4	0.6
Hardwood	5.6	5.9	4.8
Unspecified	0.7	0.7	0.7
<b>Exports, incl. poles</b>	<b>1.9</b>	<b>1.1</b>	<b>0.9</b>
Pine	1.0	0.6	0.6
Spruce	0.8	0.4	0.2
Hardwood	0.1	0.1	0.1

*Pine: Pinus sylvestris*  
*Spruce: Picea abies*  
*Hardwood: mainly*  
*Betula sp.*

*'Unspecified' consists of*  
*imported wood chips*  
*and residues.*

*Source: Finnish Forest*  
*Research Institute*



## Wood consumption in sawmilling, plywood and pulp industries, 1994–96

Year	Domestic roundwood		Imported wood	Wood residues	Total
	Conif.	Hardwood			
Sawmilling					
1994	22.2	0.2	0.3	-	22.7
1995	21.5	0.2	0.3	-	22.0
1996	20.9	0.2	0.6	-	21.7
Plywood and veneer industry					
1994	1.1	1.0	0.1	-	2.3
1995	1.3	1.1	0.2	-	2.5
1996	1.4	1.0	0.2	-	2.6
Chemical pulp industry					
1994	11.2	4.8	7.7	6.1	29.8
1995	11.7	3.6	8.0	6.9	30.2
1996	10.9	4.7	6.7	7.0	29.4
Mechanical pulp industry					
1994	8.4	0.6	0.4	2.3	11.7
1995	9.0	0.5	0.4	2.2	12.1
1996	7.9	0.6	0.4	2.2	11.1

Source: Finnish Forest Research Institute



## Labour force

Efficient multi-function timber harvesters (nowadays numbering about 1 200) are increasingly used in logging operations. Mechanization in logging has led to a continuous fall in the number of forest workers. A workforce of only about 6 000 men are employed in logging proper.

Forestry employed 25 000 people in 1996, compared with 63 000 in 1980. The same trend applies to forest industries. They employed 120 000 people in 1980, but only 73 000 in 1996. However, production has increased about 30% during the same period. Consequently, forestry and forest industries, even during a boom, do not have a decisive impact on the severe unemployment problem in Finland (13.2% in November 1997).

### Employment in forestry and forest industries, 1994–96

	1994	1995	1000 persons 1996
Forestry	25	28	25
Forest industries	74	74	73
Forest sector, total	99	102	97
Employment, total	2 024	2 068	2 096
Unemployed, total	456	430	408
Unemployment rate, %	18.4	17.2	16.3

Source: Statistics Finland



## Employment in forest industries, 1994–96

Branch of industry	1000 persons		
	1994	1995	1996
Sawmilling	13	13	11
Plywood and veneer industry	6	6	6
Other board industry	1	1	1
Other wood-products industry <sup>1</sup>	11	12	13
Pulp industry	19	19	19
Paper industry	18	18	18
Paperboard industry	6	5	5
<b>Forest industries, total</b>	<b>74</b>	<b>74</b>	<b>73</b>

<sup>1</sup> Including carpentry products and pre-fabricated wooden houses.

Sources: Statistics Finland, Finnish Forest Research Institute

Commercial roundwood removals in 1996 totalled 46.9 million m<sup>3</sup>, of which an unusually high proportion (85%) came from non-industrial, private forests. Fellings have been at a very high level during the last three years.

Logging also in non-industrial, private forests is mainly carried out by the forest industries or by their wood-procurement organisations. In 1996, forest owners themselves carried out or organized the logging of 9.2 million m<sup>3</sup>, or 23% of the commercial roundwood removed from their forests.

Roundwood prices have been increasing since 1993 due to high demand. In Finland, the roundwood price level is negotiated regionally between forest owners and forest industries.

