Criterion 3: Maintenance and Encouragement of Productive Functions of Forests (Wood and Non-Wood)

Coordinating lead author **Michael Köhl**

Lead authors **Annemarie Bastup-Birk and Marco Marchetti**

Co-authors **Dora Cimini (3.1, 3.5), Piermaria Corona (3.1, 3.2, 3.5), Bo Jellesmark Thorsen (3.4), Bruno Lasserre (3.1, 3.2), Davide Pettenella (3.3, 3.4), Olli Saastamoinen (3.3) and Frank Søndergaard Jensen (3.4)**

Chapter reviewer **Andreas Zingg**

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Key findings by indicator

3.1 Increment and fellings

Forests in Europe are growing at a high rate, the only exception being Central-West Europe where catastrophic events, mainly storms, have significantly influenced the negative trend between 2005 and 2010. Harvesting of wood has decreased in all of Europe. Less than 2/3 of the increment is removed from the growing stock by fellings.

3.2 Roundwood

In 2010 more than 578 million m³ of roundwood have been produced. The overall value of marketed roundwood is still increasing and reached EUR 21 152 million[3] in 2010. Europe remains one of the main roundwood producers in the world. The demand for wood fuel is increasing at a high rate in some Western European countries.

3.3 Non-wood goods

The total value of non-wood goods (NWGs) reported has almost tripled since the 2007 assessment. This is partly due to the improved reporting. However, NWGs are an important source of income and their share of the total economic value generated by forests is increasing. In 2010, Christmas trees, fruits and berries, and cork were the most important NWGs. The total value of marketed NWGs represented 15 percent of the roundwood value when comparing countries reporting both values.

3.4 Services

The total amount of value for marketed services is more or less stable in comparison with 2007, and amounts to at EUR 818 million. The value of total marketed services represents 7 percent of the roundwood value when comparing countries that reported both values. There is evidence for a positive trend.

3.5 Forest under management plans

Most forest area in the reporting countries is covered by a forest management plan or an equivalent. There are substantial differences in form and content of management plans in European countries.

[3] Based on data from 33 countries representing more than 90 percent of the Forest Europe area.

Indicator 3.1 Increment and fellings

Introduction

The balance between net annual increment (NAI) and annual fellings has been the first criterion for assessing the sustainability of forests. The relation between increment and fellings is decisive for the current and future availability of wood and for shaping a stable growing stock. Fellings should not exceed increment in the long run. From a mid-term perspective, forest management may still be sustainable even if fellings exceed increment. As timber markets are volatile, growing stock surplus, which was aggregated in periods of weak markets, can be utilized under prospering market conditions without harming the principle of sustainability.

Concerns about the emission of greenhouse gases and shortage of natural resources have led to increasing demand for woody biomass as a renewable material and energy source. The transition to a market economy in Eastern Europe fostered wood utilization and timber processing. These developments have had an impact on the amount of fellings. Fellings were and still are smaller than increment, but the proportion of increment that is utilized is likely to increase in the future.

Status

In order not to debase the proportion of increment extracted through fellings with forests that are not utilized for timber production, the following information refers to Forest Available for Wood Supply (FAWS) only. Increment is given as NAI, which is defined as the average annual volume over the given reference period of gross increment (i.e. the total increase of growing stock during a given time period) less that of natural losses on all trees to a minimum diameter at breast height (d.b.h.) of 0 cm. If fellings are lower than the net increment, the growing stock is increasing (see Figure 29 and Table 15). A part of the fellings remains in the forest as logging losses (e.g. stem sections with defects) and is not utilized for energy or wood products. The discrepancy between fellings and removals is reflected under Indicator 3.2 "marketed roundwood."

Information on NAI in the year 2010 was provided by 24 countries, representing 96 percent of the forests in Europe (77 percent of Europe without the Russian Federation), NAI reported for 2010 was slightly higher than 1 500 million m³. Expanding this figure to the entire FOREST EUROPE area would yield an annual increment of approximately 2 100 million m³ for the European forest area available for wood supply. Among the reporting countries, the Russian Federation has the highest share (about 56 percent of the total), while Central-West Europe and North Europe together account for about 33 percent of the total NAI. At the country level the Russian Federation reported the highest total NAI, followed by Germany, Sweden, France and Finland (see Figure 30). NAI per ha was highest in Central-West Europe (7.8 m³/ha) and lowest in the Russian Federation (1.3 m³/ha). In Germany and Denmark the NAI per ha exceeded 10 m³/ha.

In 2010, 680 million m3 of fellings were reported by 31 countries, representing 98 percent of the European forests (90 percent for Europe without the Russian Federation). The largest total volumes of fellings were reported for North Europe (181 million. m³), Central-West Europe (172 million m³) and the Russian Federation (170 million. m³); those three regions share about 76 percent of the total fellings reported for Europe.

For a consistent comparison of increments and fellings and the calculation of felling rates, information on both increments and fellings is required at the country level. 24 countries representing 95 percent of Europe's FAWS, or 77 percent of Europe's FAWS without the Russian Federation, provided this information (see Figure 30). Table 16 combines the NAI and fellings shown in Figure 30 and provides the felling rates in terms of fellings as percent of NAI.

In none of the 24 reporting countries did fellings exceed NAI. Based on the countries reporting in the FOREST EUROPE region, approximately 40 percent of the NAI is utilized by fellings (62 percent in Europe without the Russian Federation). The highest felling rates are reported for Switzerland (99 percent), Austria (99 percent), Lithuania (86 percent), Sweden (83 percent) (see Figure 31). Lowest felling rates were reported for the Russian Federation (20 percent), Cyprus (25 percent), Ukraine (33 percent), Spain (36 percent), Slovenia (37 percent) and Italy (39 percent).

