

Criterion 6: Maintenance of other Socioeconomic Functions and Conditions

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Human interactions with forests span over ages. Forests have served as a source of food, shelter, and wood for various purposes. Though progress in technologies and urbanisation have reduced the dependence of people on food from forests, forests still generate job opportunities and income, as well as provide many other ecosystem services, including those essential for sustainable livelihoods in rural areas, bringing benefits for human health and sustainable life in urban areas. The forest sector is a part of a circular bio-economy with potential for further development.

Key messages

- Forest land is almost equally owned by public and private entities; however, the number of private entities is much higher and their average size much smaller.
- Forest sector growth is lagging, resulting in a decline in the sector's contribution to GDP in Europe.
- Income is largely limited to timber production, while undeveloped markets with other ecosystem services often result in low net revenues, which also limits investment for further development.
- Forests and their management are a source of livelihood in many rural areas. Despite that, employment in the forest sector is declining in the long term and there remains a high number of accidents in forestry.
- Policy objectives related to the maintenance of socio-economic functions focus, among other things, on ecosystem services, free access to forests, forest-related value chain contribution to GDP, favourable employment opportunities, forest biomass for energy generation, investments for innovation, and sustainable consumption. The major challenges include the continuing depopulation of rural areas, occupational safety and health, pressures of increasing recreation use, but also to the limited connection infrastructure to forests, volatile wood markets, and efficiency of woody biomass use.

Indicator 6.1 Forest holdings

Number of forest holdings, classified by ownership categories and size classes

Key findings

- About 53.5% of Europe's forests are in public ownership and 46.5% in private ownership.
- Private holdings are, in general, much smaller than public ones. In terms of numbers, majority of private holdings are up to 10 ha, in terms of areal representation, the largest proportion of private forests is in the size class from 11 to 500 ha.
- In the period 1990-2015, afforestation and privatisation of public land resulted in about 22% increase of private forest area and a decrease of public forest area by 2%.

Introduction

The type and size of forest holdings are fundamental characteristics of forestry with profound impacts on the way forests are managed and on the resulting products and services provided for society. Due to different historical, legal and social circumstances of each country, patterns of public and private ownership vary greatly across Europe and several trends of change are observed. Specific developments include:

- the restitution of nationalised forests in former socialist countries in Central-East and South-East Europe,
- the privatisation and reorganisation of state forests,
- fragmentation and urbanisation,
- the extension of forest areas through afforestation of public and private land,
- the natural expansion of the forest, which often occurs on less productive agricultural land.

Although the forest ownership has gained increasing attention by science and policy (e.g., the UNECE/FAO Forest Ownership Project), the knowledge on the drivers of change is still limited. They include privatisation of state forests in some countries but also agricultural policies, which lead to structural changes in farms with indirect effects on forests. It should be noted that all these changes happen slowly and are deeply interconnected with the legal and social circumstances of each country – which are, in fact, more differentiated and unique than indicated by the statistics. Further, forest ownership is much more

complex than the simplified division into public and private entities. For instance, public ownership can occur at the national level but also at subnational or local levels. Private owners can be:

- individuals (e.g., farmers, absentee owners, ancient families or profit-oriented investors), or
- organisations (e.g., profit or non-profit industry/enterprises or associations/communities, such as churches).

Motivations, goals, capacities and behaviour of forest owners vary and their property rights differ across European regions. General overviews or cross-country comparisons are highly restricted by differing national statistical systems and limited data availability. This report comprises basic information from national statistics on public and private ownership as well as the number and size of forest holdings. Given that this information was not available for all countries, we report the data coverage for the respective characteristics and regions.

Status

In total, there are about 53.5% of public and 46.5% of private forests in Europe (Table 6.1-1). At the national level, we find a strong variation with specific regional differences in regard to the shares of public and private forests across Europe. While private ownership clearly dominates in western European regions (Central-West, South-West and North Europe), it is the opposite in Central-East and South-East Europe, even after restitution processes have almost finished in most of these countries. In North Europe, around 70% of the forests are privately owned, while in South-East Europe around 90% are public (Table 6.1-1). In some countries, forests are almost exclusively in public ownership.

Public forest holdings are, on average, much larger than private ones. However, the sizes and numbers of both vary greatly among countries. Smaller holdings tend to be found in South-East Europe, and larger ones in North Europe. Public forests are mostly municipal and state holdings, where state forests are sometimes split into smaller units for management purposes. Most of public holdings in Europe (20 342 holdings reported by 19 countries) have a size between 11 and 500 ha, while the vast majority of private forest properties (almost two million holdings reported by 18 countries) belong to the size class up to 10 ha, often as a result of inheritance splitting.

The largest proportion of public forests area is in holdings larger than 500 ha (60 million ha reported by 18 countries), while the most of private forest area

is in holdings of size class from 11 to 500 ha (almost 17 million ha, followed by the size class above 500 ha with 12 million ha reported by 17 countries).

Table 6.1-1: Share of public and private ownership, by region, 2015

Region	Public		Private	
	1 000 ha	%	1 000 ha	%
North Europe	17 512	29.8	41 268	70.2
Central-West Europe	13 366	37.0	22 778	63.0
Central-East Europe	37 446	85.7	6 241	14.3
South-West Europe	5 352	24.5	16 475	75.5
South-East Europe	29 520	90.5	3 085	9.5
EU-28	56 892	39.3	87 785	60.7
Europe	103 196	53.5	89 847	46.5

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 100%, C-EE 100%, S-WE 70%, S-EE 81%, EU-28 92%, Europe 87%.