## Roundwood markets



## Roundwood procurement and consumption in Finland, 1996

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Sources	mill. m <sup>3</sup>
Commercial roundwood	
from private-owned forests	39.9
from industry-owned forests	2.6
from state-owned forests	4.4
Non-commercial wood	5.7
Domestic roundwood, total	52.6
Imported wood	8.4
<b>Roundwood procurement, total</b>	<b>61.0</b>
<b>Consumption</b>	
Sawmilling	21.7
Wood-based panels	2.8
Other wood-based products	0.4
Chemical pulp industry	22.4
Mechanical pulp industry	8.9
Industry, total	56.2
Fuelwood in dwellings	4.6
Exports of roundwood	0.9
<b>Roundwood consumption, total</b>	<b>61.7</b>

---

*N.B. 1. Imported wood is mostly birch pulpwood from Russia.*

*N.B. 2. Sawmills furnished pulp industry with 9.1 mill. m<sup>3</sup> of wood chips and residues.*

*Source: Finnish Forest Research Institute*



## Roundwood removals by ownership category, 1994–96

Ownership category	1994	1995	mill. m <sup>3</sup> 1996
Private forests <sup>1</sup>	46.4	50.6	45.6
commercial	40.6	44.9	39.9
non-commercial	5.8	5.7	5.7
Forests industries	4.4	1.8	2.6
Forest and Park Service <sup>2</sup>	4.2	4.3	4.4
Commercial, total	49.2	51.0	46.9
<b>Grand total</b>	<b>55.0</b>	<b>56.7</b>	<b>52.6</b>

<sup>1</sup> including here communes, parishes and some other public owners.

<sup>2</sup> Finland's state-owned enterprise managing most of state-owned forests.

Source: Finnish Forest Research Institute

## Roundwood removals by assortment, 1994–96

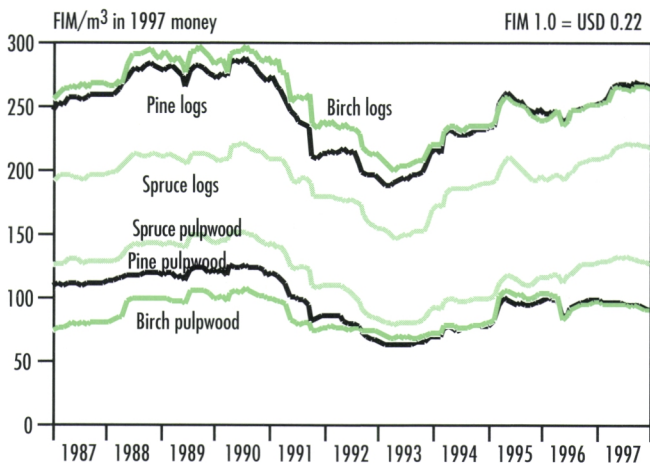
Roundwood assortment	1994	1995	mill. m <sup>3</sup> 1996
Logs	24.9	24.7	23.0
pine logs	9.6	9.7	9.0
spruce logs	14.1	13.8	12.9
hardwood logs	1.2	1.2	1.0
Pulpwood	24.2	26.2	23.9
pine pulpwood	9.7	10.7	10.3
spruce pulpwood	9.4	9.9	9.0
hardwood pulpwood	4.7	5.4	4.6
other industrial wood	0.4	0.2	-
Commercial fuelwood <sup>1</sup>	0.1	0.1	0.1
Commercial removals, total	49.2	51.0	46.9
Non-commercial removals	5.8	5.7	5.7
<b>Grand total</b>	<b>55.0</b>	<b>56.7</b>	<b>52.6</b>

<sup>1</sup> only that purchased by industry.

Source: Finnish Forest Research Institute



## Stumpage prices in non-industrial, private forestry, 1987–97



Source: Finnish Forest Research Institute



Currently, about 110–120 000 hectares of forest land are planted or seeded annually for forestry, and favouring almost exclusively native tree species. Seed-tree or shelterwood fellings have been carried out annually on 50–70 000 hectares.