Table 15: Net annual increment and fellings by region, 2010

Region	Net Annual Increment		Fellings	
	Million m³	m³/ha	Million m³	m³/ha
Russian Federation	852.9	1.3	170.0	0.3
North Europe	237.2	4.6	181.1	3.3
Central-West Europe	261.0	7.8	172.4	5.0
Central-East Europe	98.3	5.6	114.2	3.6
South-West Europe	78.4	3.3	29.3	1.4
South-East Europe	23.9	5.9	16.9	2.7
Europe	1 551.6	1.8	683.2	0.8
Europe without the Russian Federation	698. 7	5.4	513.2	3.5
EU-27	619.7	4.7	469.3	3.7

Table 16: Felling rates (fellings as percent of net annual increment), 2010, based on data from 24 countries

Region	Felling rate (%)
Russian Federation	19.9
North Europe	70.9
Central-West Europe	65.0
Central-East Europe	57.2
South-West Europe	42.1
South-East Europe	46.9
Europe	38.9
Europe without the Russian Federation	62.4
EU-27	64.2

Figure 29: Components of gross increment and drain

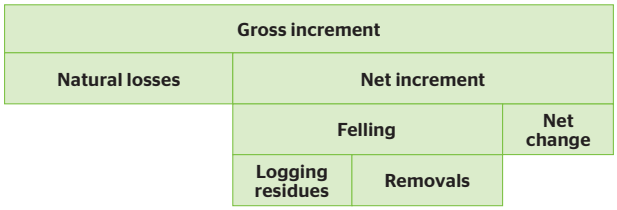


Figure 30: Annual fellings and annual increment for European reporting countries (million m³), 2010

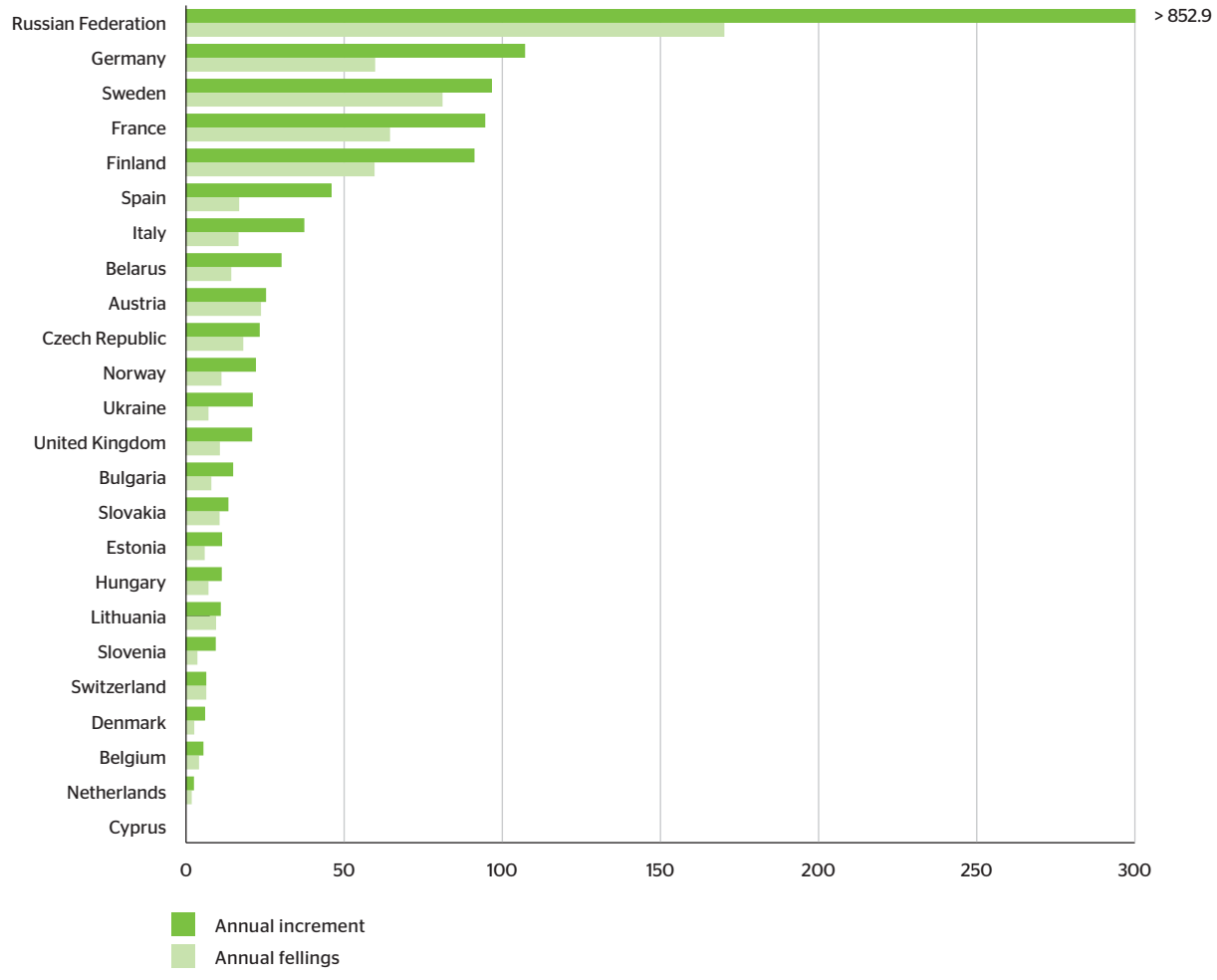


Figure 31: Geographical distribution of felling rates, 2010 (percent)