Trends

In the countries providing data on forest holdings for both 1990 and 2015, the private forest area increased by about 22.2%, whereas the public forest area decreased by 2.2% compared to the initial area in 1990. This reflects an overall increase in forest area as well as privatisation of public forests.

In North Europe, the public forest area decreased by 15.7%, mainly due to the restitution and privatisation processes in the Baltic countries, leading to a decrease of public forest area in these three countries to 41.1% since 1990, with the major change between 1990 and 2000. In the Scandinavian countries, changes due to privatisation were negligible. Private forest area in North Europe is characterised by a steady increase of 11.5% over the period 1990-2015.

In Central-West Europe both public and private forest areas increased from 1990 to 2015, with a more pronounced increase in private forests. This increase was due to afforestation (programmes) in both ownership categories. A similar situation was found in South-West Europe with an even stronger increase by more than 20.4% in public and 28.1% in a private forest.

Since 1990, restitution processes have restored private forest land in several East European countries. This development was stronger in Central-East than in South-East Europe. Generally, in this region, the public forest area moderately decreased in favour of a growing share of privately-owned forests. Given that the restitution processes are near to completion

in many of these countries, this general trend has slowed down substantially in the last years. In South-East Europe, we find an overall increase in both publicly- and privately-owned forest area, with a slight increase of public forest area by 6.5% but 67.7% of private forests, according to data available from five countries in this region and a major impact on private forests caused by reprivatisation in Bulgaria.

Public forest land is still dominating in both Central-East and South-East Europe (Figure 6.1-1). The strong dominance of public forests in a number of non-EU countries in South-East Europe explains the difference in the overall share of public and private forests when comparing EU-28 with Europe as a whole. Generally, shares of public forests have slightly decreased in Europe.

Looking at the number of forest holdings, we observe a mixed picture of both public and private forests in most European regions. Extremely limited data, however, hinder a more detailed analysis of trends. Changes in the number of public forest holdings include different trends of centralization or decentralisation of state forests. The rising number is partly caused by internal re-organisation but also due to new municipal forests after restitution of state forests in East Europe. In private forests, the often-assumed trend of ownership fragmentation is not reflected by the data. Structural changes in the agricultural sector also lead to increasing average farm size.

In North Europe, a slight increase in the number of public forest holdings can be detected, while private forest holdings increased in most countries, especially in the Baltics. Central-West Europe is characterised by a slightly decreasing number of holdings in both ownership categories, although with some

exceptions. In Central-East Europe there was a slight decrease in the number of public forest holdings, while a more pronounced increase in private forest holdings took place. General trends in South-West and South-East Europe cannot be identified due to limited data coverage over the entire period.



Figure 6.1-1: Trends in the share of public forest area, by region, 1990-2015

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 100%, C-EE 94%, S-WE 70%, S-EE 74%, EU-28 90%, Europe 85%.

Indicator 6.2 Contribution of forest sector to GDP

Contribution of forestry and manufacturing of wood and paper products to gross domestic product

Key findings

- The total gross value added in the forest sector in Europe contributed about 0.7% to the gross domestic product in 2015. The forest sector is of the highest relative economic importance in North Europe, contributing to the gross domestic product by almost 2%.
- The growth of forest sector gross value added is slower than the average growth of economies, resulting in the decline of forest sector contribution to gross domestic product in Europe from 1.14% in 2000 to 0.79% in 2015.

Introduction

The forest sector consists of forestry¹⁶, the manufacture of wood and articles of wood (hereinafter “wood industry”)¹⁷ and the manufacture of paper and paper products (hereinafter “paper industry”)¹⁸. Their contribution to the gross domestic product (GDP) indicates the sector’s economic importance. It is measured by the gross value added (GVA) and calculated as the total value of the sector’s output minus the value of intermediate goods and services used as inputs during production. The data provided for this indicator only reflect the reported and direct contribution of activities in the formal forest sector to GDP¹⁹, i.e. the added value generated

and measured in the subsectors. However, given that forestry provides multiple not reported public ecosystem goods and services, the actual impact on the economy can be assumed to be underestimated in this publication.

In order to obtain comparability across regions and over time, the information about the GVA by the forest sector was extracted from the EUROSTAT Database (national accounts aggregates by industry) for four years (2000, 2005, 2010 and 2015), and disaggregated into the value added by three subsectors. Pre-filled data were validated by the countries and missing data were added. The resulting figures were converted into a common currency (euro) for aggregation at the European and regional levels.²⁰

Apart from a few exceptions, it was possible for the majority of countries to compile the required data. In some countries, some data were not available for all subsectors in each given year. However, the countries that provided data for all years account for more than 94% of the forest area of EU-28 countries and for about 78% of the forest area in Europe.

Status

In 2015, the total GVA in the forest sector in Europe amounted to EUR 1174 thousand million and contributed 0.72% to GDP in the region. Forestry accounted for 22.1% of the GVA of the overall forest sector, while the wood industry generated 36% and the paper industry 41.9% of this total.