About 160 000 hectares of seedling stands are treated annually with silvicultural measures. About half of Finland's mires have been drained for forestry, but nowadays this has almost ceased. The same applies to forest fertilization.

The total costs of silvicultural and forest improvement work were FIM 1 028 million (about USD 230 million) in 1996. Of the FIM 849 million spent in non-industrial, private forestry, 66% were accounted for by forest owners' own financing or work, and the rest were financed through state grants (32%) and loans (2%).

## Silvicultural and forest improvement work

### Forest area treated with fellings, 1994–96

Type of felling	1 000 ha		
	1994	1995	1996
Thinnings	260	243	193
Clear fellings	147	110	120
Seed-tree and shelterwood fellings	71	57	53
Removals of seed-trees and shelterwood	50	41	37
Other fellings	15	6	5
<b>Total</b>	<b>543</b>	<b>457</b>	<b>409</b>
% of forest area	2.4	2.0	1.8

Source: Finnish Forest Research Institute

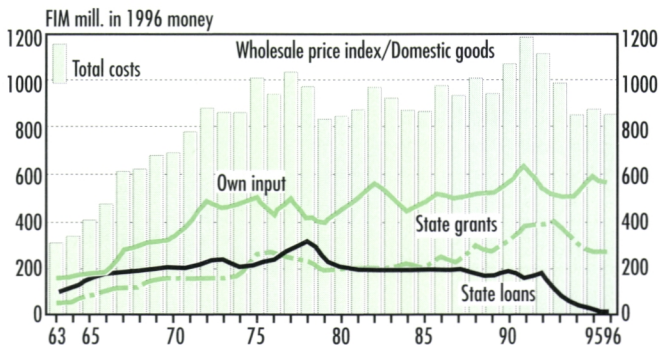


## Silvicultural and forest improvement work, 1995–96

Type of work		1995	1996
Clearing of regeneration area	1000 ha	81	73
Soil preparation	"	128	129
Artificial regeneration	"	112	119
Seedling stand improvement	"	164	157
Forest fertilization	"	9	17
Drainage of mires	"	15	6
Maintenance of drainage	"	79	69
Construction of forest roads	km	2 558	1 842
<b>Total costs</b>	<b>FIM mill</b>	<b>1 070</b>	<b>1 028</b>

Source: Finnish Forest Research Institute

## Financing of silvicultural and forest-improvement works in non-industrial, private forests 1963–96





The nationwide information on Finland's forest resources is based on surveys carried out by the Finnish Forest Research Institute.

Traditionally, systematic ground sampling has been applied. Since 1990, satellite imagery and digital map data have been employed in order to produce results also for small areas. The inventory years to date have been as follows:

I	1921–24	IV	1960–63	VII	1977–84
II	1936–38	V	1964–70	VIII	1986–94
III	1951–53	VI	1971–76	IX	1996–

Despite the 12% reduction in forest area in 1944 due to the war, Finland's wood resources are currently more plentiful than in the pre-war years. According to the 1st national forest inventory, the total growing stock volume was 1 588 million m<sup>3</sup>. The 7th national inventory produced the result of 1 660 million m<sup>3</sup> and the 8th that of 1 887 million m<sup>3</sup>. In recent years, the annual volume increment has exceeded the drain by some 20 million m<sup>3</sup>.

During the past 70 years, the structure of Finnish forests has changed significantly. They now have a more even age structure. Scots pine's share of the growing stock is 45% and that of Norway spruce 37%, leaving 18% for the broadleaved species, mostly birch. This distribution has been a stable one. However, Scots pine is the dominant species on 65% of the forest land area.