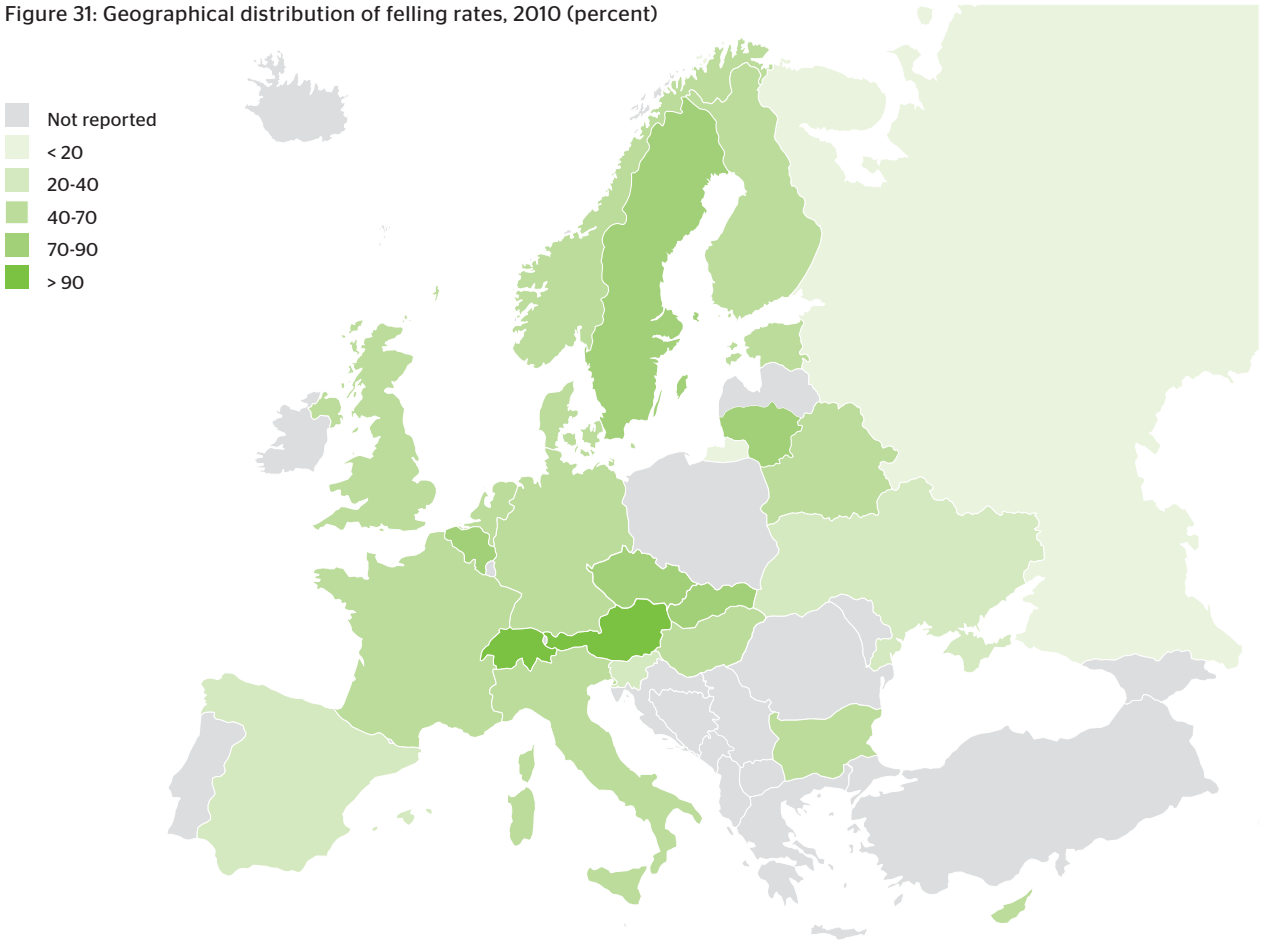


Figure 31 shows that utilization rates in the reporting countries do not exceed increment and thus comply with sustainable forest management. Sweden, Austria and Switzerland have faced catastrophic storms in the past decade, which resulted in high natural losses and consequent removal of downed timber as well as reductions in NAI. Growing stock in Switzerland (over 350 m³/ha) has increased due to cautious cutting regimes over the last decades, making that country the front-runner in Europe. Under these conditions utilization rates greater than 100 percent could still be sustainable. However, the current Swiss utilization rate of 99 percent does not reduce the country's outstanding high growing stocks.

At least for the 24 countries reporting, the mobilization of a substantial amount of timber by increasing fellings would be possible without any threat for the sustainability of growing stock.

Trends

Twenty-three countries provided a complete series for NAI and fellings for all four reporting years (1990, 2000, 2005 and 2010). Those countries represent approximately 95 percent of the European forest area (77 percent for Europe without the Russian Federation).

In the reporting countries NAI has been increasing by approximately 4.2 million m³ per year since 1990 (see Table 17). Between 2005 and 2010 NAI decreased by 0.4 million m³ or 1.2 million m³ per year for Europe without the Russian Federation. This decrease is a result of the annual decrease of NAI by approximately 4.8 million m³ in the Central-West Europe region. Among the reporting countries this trend is mainly influenced by the changes of NAI in Germany and France.

Fellings in the reporting countries (see Table 18) decreased in the course of the 1990s (about 12.3 million m³ per year), followed by an increase of 10.9 million m³ per year between 2000 and 2005, and decreasing again in the last five years (about 7.5 million m³ per year). These trends are strongly influenced by the changing felling patterns in the Russian Federation. In Europe without the Russian Federation, fellings were reduced only in Central-West Europe and North Europe between 2005 and 2010. In all other regions and periods fellings increased consistently.

The felling rates between 1990 and 2010 remained considerably below 100 percent (see Table 19). In the Russian Federation the felling rate decreased from 41 percent in 1990 and reached a steady state of approximately 20 percent since 2000. In Europe without the Russian Federation the felling rates increased from 58 percent in 1990 to 62.4 percent in 2010. The largest variability in felling rates over time can be found in the North Europe region.