Table 6.2-1: Value added in forest sector, by subsectors and relative contribution to gross domestic product, by region, 2015

Region	Gross value added in the forest sector								
	Forestry (ISIC/NACE 02)		Wood industry (ISIC/NACE 16)		Paper industry (ISIC/NACE 17)		Forest sector (ISIC/NACE 02, 16, 17)		Contribution to total GDP
	1 000 million	%	1 000 million	%	1 000 million	%	1 000 million	(%)	
North Europe	8.9	37.8	6.6	28.0	8.0	34.2	23.5	1.97	
Central-West Europe	8.6	15.0	21.3	37.3	27.2	47.6	57.0	0.61	
Central-East Europe	4.3	29.6	6.0	41.3	4.2	29.1	14.5	0.50	
South-West Europe	3.2	16.3	7.5	38.0	9.0	45.7	19.7	0.75	
South-East Europe	0.9	34.8	1.0	35.6	0.8	29.6	2.7	0.83	
EU-28	24.5	22.2	37.9	34.4	47.8	43.4	110.1	0.82	
Europe	25.9	22.1	42.3	36.0	49.2	41.9	117.4	0.72	

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 72%, S-WE 100%, S-EE 40%, EU-28 100%, Europe 84%.

¹⁶ ISIC/NACE Division 02: Forestry and logging

¹⁷ ISIC/NACE Division 16: Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials

¹⁸ ISIC/NACE Division 17: Manufacture of paper and paper products

¹⁹ Data were collected and presented in accordance with ISIC Rev. 4 and NACE Rev. 2 (2008)

²⁰ Unless otherwise stated in the text, the figures presented here are in nominal terms, not adjusted for inflation.

Table 6.2-1 presents the GVA of the forest sector and subsectors, and the relative contribution to GDP by region in 2015. The economic importance of the forest sector and the distribution of value added among the three subsectors vary greatly among countries and across regions.

The forest sector has the highest relative economic importance in North Europe where its contribution to GDP is about twice as high (1.97%) as the European average (0.72%). Around 85% of the value added in the European forest sector is produced in three regions: North Europe, Central-West Europe and South-West Europe. This is largely due to the high levels of value added achieved in the processing subsectors in these regions. At the country level, the value added of the forest sector in 2015 was highest in Germany (EUR 20.9 thousand million), followed by France (EUR 11.5 thousand million), Italy (EUR 11.0 thousand million), Sweden (EUR 10.3 thousand million), United Kingdom (EUR 10.2 thousand million), Finland (EUR 7.6 thousand million), Poland (EUR 6.5 thousand million), Spain (EUR 6.0 thousand million) and Austria (EUR 5.4 thousand million).

Forestry, as a subsector, is most important in South-East Europe, where it accounted for around 34.8% of the total value added to the overall sector. In North and Central-East Europe, this share is also higher than the European average, while it reaches just about 15.0% in Central-West and 16.3% South-West Europe.

The European wood industry generated 36% of the forest sector's value added with North Europe falling below this average. In Central-West and South-West Europe, the value added of the forest sector is dominated by the contribution of the paper industry.

The forest sector is particularly important for the economies of Latvia, Estonia, Finland, Slovakia, Sweden, Bosnia and Herzegovina and Lithuania, where it accounts for 2.4 to 4.5% of GDP. The sector is also relatively important in Slovenia, Austria, Czech Republic, Portugal and Poland, where it generated about 1.7 to 1.9% of GDP. In all other European countries, the forest sector contributed less than 1.5% to GDP (Figure 6.2-1).

Trends

Figure 6.2-2 shows the trends in the forest sector's value added by subsectors and contribution to GDP in Europe. For compatibility and consistency over time, the countries that provided only partial data were excluded. The countries presented in the graph accounted for around 90% of Europe's GDP and value

added in the forest sector. Therefore, the respective trends provide an appropriate picture of the overall development in Europe. Tables 6.2-2, 6.2-3 and 6.2-4 present the forest sector's GVA by subsectors and regions for years 2000, 2005, 2010 and 2015.

The annual GVA of the forest sector (Figure 6.2-2) in Europe remained quite stable at around EUR 100 thousand million from 2000 to 2010 and increased to EUR 110.5 thousand million in 2015. The contribution of the forest sector to GDP in Europe declined from 1.14% in 2000 to 0.79% in 2015. This was mainly due to the fact that the forest sector did not keep pace with the other rapidly growing sectors of the European economy.

The trends in gross value added varied across subsectors (Figure 6.2-2). GVA in the forestry subsector was quite stable from 2000 to 2005 and then grew steadily by 4.7% annually over the period 2005-2015. GVA in the wood industry grew by 1.5% annually in 2000-2005 but was disrupted by the global economic downturn in 2008-2009. It declined at an annual rate of 0.8% from 2005 to 2010, while from 2010 to 2015, it recovered by 1.3% annually. GVA of the paper industry decreased by 1.5% annually during 2000-2010. After the global economic downturn, the paper industry recovered and grew by 1.9% annually during the period 2010-2015.

The regional distribution of the forest sector's value added in Europe also changed slightly during 2000-2015 (Figure 6.2-3). The share of South-West and North Europe decreased from 20.9 to 17.8% and from 23.4 to 21.3%, respectively. In South-West Europe, this reduction was mainly caused by a value-added decrease of 22.9% in the wood industry. In North Europe, the value added of the paper industry decreased by 35% over the period 2000-2015. Meanwhile, Central-East Europe's share increased from 3 to 7.1% mainly due to gains in the value added in all subsectors. The shares of Central-West Europe remained roughly the same during the period 2000-2015.