The area of productive forest land (criterion: capability to yield at least 1 m<sup>3</sup>/ha/yr) is 20.0 million hectares and that of other wooded land 3.0 million hectares. Thus, the total wood-growing area is 23.0 million hectares. Of this, 1.17 million hectares (5.0%) have been set aside for conservation purposes. These areas, in which all forestry activities are prohibited, lie almost entirely in the northern part of the country. The Finnish concepts of forest land and other wooded land both enter into the new, internationally defined forest-land concept, which sets a canopy cover of 10% as the threshold between forest lands and other lands.

## Forest resources



## Principal land use categories in Finland, 1986–94

	mill. ha
<b>Total area</b>	<b>33.8</b>
Inland watercourses	3.3
Land area	30.5
Forest land	20.0
Other wooded land	3.0
Waste land	3.1
Roads, depots	0.2
<b>Forestry land, total</b>	<b>26.3</b>
Agricultural land	3.0
Built-up areas	0.8
Transport routes	0.4

Source: Finnish Forest Research Institute

## Mineral soils and mires and their drainage, 1986–94

	mill. ha
Mineral soils	17.2
Mires	8.9
Roads, depots	0.2
<b>Forestry land, total</b>	<b>26.3</b>
Spruce mires	2.3
Pine mires	4.9
Open mires	1.7
<b>Total</b>	<b>8.9</b>
Undrained mires	4.3
Recently drained mires	1.1
Transforming mires	2.7
Transformed mires	0.9
<b>Total</b>	<b>8.9</b>

A site is recorded as mire if it is peat-covered or mire plants account for more than three quarters of the field layer flora. In transforming mires the effect of drainage is perceptible in the growing stock. Transformed mires have reached full post-drainage productivity.

Source: Finnish Forest Research Institute



## Dominant tree species of forest stands, 1986–94

		% <sup>1</sup>
Temporarily non-stocked		1.5
Scots pine	<i>Pinus sylvestris</i>	64.5
Norway spruce	<i>Picea abies</i>	25.7
Other coniferous		0.1
Silver birch	<i>Betula pendula</i>	1.3
Downy birch	<i>Betula pubescens</i>	6.2
Aspen	<i>Populus tremula</i>	0.3
Alder	<i>Alnus sp.</i>	0.4
Other broadleaves		0.1
Total		100.0
Forest land area	(mill. ha)	20.0

<sup>1</sup> of forest land area.

Note that of volume share of the broadleaved species is much greater.

Source: Finnish Forest Research Institute

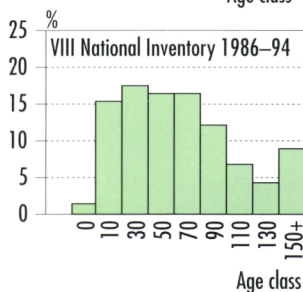
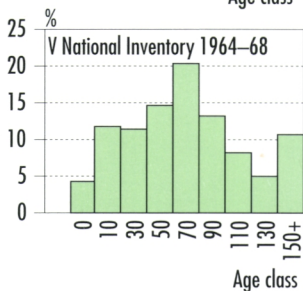
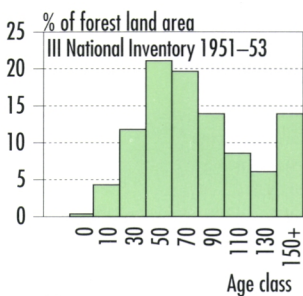
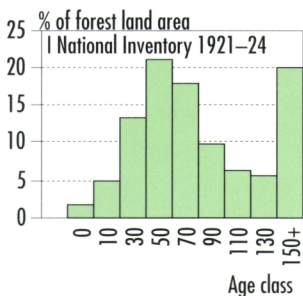
## Timber resources in Finland, 1986–94

Forest and other wooded land	mill. ha	23.0
Growing stock volume	mill. m <sup>3</sup>	1 887
Scots pine	"	864
Norway spruce	"	690
Broadleaves	"	334
Volume increment	mill.m <sup>3</sup> /yr	77.1
Scots pine	"	33.1
Norway spruce	"	27.4
Broadleaves	"	16.6