Table 17: 1990-2010 trends of net annual increment at regional level for the FOREST EUROPE countries with data available for each reporting year (23 countries reporting on NAI)

Region	Net Annual Increment						
	Subtotals (million m³)				Annual change (million m³/yr)		
	1990	2000	2005	2010	1990-2000	2000-2005	2005-2010
Russian Federation	832.7	841.1	848.8	852.9	0.8	1.6	0.8
North Europe	200.8	206.3	221.9	226.4	0.6	3.1	0.9
Central-West Europe	264.3	284.4	284.8	261.0	2.0	0.1	-4.8
Central-East Europe	84.0	87.9	89.5	98.3	0.4	0.3	1.7
South-West Europe	57.8	73.9	75.2	78.4	1.6	0.3	0.6
South-East Europe	17.3	20.9	22.4	23.9	0.4	0.3	0.3
Europe	1 456.9	1 514.5	1 542.7	1 540.8	5.8	5.6	-0.4
Europe without the Russian Federation	624.2	673.4	693.9	687.9	4.9	4.1	-1.2
EU-27	550.6	597.8	619.5	608.9	4.7	4.3	-2.1

Table 18: 1990-2010 trend of annual fellings (23 countries)

Region	Fellings						
	Total (million m³)				Annual change (million m³/yr)		
	1990	2000	2005	2010	1990-2000	2000-2005	2005-2010
Russian Federation	340.0	166.0	186.0	170.0	-17.4	4.0	-3.2
North Europe	130.1	163.1	171.0	159.4	3.3	1.6	-2.3
Central-West Europe	149.8	166.3	181.3	169.5	1.7	3.0	-2.4
Central-East Europe	44.9	45.6	55.1	56.2	0.1	1.9	0.2
South-West Europe	31.1	31.2	30.7	29.3	0.0	-0.1	0.3
South-East Europe	6.1	6.3	9.0	11.2	0.0	0.5	0.4
Europe	701.9	578.4	633.1	595.7	-12.3	10.9	-7.5
Europe without the Russian Federation	361.9	412.4	447.1	425.7	5.1	6.9	-4.3
EU-27	325.5	378.1	408.5	387.6	5.3	6.1	-4.2

Table 19: Felling rates for 2010, based on data from 23 countries

Region	Felling rates			
	1990	2000	2005	2010
Russian Federation	40.8	19.7	21.9	19.9
North Europe	64.8	79.0	71.0	70.4
Central-West Europe	56.7	58.5	63.7	65.0
Central-East Europe	53.5	51.9	61.6	57.2
South-West Europe	53.7	42.2	40.8	63.0
South-East Europe	35.1	30.2	40.2	46.9
Europe	48.2	38.2	41.0	38.9
Europe without the Russian Federation	58.0	61.2	64.4	62.4
EU-27	59.1	63.2	65.9	64.2

Indicator 3.2 Roundwood

Introduction

Roundwood comprises all wood obtained from removals, including wood recovered from natural, felling and logging losses. Roundwood can be sub-divided into industrial roundwood (wood in the rough), which is mainly used for construction and processed timber products, and wood fuel, which is increasingly important as a source of renewable energy. Roundwood production acts as an interface between the forestry and the timber sector: it provides income for forest owners, serves as resource for the timber sector and its added value, and contributes to the economy, especially in rural areas.

Only a few countries assess the removal of wood fuel on a representative scale. It is widely accepted that a considerable amount of wood fuel is utilized for self-consumption and enters neither markets nor statistical records. The figures presented in the following might show such a bias and underestimate the total removals of wood fuel from forests.

Status

Information on total roundwood production was provided by 38 countries, representing 98 percent of the forests in the European area (89 percent for Europe without the Russian Federation). 578 million m³ of roundwood removals have been reported for 2010 (468 million m³ for Europe without the Russian Federation) 150 million m³ of which is in Central-West Europe and 144 million m³ in North Europe (see Table 20). The highest total removals of roundwood at the country level have been realized in the Russian Federation (110 million m³), Sweden (74 million m³), France (62 million m³), Germany (48 million m³), and Finland (47 million m³). Removals per hectare ranged from 4.4 m³/ha in Central-West Europe to 0.2 m³/ha in the Russian Federation.

Thirty-three countries reported data on the value of total removals for 2010 (see Table 20), representing 94 percent of the European area (69 percent for Europe without the Russian Federation). The value of roundwood removals amounts to EUR 21 152 million (EUR 17 743 million for Europe without the Russian Federation). The highest value was reported for the Russian Federation (EUR 3 409 million), followed by Germany (EUR 3 003 million) and France (EUR 2 980 million). The value reported for Central-West Europe (EUR 7 941 million) is well above the values reported for the other regions. The value of wood removals varied between EUR 5/ha (the Russian Federation) and EUR 241/ha (Central-West Europe).

The figures presented in Table 20 relate to the total removals and do not take into account if removals were de facto marketed or not. 24 countries (19 percent of Europe, 97 percent of Europe without the Russian Federation) provided data on marketed roundwood, i.e. roundwood sold on markets. Marketed roundwood excludes roundwood harvested for self-consumption (subsistence) and other forms of uses without market transaction.

Table 21 and Figure 32 presents the proportion of marketed roundwood as a share of the total removals by regions. On average 89 percent of the total removals were marketed. The lowest proportion was found in the Central-West Europe region. Here 20 percent of the total removals did not enter markets. In all other regions the percentage of marketed removals was well above 90 percent. In the South-West Europe region, for which two countries provided data, the entire removals were reported to be marketed. The data in Table 21 and Figure 32 need to be interpreted with care, especially because removals of wood fuel are not well monitored in all countries and could cause a bias in the estimation of the marketed roundwood.

Trends

The trend of marketed total roundwood is based on 25 countries, representing approximately 94 percent of Europe or 69 percent of Europe without the Russian Federation. 25 countries provided sufficient data for volume and value of removals in order to calculate a time series for the period 1990 to 2010 (see Table 22).