At country level, most of the countries in Europe increased their value added of the forest sector during the period 2000 to 2015. The highest increase in value added took place in Germany (EUR 1.99 thousand million), followed by Romania (EUR 1.4 thousand million). Finland, Spain, Italy, Greece, Ireland, Norway, Belgium and Denmark are among the countries in which the added value of the forest sector decreased in this period. The highest decrease was reported in Finland (EUR -1.6 thousand million) and Italy (EUR -0.740 million).

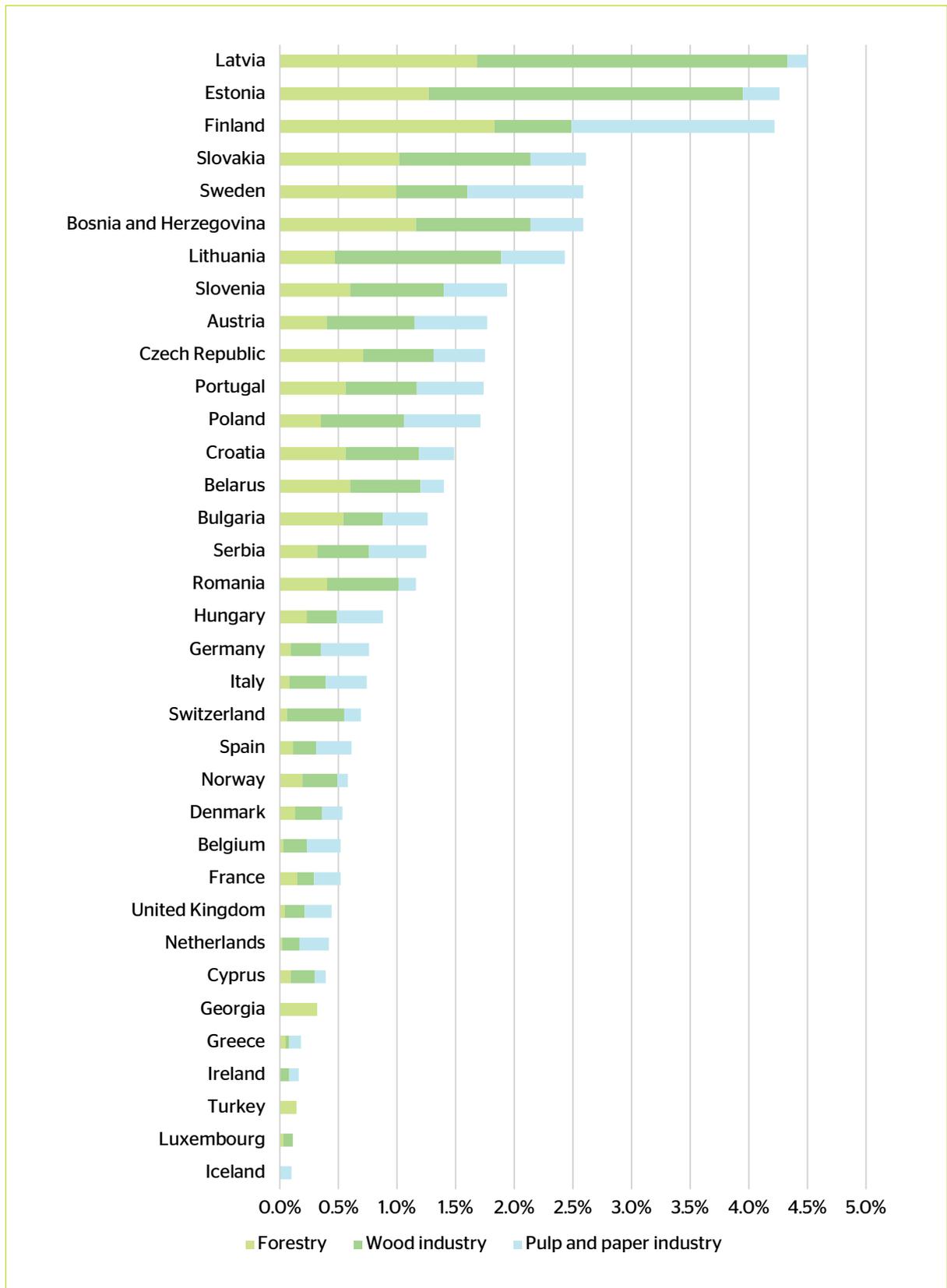


Figure 6.2-1: Contribution of the forest sector to gross domestic product, by country, 2015