Source: Finnish Forest Research Institute



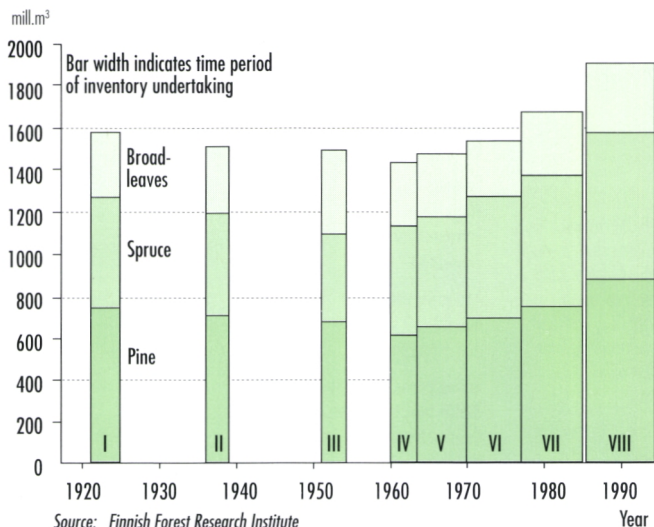
## Age structure development of the Finnish forests



Source: Finnish Forest Research Institute



## Growing stock volumes according to eight national forest inventories



## Forest ownership in Finland, 1986–94

Ownership category	Forest land mill. ha	Forestry land mill. ha	%
Non-indust., private	12.4	14.2	54.2
Companies	1.7	2.0	7.7
State	5.0	8.8	33.4
Others	1.0	1.2	4.7
<b>Total</b>	<b>20.0</b>	<b>26.3</b>	<b>100.0</b>

Source: Finnish Forest Research Institute



## Non-industrial private ownership of forests, 1990

Ownership group	%	
	On holdings/ owners	On forest land area
Family ownership	76	76
Group ownership	6	7
Heirs ownership	18	17
Farmers	32	42
Wage earners	27	24
Entrepreneurs	5	5
Pensioners	36	29
Age < 40 years	14	16
Age 40–59 years	44	45
Age 60+ years	42	39
Reside permanently on holding	59	66
Reside part of year on holding	9	9
Reside elsewhere	32	25

*The figures apply forest holdings with 5+ ha of forest land, of which there are about 280 000, and their corresponding forest land area is 12.4 million ha.*

*Source: Finnish Forest Research Institute*



## Growing stock volume by ownership category, 1986–94

Ownership category	Scots pine	Norway spruce	Broad-leaves	mill. m <sup>3</sup> Total	%
Non-indust., private	533	526	243	1 302	69.0
Companies	77	51	22	150	7.9
State	211	80	53	344	18.2
Others	43	33	16	92	4.9
<b>Total</b>	<b>863</b>	<b>690</b>	<b>334</b>	<b>1 887</b>	<b>100.0</b>

Source: Finnish Forest Research Institute

## Annual volume increment by ownership category, 1986–94

Ownership category	Scots pine	Norway spruce	Broad-leaves	Total	%
		mill. m <sup>3</sup> /yr			
Non-indust., private	20.8	21.8	12.7	55.3	71.7
Companies	3.9	2.3	1.2	7.4	9.6
State	6.7	2.1	1.9	10.7	13.9
Others	1.7	1.2	0.8	3.7	4.8
<b>Total</b>	<b>33.1</b>	<b>27.4</b>	<b>16.6</b>	<b>77.1</b>	<b>100.0</b>

Source: Finnish Forest Research Institute



## Mean growing stock volume and annual increment by ownership category, 1986–94

The data refer to stands on forest land. State forests are located mainly in northern Finland where the climate is less favourable.