Table 20: Volume and value of marketed and non-marketed roundwood, 2010

Region	Volume (1 000 m³)	Volume (m³/ha FAWS)	Value (million EUR)	Value (EUR/ha FAWS)
Russian Federation	110 000	0.2	3 408	5.0
North Europe	143 813	3.0	4 979	110.9
Central-West Europe	150 473	4.4	7 941	240.9
Central-East Europe	103 500	3.3	2 596	180.7
South-West Europe	24 846	1.5	703	47.1
South-East Europe	45 048	2.2	1 524	109.7
Europe	577 680	0.7	21 152	26.6
Europe without the Russian Federation	467 680	3.1	17 743	145.2
EU-27	404 938	3.3	16 077	145.7

Table 21: Proportion of marketed roundwood from total removals, 2010 (24 countries reporting)

Region	Proportion roundwood marketed from total removals %
Russian Federation	-
North Europe	91.9
Central-West Europe	79.7
Central-East Europe	99.8
South-West Europe	100
South-East Europe	92.0
Europe	-
Europe without the Russian Federation	89.0

Figure 32: Value of marketed roundwood, 2010 (EUR billion)

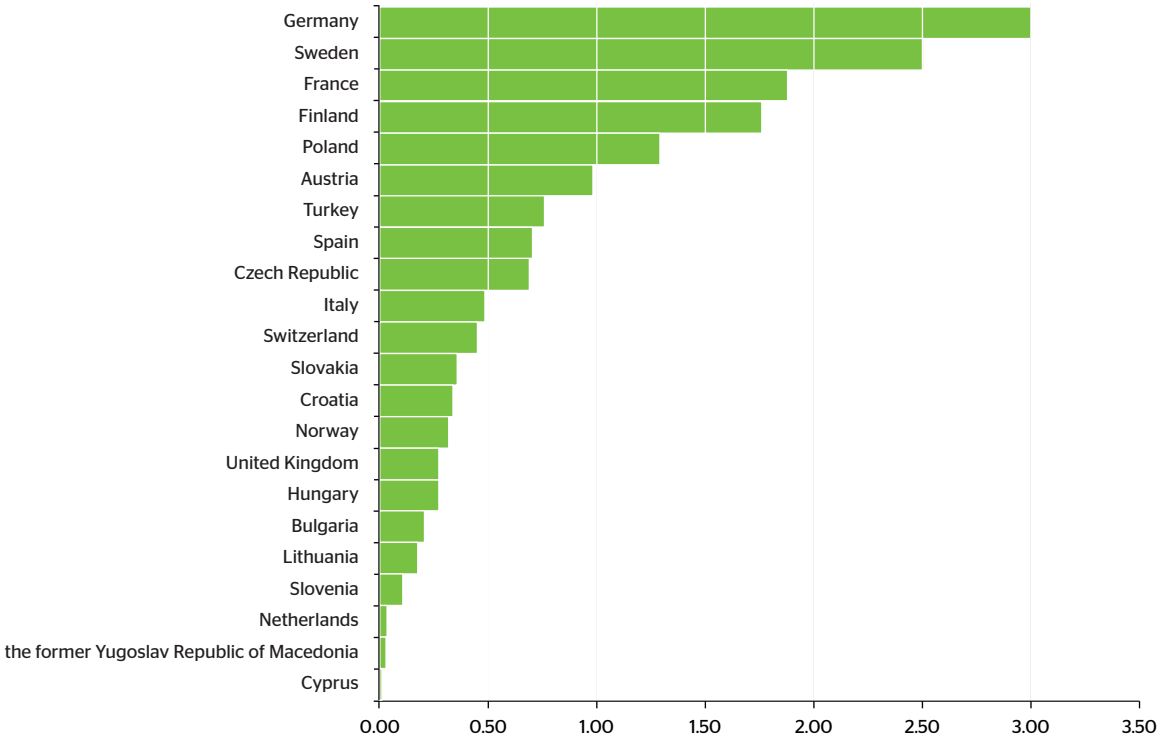


Table 22: Trend in volume and value of total roundwood, 1990 - 2010 (25 countries)

Region	Total roundwood															
	Volume (1 000 m³)				Volume (m³/ha FAWS)				Value (million EUR)				Value (EUR/ha FAWS)			
	1990	2000	2005	2010	1990	2000	2005	2010	1990	2000	2005	2010	1990	2000	2005	2010
Russian Federation	238 188	92 000	113 000	110 000	0.3	0.1	0.2	0.2	-	1 183	1 626	3 408	-	2	2	5
North Europe	99 231	136 408	146 347	132 722	2.3	3.3	3.6	3.2	3 714	4 720	4 867	4 979	83	105	108	111
Central-West Europe	132 991	144 259	155 919	147 857	4.3	4.5	4.8	4.5	6 358	6 216	7 024	7 941	189	184	208	235
Central-East Europe	46 054	53 786	64 188	66 991	3.2	3.8	4.7	4.7	933	1 884	2 341	2 596	65	131	163	181
South-West Europe	15 471	14 995	15 641	13 980	1.1	1	1	0.9	539	689	757	703	36	46	51	47
South-East Europe	26 441	27 654	31 394	35 253	1.9	2	2.4	2.7	1 323	1 354	1 538	1 524	95	97	111	110
Europe	558 375	469 101	526 488	506 803	0.7	0.6	0.7	0.6	12 867	16 047	18 154	21 151	16	20	23	26
Europe without the Russian Federation	320 187	377 101	413 488	396 803	2.8	3.2	3.5	3.4	12 867	14 864	16 528	17 743	106	122	136	146

The 25 countries reporting show a decrease in removals between 1990 and 2010, which was mainly caused by the Russian Federation, where removals in 2010 were less than half of the removals realized in 1990. In Europe without the Russian Federation, removals increased between 1990 and 2010 by approximately 66 million m³, with a high in 2000 (413 million m³) caused by sanitary fellings and the removal of downed trees after heavy storms in the end of the 1990's. Between 1990 and 2010 the level of removals per ha was maintained in all European regions, except the Central-East Europe region where a consistent rise from 3 m³/ha in 1990 to 5 m³/ha in 2010 was reported.

The value of removals increased steadily in all regions. A pronounced increase of value of removals can be observed in the Central-East Europe region (from EUR 933 million in 1990 to EUR 2 596 million in 2010) and in the Russian Federation (from EUR 1 183 million in 1995 to EUR 3 408 million in 2010).

Indicator 3.3 Non-wood goods

Introduction

Temperate and boreal forests are a traditional source not only for timber but also for many products that have been extracted from forests, including resin, tannin, fodder, litter, medical plants, fruits, nuts, roots, mushrooms, seeds, honey, ornamentals and exudates. In many parts of central Europe, forest sites became subject to nutrient imbalance due to using forests for grazing and extracting litter. Over time the utilization of non-timber products became marginalized as the management objectives shifted to timber production. The shift has been driven by different processes: the increasing estrangement of local people by an increasing disregard of subsistence use and small-scale rural industries, technological substitution, intensification of agricultural production and prosperity development.