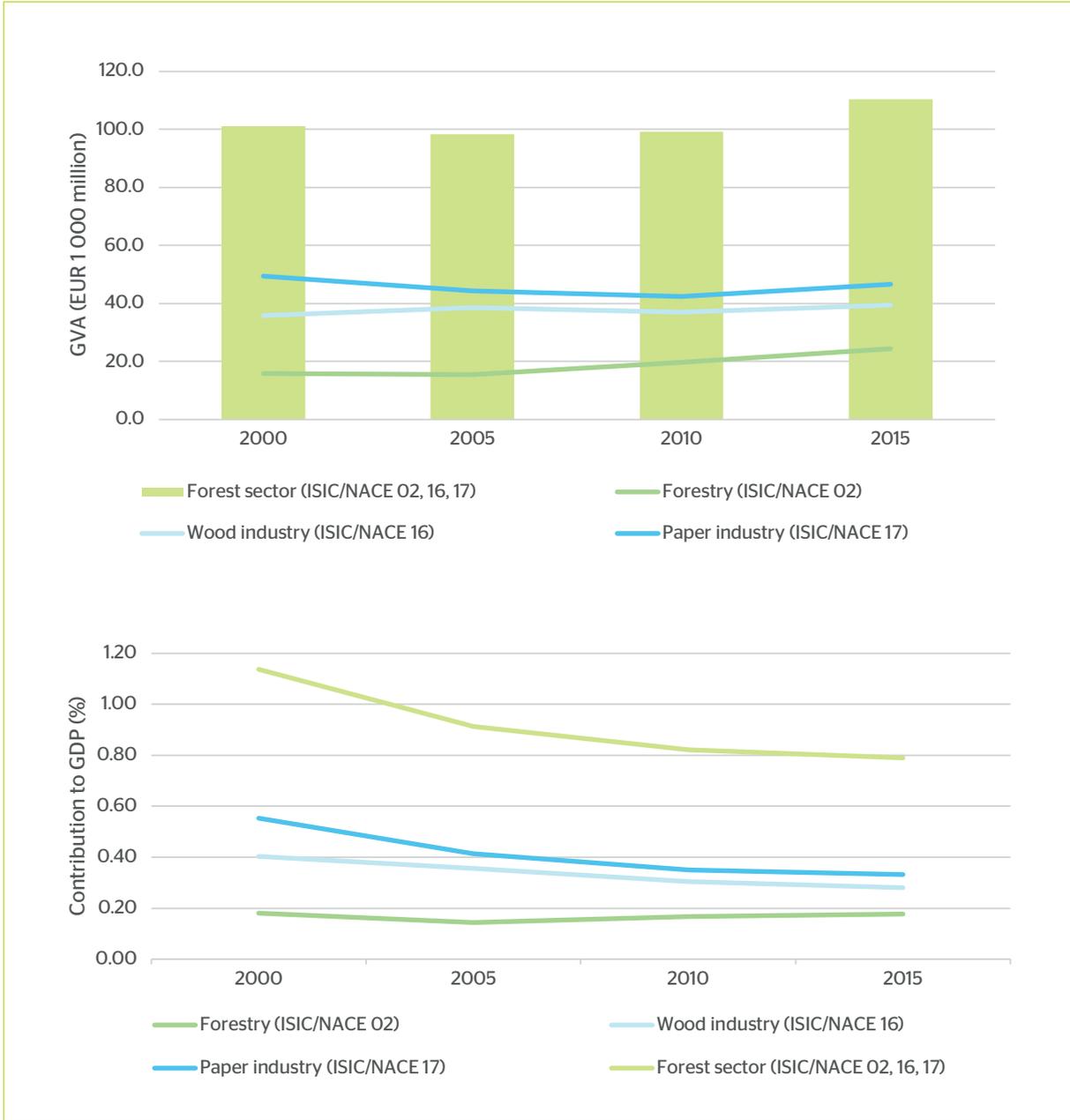


Figure 6.2-2: Trends in the forest sector and subsectors gross value added and relative contribution to gross domestic product in Europe, 2000-2015

Note: Data coverage as % of total regional forest area: 78%.