Source: Finnish Forest Research Institute

Ownership category	Mean volume m <sup>3</sup> /ha	Increment m <sup>3</sup> /ha/yr	Increment %
Private	104	4.4	4.2
Companies	85	4.2	4.9
State	64	2.0	3.1
Others	92	3.8	4.1
<b>Total</b>	<b>92</b>	<b>3.8</b>	<b>4.1</b>

## Increment (I) and drain (D) in 5 -year periods

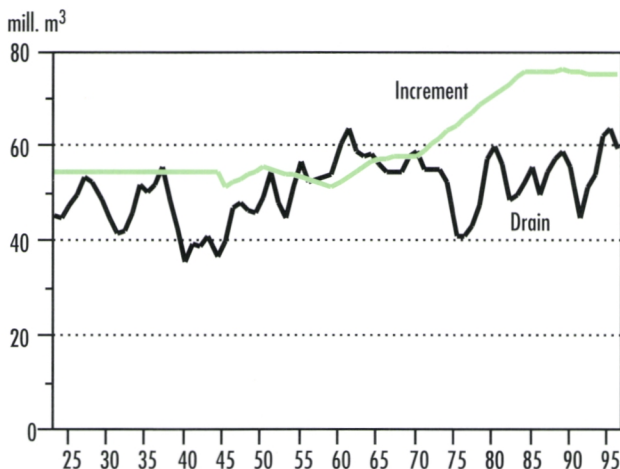
		1980–84	1985–89	mill. m <sup>3</sup> /yr 1990–94
Scots pine	I	29.6	32.2	33.3
	D	21.8	20.9	20.0
Norway spruce	I	26.2	26.9	25.0
	D	20.2	21.9	22.3
Broadleaves	I	16.2	16.5	16.8
	D	11.1	12.1	11.0
<b>Total</b>	I	<b>72.0</b>	<b>75.6</b>	<b>75.1</b>
	D	<b>53.2</b>	<b>54.9</b>	<b>53.3</b>

Note. Increments for 1990–94 are predictions.

Source: Finnish Forest Research Institute



## Growing stock increment and drain, 1923–96



## Multiple-use production of forests, 1994–96

Product		1994	1995	1996
Commercial roundwood	mill. m <sup>3</sup> o.b.	49	51	47
Non-commercial roundwood	mill. m <sup>3</sup> o.b.	6	6	6
Commercial forest berries	m.t. <sup>1</sup>	10 339	9 188	6 718
Commercial forest mushrooms	m.t. <sup>1</sup>	462	395	377
Lichen picked for exporting	m.t.	401	233	254
Moose venison	m.t.	6 842	6 226	3 921
Hare	m.t.	740	819	993
Forest game birds	m.t.	327	284	308
Fur-bearing animals	1000 indiv.	321	276	209
Reindeer meat production	m.t.	3 200	2 800	2 700

<sup>1</sup> Quantities offered for sale, in metric tons.

Sources: Finnish Forest Research Institute, Finnish Game and Fisheries Research Institute



## Forest condition in Finland, 1986–94

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Forest land area, total 20.0 mill. ha

<b>Extent of damage affecting stand quality</b>	<b>% of forest land</b>
---	-------------------------

Totally damaged	0.4
Severely damaged	4.2
Moderately damaged	17.0
<b>Total</b>	<b>21.6</b>