Today there is an institutional rediscovery of the value of forest products and services other than timber. The socio-economic contribution of forests to livelihood and the impact of their use on the environment are essential components of modern concepts for sustainable forest management (Vantome, 2003) . The integration of the assessment of non-wood goods (NWGs) in extensive forest surveys causes problems as most NWGs are site specific, depend on spatial distributions and may be of only local importance.

The present indicator covers the value and quantity of marketed NWGs from forest and other wooded land. For reasons of consistency, NWGs harvested for self-consumption and other forms of uses are excluded, even if they could represent a substantial part of the total amount of harvested NWGs. In the available datasets, the main NWGs identified are as follows: Christmas trees, mushrooms and truffles, fruits and berries, cork, ornamental plants, medicinal or colorant products, seeds of forest tree species, game products and honey.

Status and trends

Quantities and/or values of marketed NWGs were provided by 33 countries. The available data sets are fragmentary for several reasons: the utilized assessment measures for quantity are not harmonized and render it difficult to compare data, collecting data on NWGs is costly, and most countries collect data only for specific NWGs that are of local significance. As the importance of NWGs differs among countries, a holistic view of all types of NWGs across Europe is difficult to obtain. However, the reported data clearly show that NWGs can be an important source of income on the local level (see Figure 33 and Table 23).

Due to the differences in reference units (e.g. weight, volume, number, or price) the following remarks relate not to quantity but to the value of NWGs. The total value that was reported for NWGs reaches almost EUR 2 763 million for the entire FOREST EUROPE region, of which EUR 2 116 million are marketed plant products and EUR 648 million are marketed animal products. The need for further processing differs significantly among individual NWGs; as a consequence, for some products, the marketed value of NWGs generates only marginal income for the forest owners as most of the marketed value is related to processing.
Christmas trees, fruits, berries and edible nuts, and cork are the three categories of NWGs for which the highest total values were obtained. In 2010, the reported values for those NWGs represented 83 percent of the total value of marketed NWGs in the FOREST EUROPE region.

The highest shares in the value generated by NWGs are tied with the Central-West (EUR 813 million) and the South-West Europe region (EUR 869 million). Lowest shares are reported for the South-East (EUR 35 million) and the Central-East (EUR 4 million) Europe region.

In 2010 almost EUR 980 million were realized by the marketing of Christmas trees, with highest values reported

Figure 33: Share of total value of marketed NWGs – plant products; absolute values given in EUR 1 000

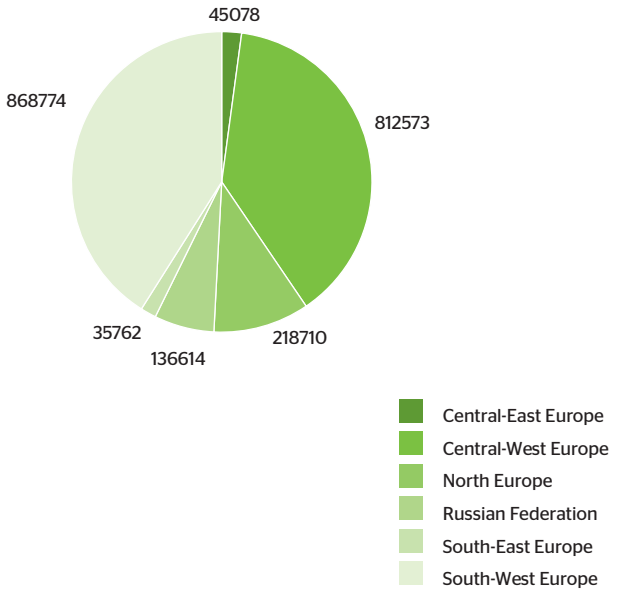


Figure 34: Share of total value of marketed NWGs – animal products; absolute values given in EUR 1 000

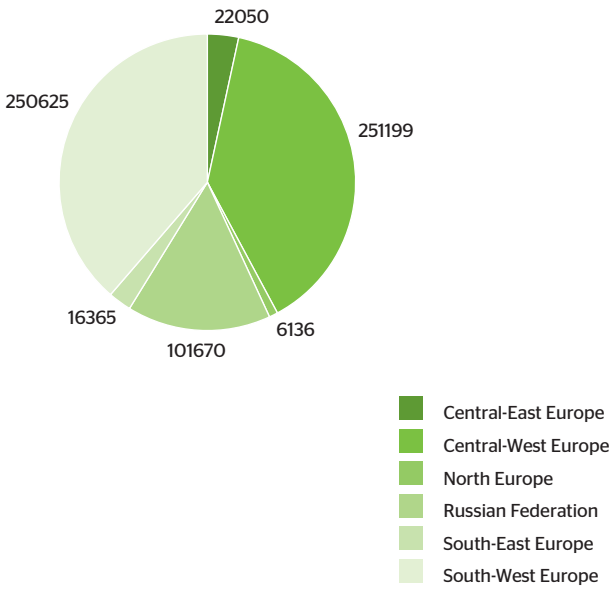


Table 23: Quantity and value of marketed NWGs: marketed plant products

	Christmas trees		Mushrooms and truffles		Fruits, berries and edible nuts		Cork		Resins, raw material – medicine, aromatic products, colorants, dyes		Decorative foliage, incl. ornamental plants (mosses,..)		Other plant products
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Value
Region	1 000 pcs	1 000 €	tonnes	1 000 €	tonnes	1 000 €	tonnes	1 000 €	tonnes	1 000 €	tonnes	1 000 €	1000 €
Russian Federation	6	4	9 332	21 006	49 053	105 501	-	-	5 059	7 861	-	2 240	3
North Europe	17 162	132 104	4 428	12 493	52 231	15 107	-	-	882	182	400	58 824	-
Central-West Europe	38 850	733 900	732	14 550	239	883	1 550	775	145	32	1 581	7 202	55231
Central-East Europe	1542	2 830	29 935	10 587	61 362	28 132	-	-	957	1 621	350	1 802	106
South-West Europe	-	110 828	366 873	124 161	208 236	299 574	167 665	323 850	7 351	2 364	-	-	7997
South-East Europe	631	377	17 398	11 283	5 056	10 296	-	-	17 368	12 476	37	921	408
Europe	58 193	980 043	428 699	194 081	376 178	459 494	169 215	324 625	31 762	24 536	2 368	70 989	63745
Europe without the Russian Federation	58 187	980 039	419 367	173 075	327 125	353 993	169 215	324 625	26 703	16 675	2 368	68 749	63742