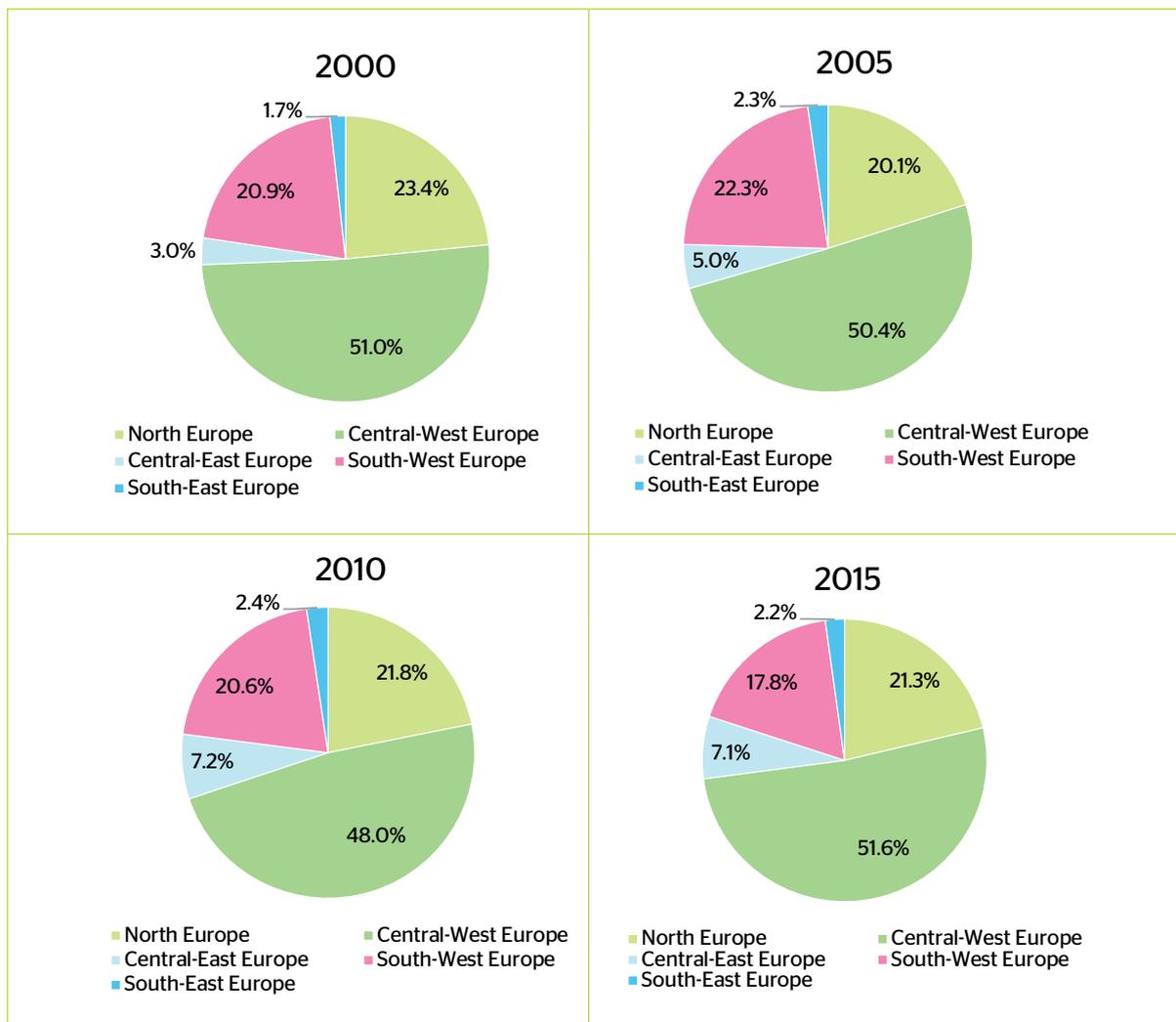


Figure 6.2-3: Trends in the regional distribution of the forest sector's gross value added, 2000-2015

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 50%, S-WE 100%, S-EE 34%.

Table 6.2-2: Trends in forestry (ISIC/NACE 02) gross value added and contribution to gross domestic product, by region, 2000-2015

Region	Gross value added (EUR 1 000 million)				Contribution to GDP (%)			
	2000	2005	2010	2015	2000	2005	2010	2015
North Europe	6.1	4.8	8.2	8.9	0.85	0.55	0.78	0.75
Central-West Europe	5.6	5.7	6.1	8.6	0.09	0.08	0.08	0.09
Central-East Europe	1.0	1.4	1.9	2.9	0.56	0.43	0.43	0.56
South-West Europe	2.8	3.2	2.7	3.2	0.16	0.13	0.11	0.12
South-East Europe	0.8	1.1	1.6	1.9	0.16	0.16	0.16	0.18
EU-28	14.9	14.5	18.5	23.2	0.18	0.18	0.17	0.18
Europe	16.3	16.1	20.6	25.5	0.18	0.17	0.17	0.17

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 50%, S-WE 100%, S-EE 88%, EU-28 94%, Europe 88%.

Table 6.2-3: Trends in wood industry (ISIC/NACE 16) gross value added and contribution to gross domestic product, by region, 2000-2015

Region	Gross value added (EUR 1 000 million)				Contribution to GDP (%)			
	2000	2005	2010	2015	2000	2005	2010	2015
North Europe	5.2	6.5	6.0	6.6	0.73	0.75	0.57	0.55
Central-West Europe	19.1	18.8	17.9	21.3	0.32	0.27	0.23	0.23
Central-East Europe	1.2	2.3	3.7	3.3	0.06	0.12	0.18	0.13
South-West Europe	9.7	10.1	8.7	7.5	0.54	0.43	0.34	0.29
South-East Europe	0.7	0.9	0.9	0.8	0.38	0.33	0.25	0.26
EU-28	33.5	35.6	33.6	35.2	0.40	0.35	0.29	0.27
Europe	35.9	38.6	37.1	39.5	0.33	0.31	0.27	0.24

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 51%, S-WE 100%, S-EE 34%, EU-28 94%, Europe 79%.

Table 6.2-4: Trends in paper industry (ISIC/NACE 17) gross value added and contribution to gross domestic product, by region, 2000-2015

Region	Gross value added (EUR 1 000 million)				Contribution to GDP (%)			
	2000	2005	2010	2015	2000	2005	2010	2015
North Europe	12.4	8.5	7.5	8.1	1.72	0.97	0.72	0.66
Central-West Europe	26.9	25.3	23.6	27.2	0.45	0.36	0.31	0.29
Central-East Europe	0.9	1.2	1.6	1.7	0.55	0.39	0.35	0.33
South-West Europe	8.6	8.6	9.0	9.0	0.47	0.37	0.35	0.34
South-East Europe	0.6	0.8	0.8	0.8	0.33	0.27	0.22	0.24
EU-28	47.6	42.8	41.0	45.3	0.56	0.42	0.36	0.35
Europe	49.5	44.4	42.5	46.7	0.55	0.41	0.35	0.33

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 51%, S-WE 100%, S-EE 34%, EU-28 94%, Europe 79%.