### **Damaging agents**

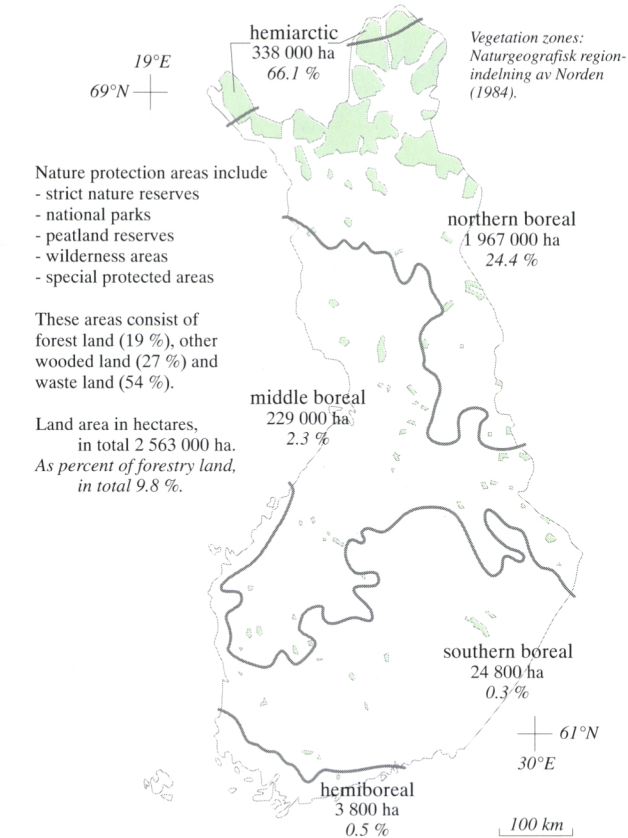
Natural competition	1.4
Climatic factors	5.2
Harvesting damage	0.6
Moose	1.2
Voles	0.1
Insects	0.3
Fungi	7.0
Multiple symptoms	1.5
Unknown	4.3
<b>Total</b>	<b>21.6</b>

---

*Source: Finnish Forest  
Research Institute*



# Nature protection areas by vegetation zones



Source: Finnish Environment Agency (1995)



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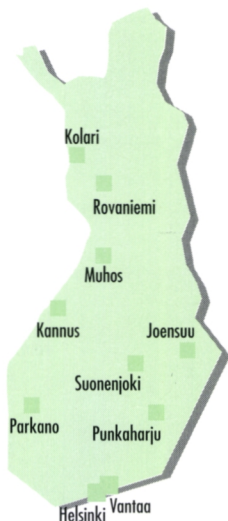
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The Finnish Society of Forest Science and the Finnish Forest Research Institute jointly publish the scientific journals *Acta Forestalia Fennica* and *Silva Fennica*.

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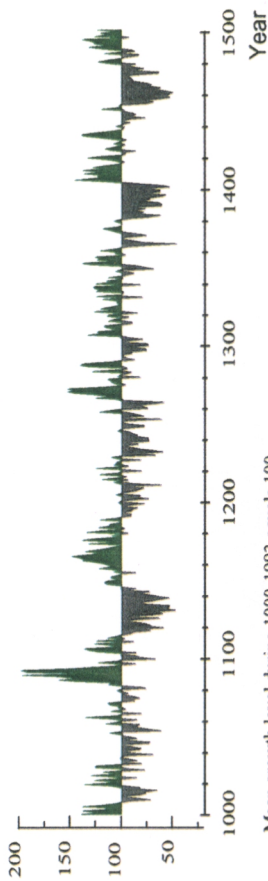
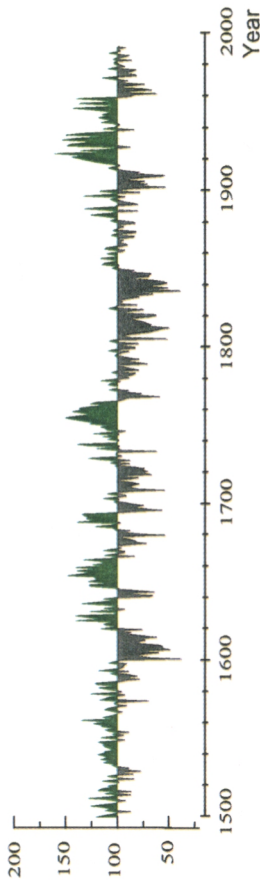
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*Source: Finnish Forestry Association*



# A 1000-year tree-ring calendar of timberline Scots pine in Finland



Mean growth level during 1000-1993 equals 100

Source: *The Finnish Forest Research Institute*