for Central-West Europe (EUR 734 million) and North Europe (EUR 132 million). Christmas trees account for 34 percent of the total reported value of NWGs. 25 countries reported data on Christmas tree production. In Croatia, Denmark and Germany, harvested quantities exceeded 10 million pieces; the whole production in FOREST EUROPE countries amounted to 58 million Christmas trees. Values above EUR 100 million from Christmas tree production were realized in Denmark, France, Germany and Spain.

Data on mushrooms and truffles were provided by 24 countries and account for 9 percent (EUR 194 million) of the total value generated by NWGs. The highest values were reported for South-East and South-West Europe. Central-East Europe shows the lowest value obtained for mushrooms and truffles but the second highest quantity (30 million tonnes) after South-West Europe (367 million tonnes). Italy is by far the most important producer of mushrooms and truffles, with a share of 357 million tonnes or 83 percent of the total quantity.

Information on the quantity of fruits, berries and edible nuts has been reported by 23 countries, and on their value by 17 countries. In the reporting countries harvested fruits, berries and edible nuts amounted to 376 000 million tonnes, or EUR 459 million. The main producers in quantitative terms were Italy (116 million tonnes), Spain (70 million tonnes) and the Russian Federation (49 million tonnes), in terms of value, the main producers were Italy (EUR 187 million), the Russian Federation (EUR 106 million), Spain (EUR 60 million) and Portugal (EUR 34 million).

Data on cork production, which is limited to the Mediterranean region, were provided by France, Italy, Portugal and Spain. Portugal was the most important producer of cork and reports a production of 100 million tonnes with a value of EUR 203 million. The production in Spain (62 million tonnes; EUR 111 million), Italy (6 million tonnes; EUR 9 million) and France (1.6 million tonnes, EUR 0.7 million) was considerably lower.

Data on the three categories "Resins, raw material-medicine, aromatic products, colorants, dyes", "Decorative foliage, incl. ornamental plants", and "other plant products" were provided by 23 countries ("Resins etc.": 13 countries, "Decorative foliage": 9 countries; "other plant products": 10 countries). The total value of these three categories comprised approximately EUR 160 million. Among the countries reporting, the highest values were generated for decorative foliage in Denmark (EUR 58 million), for other plant products in Germany (EUR 54 million) and for resins, raw material- medicine, aromatic products, colorants, and dyes in Turkey (EUR 10.6 million) and the Russian Federation (EUR 7.9 million).

The share of total marketed values for marketed animal products is given in Figure 34. Central-West-Europe and South-West Europe (each about EUR 251 million) show the highest share. Table 24 presents the quantity and value of different types of marketed animal products.

Game comprises all hunted birds and mammals, such as partridge, pheasant, hare, deer, wild boar and chamois. The figures presented include game whose habitats are

forest-related or forest-dependent. Excluded is game roaming on farms. Data on game harvest, meat and hides were reported by 23 countries for the quantity and 19 countries for the value. In many countries, the commercial sale of game meat is an important economic activity. Among the reporting countries Germany (EUR 180 million) was by far the highest producer of game meat in terms of value. Among the reported value of non-wood products, game made up EUR 409 million (14 percent of NWGs) for all responding FOREST EUROPE countries.

Honey and bees wax production was mentioned by nine countries for quantities. The total value of marketed honey and bees wax amounted to EUR 243 million. The Russian Federation alone accounted for 47 percent of the total value.

The other categories of marketed animal products contributed approximately 3 percent to the total value generated by NWGs.

The value of NWG has almost tripled since the last State of Europe's Forests report in 2007. However, this increase is partly an artefact due to the rising information needs on NWGs and respective increase of assessment activities. Thus no trend for NWGs is presented.

Indicator 3.4 Services

Introduction

Forests provide numerous services beneficial to the public, e.g. their role in the global carbon cycle or in the protection of infrastructure. In the neighbourhood of agglomerations forests provide significant facilities for recreation. Forest services can either be marketed and generate economic values, or occur as side-effects of forest management without any economic benefits. The reported marketed services are forest-dependent or mainly forest-related and can be marketed by forest owners or others.

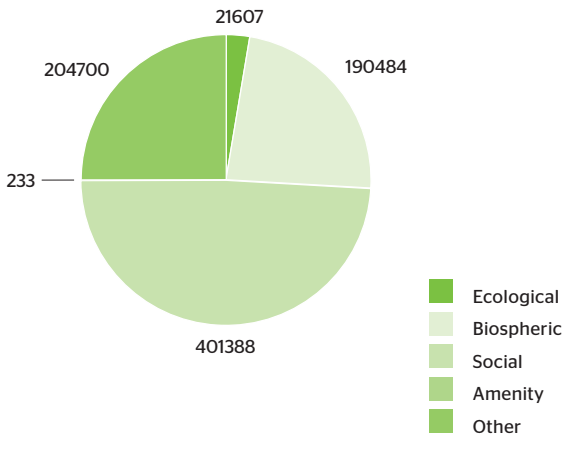
Marketed ecological services include those related to Indicators 5.1 and 5.2 (soil, water and other environmental functions as well as infrastructure and managed natural resources) on a voluntary contractual basis with compensation or other payments from private or public bodies.