Indicator 6.3 Net revenue

Net revenue of forest enterprises

Key findings

- The average net operating surplus of forest enterprises in Europe was about EUR 88 per hectare of forest in 2015.
- Factor income, as the sum of labour costs and profit, was about EUR 143 per hectare in 2015, however, it varies considerably among European regions.
- Per-hectare factor income of forestry increased by an average annual rate of about 3% in the period 2000-2015, showing high volatility across European regions.

Introduction

The net revenue of forest enterprises is an important indicator of the economic performance and viability of forest management. From the national perspective, the increasing net revenue of forest enterprises reflects the contribution to a country's economic growth. The net revenue is presented by means of the factor income and the net operating surplus.

Factor income of forest enterprises measures the remuneration of all factors of production (land, capital, labour) generated by forestry activities. It represents the value generated by an economic unit engaged in forest production activities. The factor income represents the net value added less any taxes on production and adding any subsidies on the production.

Information about factor income and the net operating surplus was extracted from the EUROSTAT Database (Economic aggregates of forestry) for four years (2000, 2005, 2010 and 2015)²¹. Pre-filled data

were validated by countries, and missing data were added when available. The resulting nominal figures were converted into a common currency unit (euro) for aggregation at the European and regional levels.

Status

In the reporting countries, factor income of forest enterprises amounted to EUR 21 thousand million in 2015. The main share of factor income was generated in North and Central-West Europe (Table 6.3-1). These are the regions with the highest data coverage (corresponding to 97% and 99% of the total regional forest area, respectively). Given that many countries of the other regions did not report continuously, data coverage is substantially lower, thereby hindering the cross-regional comparison of economic performance. The same holds for the net operating surplus, which summed up to about EUR 12.9 thousand million and the biggest share was reported in North and Central-West Europe.

Table 6.3-1 shows that the factor income, as well as net operating surplus per ha in 2015 varied considerably among regions. South-West Europe recorded the highest factor income (EUR/ha 249.2) and net operating surplus (EUR/ha 212.0) in 2015 followed by Central-West Europe. The lowest factor income and net operating surplus per hectare were generated in South-East Europe. When interpreting these regional results, it should be noted that some of them are based on a rather low data coverage (between 11% in South-West Europe and 52% in Central-East Europe) of the total forest area in these regions. South-West Europe, for example, is represented by just one country (Portugal) providing data on both characteristics.

Table 6.3-1: Status of the factor income and net operating surplus of the forest enterprises, by region, 2015

Region	Factor income		Net operating surplus	
	EUR million	EUR/ha	EUR million	EUR/ha
North Europe	7 097	102.8	5 518	80.0
Central-West Europe	8 155	214.2	5 018	131.8
Central-East Europe	3 943	171.7	1 094	47.6
South-West Europe	825	249.2	702	212.0
South-East Europe	966	73.0	571	43.1
EU-28	19 910	152.0	12 413	94.7
Europe	20 987	143.1	12 903	88.0

Note: Data coverage as % of total regional forest area: NE 97%, C-WE 99%, C-EE 52%, S-WE 11%, S-EE 33%, EU-28 81%, Europe 65%.

²¹ The figures presented here are in nominal terms, not adjusted for inflation.

Table 6.3-2: Trends in the factor income of forestry, by region, 2000-2015

Region	Factor income				The annual change rate of factor income			
	2000	2005	2010	2015	2000-2005	2005-2010	2010-2015	2000-2015
	EUR/ha				%			
North Europe	82.9	53.2	104.4	118.8	-8.54	14.43	2.69	2.43
Central-West Europe	139.4	144.3	138.4	198.0	1.29	-0.35	7.90	2.89
Central-East Europe	35.0	57.8	69.0	88.5	11.24	4.26	5.24	6.87
South-West Europe	91.8	79.4	79.8	188.7	-2.20	0.47	19.41	5.47
South-East Europe	27.9 ²²	29.0	16.5	39.2	1.39	6.96	-0.05	2.72
EU-28	93.0	77.6	105.0	142.4	-3.32	6.46	6.51	3.11
Europe	94.1	78.1	98.5	143.2	-3.43	6.48	6.50	3.07

Note: Data coverage as % of total regional forest area: NE 75%, C-WE 66%, C-EE 5%, S-WE 40%, S-EE 13%, EU-28 60%, Europe 44%.

Trends

Regional trends are difficult to determine because the number of reporting countries of each region varies over time. Therefore, only those countries are included in the statistics that continuously provided the required data for the examined time periods.

In Europe, factor income of forestry per hectare increased from EUR 94.1 to 143.2 with an average annual growth rate of about 3% in the period 2000-2015 (Table 6.3-2). Notwithstanding this positive trend, it has to be noted that factor income first decreased between 2000 and 2005, and recovered with annual growth rates of 6.5% in periods 2005-2010

and 2010-2015. The highest volatility can be found in North Europe, where an annual decrease of 8.5% from 2000-2005 was followed by a steep increase of 14.4% per year during 2005 to 2010, and an annual growth of 2.7% until 2015. A similar development can be observed for the net operating surplus of forest enterprises (Table 6.3-3). The average growth rate of 2.2% in the reporting European countries is slightly lower than in the case of the factor income. However, the variation between the different five-year periods is more pronounced at regional levels.