Marketed biospheric services include services related to Indicator 4.6 (in situ or ex situ gene conservation of genetic resources) as well as Indicator 4.9 (protected forest area), e.g. nature protection on a voluntary contractual basis with compensation or other payments from private or public bodies. This includes NATURA 2000 sites. Contract nature protection schemes are increasingly discussed as a measure to promote ecological services of forests. This class also includes afforestation projects initiated for carbon sequestration in the context of the Kyoto Protocol.

Marketed social services include hunting or fishing licences, renting of huts and houses, as well as forest-based leisure, sports, and outdoor activities and educational activities that are not free of charge to the consumers (e.g. public and schools). Recreational services not exchanged via market transactions are not reported.

Amenity services include those related to spiritual, cultural and historical functions, e.g. sacred, religious, or other forms of spiritual inspiration, sites of worship, landscape features (mountains and waterfalls), "memories" in the landscape from past cultural ties, aesthetic enjoyment and inspiration, as well as historic artefacts.

Figure 35: Marketed services from forest and other wooded land in Europe (based on data from 16 reporting countries)



Other marketed services include payments to woodland owners for licences that regulate land use for gravel extraction, telecommunication masts, wind farms, and electricity distribution, among others.

Depending on national laws, these marketed services of the forest may contribute directly to the income of forest owners and thus contribute to the economic viability of sustainable forest management.

Status and trends

Data on the value of marketed services were reported by 16 countries, representing 86 percent of the whole FOREST EUROPE area, even if data were limited in most countries. Figure 35 presents the proportion of marketed services as provided by the reporting countries.

A number of countries reported difficulties in quantifying the value of marketed services. The main reason is the impossibility of properly identifying marketed and non-marketed services. Although the marketed forest-related services are well identified, income is not known or registered or covers only part of the forest sector (e.g. private versus public ownership). The only well-documented marketed services are hunting and fishing licences.

About half of the reporting countries provided data on hunting licences, which are one of the most important traditional services. Hunting licences can be a source of significant income for private and public landowners. The rates vary considerably across Europe and depend, among other factors, on the location and attractiveness of the hunting grounds.

The total value for marketed services, considering the relatively few responding countries, was almost EUR 818 million and more or less stable in comparison with the EUR 941 million reported in 2007. The highest share was reported for social services (EUR 401 million), the lowest for amenity services (EUR 0.2 million).

From the enquiry, it is obvious that even if data on marketed services are very limited in FOREST EUROPE countries, they represent a non-negligible income for forest owners.

Table 24: Quantity and value of marketed non-wood goods (NWGs) marketed animal product

	Game meat		Living animals		Pelts, hides, skins and trophies		Wild honey and bee-wax		Raw material for medicine, colorants		Other animal products
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Value
Region	tonnes	1000 €	1000 pcs	1000 €	1000 pcs	1000	tonnes	1000 €	tonnes	1000 €	1000 €
Russian Federation	16 945	16 945	16 945	16 945	16 945	16 945	16 945	16 945	16 945	16 945	16 945
North Europe	33 535.2	5 791	-	-	47 316	345.5	-	-	-	-	-
Central-West Europe	42 264	217 505	-	-	28 700	6 738	10 150	25 616	-	-	1 340
Central-East Europe	23 903.4	15 117	3 117	1 221.2	50 358.6	2 136	-	-	160	1 115	2 461.1
South-West Europe	2 634	149 537	-	-	-	-	37 869	101 088	-	-	-
South-East Europe	2 368.31	4 266.5	-	-	6 526.3	8 439.16	4 275	3 660	-	-	-
Europe	121 650	409 162	20 062	18 166	149 846	34 604	69 239	147 309	17 105	18 060	20 746
Europe without the Russian Federation	104 705	392 217	3 117	1 221	132 901	17 659	52 294	130 364	160	1 115	3 801
EU-27	121 650	394 457	3 117	1 221	126 032	16 679	47 469	119 704	160	1 115	1 366.1

Indicator 3.5 Forest under management plans

Introduction

Management plans (or equivalents, such as guidelines at various administrative levels) allow countries to maintain and foster a valuable approach towards implementation of multiple long-term sustainability goals. FOREST EUROPE defines forest management plans as "Information (in the form of text, maps, tables and graphs) collected during (periodic) forest inventories at operational forest units level (stands, compartments) and operations planned for individual stands or compartments to reach the management goals" and equivalents as "Information collected on forest area, at forest management or aggregated forest management unit level (forest blocks, farms, enterprises, watersheds, municipalities, or wider units), and strategies/management activities planned to reach the management or development goals".

The concept and implementation of management plans vary a lot among and within countries. Some countries consider management plans as both formal and informal.

Status

29 countries reported the area of forest under management plans or equivalents for a total of 190 million ha, representing nearly 77 percent of European forest area without the Russian Federation.

Figure 36 shows the share of forests under management plans or equivalents for FOREST EUROPE countries with available data for 2010. Around 90 percent of the forests in these countries were actually under a management plan or an equivalent. Countries such as Malta, Turkey, Slovenia, Bulgaria, Liechtenstein Slovakia, Czech Republic and Belarus as well as the Russian Federation reported that all forest area was covered by management plans. Serbia, Georgia and Albania provided data without any distinction between a management plan and an equivalent.

Twenty-three countries reported about management of other wooded land. Approximately 65 percent of the other wooded land in these countries were under management plans or equivalents.

In the Central-West and South-East Europe, forest management was mainly regulated by management plans. Equivalents to management plans were important in the North and Central-East Europe for small, privately-owned forest holdings. With the exception of Spain and Malta, current information on forests under management plans was missing for South-West Europe.

Trends

24 countries provided information covering the period between 1990 and 2010. The change rate of forests covered by management plans or equivalents was slightly increasing in the last ten years, yet information was only available for 12 percent FOREST EUROPE's forest area. Only Central-West Europe (and in particular France) reported a negative change rate over the period from 2000 to 2010. The data reported indicate that the change rate of other wooded land under management plans or equivalents remained almost constant for the period 1990–2010.

Figure 36: Percentage of forest area under management plans or equivalents, 2010