Table 6.3-3: Trends in the net operating surplus of forest enterprises, by region, 2000-2015

Region	Net operating surplus				Annual change rate of net operating surplus			
	2000	2005	2010	2015	2000-2005	2005-2010	2010-2015	2000-2015
	EUR/ha				%			
North Europe	68.0	35.3	81.7	94.7	-12.34	18.29	3.06	2.24
Central-West Europe	75.7	84.5	69.5	122.0	2.83	-3.36	12.41	3.76
Central-East Europe	7.6	9.6	15.9	6.6	5.18	11.14	-16.10	-0.65
South-West Europe	299.8	187.0	166.9	212.0	-8.88	-2.56	5.29	-2.22
South-East Europe	14.7	16.8	27.1	27.2	3.28	10.80	0.05	4.62
EU-28	77.5	55.2	78.9	103.5	-6.40	7.59	5.77	2.13
Europe	68.7	49.1	71.3	92.5	-6.32	7.98	5.52	2.20

Note: Data coverage as % of total regional forest area: NE 75%, C-WE 66%, C-EE 24%, S-WE 11%, S-EE 13%, EU-28 54%, Europe 43%.

²² For 2000: Greece and Slovenia; for 2005, 2010 and 2015: Greece, Slovenia, Bulgaria

Indicator 6.4 Investments in forests and forestry

Total public and private investments in forest and forestry

Key findings

- In 2015, investments in gross fixed capital were about EUR 20 per hectare of forest area, which is more than EUR 3 thousand million in total of the reporting countries.
- Equipment and buildings represent above 74% of reported investments.
- Gross fixed capital investments show, in nominal terms, a slightly positive trend from 2000 to 2015.

Introduction

The capacity of forests to produce goods and services is strongly influenced by investments in forests and forestry. Indicator 6.4 monitors gross fixed capital formation that consists of investments, deducting disposals, made by private and public organisations in fixed assets to support the stability of forests, their resilience to climate change and the capacity to provide goods and services for the benefit of the current and future generations.

Private organisations, both profit and non-profit, invest in the sector, but adequate and continuous government funding plays an essential role in maintaining the sustainability of the sector. Gross fixed capital formation comprises three sub-categories:

- planting trees to provide regular income,
- equipment and buildings,
- other gross fixed capital investments.

33 countries provided information, five of which were able to provide full data sets on gross fixed capital formation over the whole reporting period (1990-2015) and 13 countries for the period 2000-2015, resulting in limited representativeness of the data at regional as well as at European level²³.

22 countries have been able to present data for the years 2010 and 2015, representing 60% of the European forest area. This sub-set of countries has been considered for analysis at a disaggregated level. Information on fixed capital consumption has been provided by only three countries, while data on capital transfer was available for just two countries. In consequence, for these two variables, no representative statements were possible with respect to the status and trends at the aggregated regional level.

Status

In total, 25 countries reported gross fixed capital formation, alias investments, of EUR 3 232 million in 2015 (Table 6.4-1), of which the majority was accounted for by the EU-28 countries (93.6%). North Europe and Central-West Europe reported the highest investments (EUR 1 360 and 1 103 million, respectively) in 2015. South-East Europe has limited investments in absolute terms, but also in relation to the forest cover. The range of values related to the investments per hectare of forest cover in the different European regions is quite large - in Central-West Europe (EUR/ha 30.1) it is 7.7 times higher than in South-East Europe (EUR/ha 3.9), and the European average is about EUR/ha 22 (Table 6.4-1).

Looking at the distribution of investments in the three sub-categories (Figure 6.4-1), in 2015 the main share is covered by equipment and buildings, EUR 2 395 million, i.e. 74.2%, while 16.3% have been spent on planting trees to provide regular income and 9.5% on other investments in fixed capital, such as roads, fire prevention and tourist infrastructures.

The analysis at the disaggregated level reveals substantial differences in investments across European regions (Table 6.4-2). The distribution of investments according to the three sub-categories varies among regions. In North and South-West Europe reported investments are more evenly distributed, while in the other regions the reported investments are concentrated in equipment and buildings (Figure 6.4-2). The variation in investments in planting can partly be explained by the diverse conditions for the establishment of forests.

Trends

The distribution of investments in fixed capital in Europe is summarised in Table 6.4-3.

The reported gross fixed capital investments show a positive trend between 2000 and 2015. However, two aspects have to be taken into consideration. Firstly, the analysis is limited to the 13 countries, which reported data for the period 2000-2015; and secondly, the figures are expressed in nominal values, i.e. they are not adjusted for inflation. Considering a broader set of countries (22) but only for the last five years (2010-2015) (Table 6.4-2) an increase in overall investments by more than 14% can be detected in Europe (from EUR 2 659 to 3 035 million). This is mainly due to an increase in Central-West and Central-East Europe, while in the other regions overall investments have slightly declined.

²³ The figures presented here are in nominal terms, not adjusted for inflation.

Table 6.4-1: Gross fixed capital formation in forest and forestry, by region, 2015

Region	Gross fixed capital formation	
	EUR million	EUR/ha
North Europe	1 360	25.5
Central-West Europe	1 103	30.1
Central-East Europe	486	15.4
South-West Europe	228	18.1
South-East Europe	55	3.9
EU-28	3 026	22.3
Europe	3 232	21.8

Note: Data coverage as % of total regional forest area: NE 75%, C-WE 95%, C-EE 71%, S-WE 40%, S-EE 35%, EU-28 84%, Europe 66%.

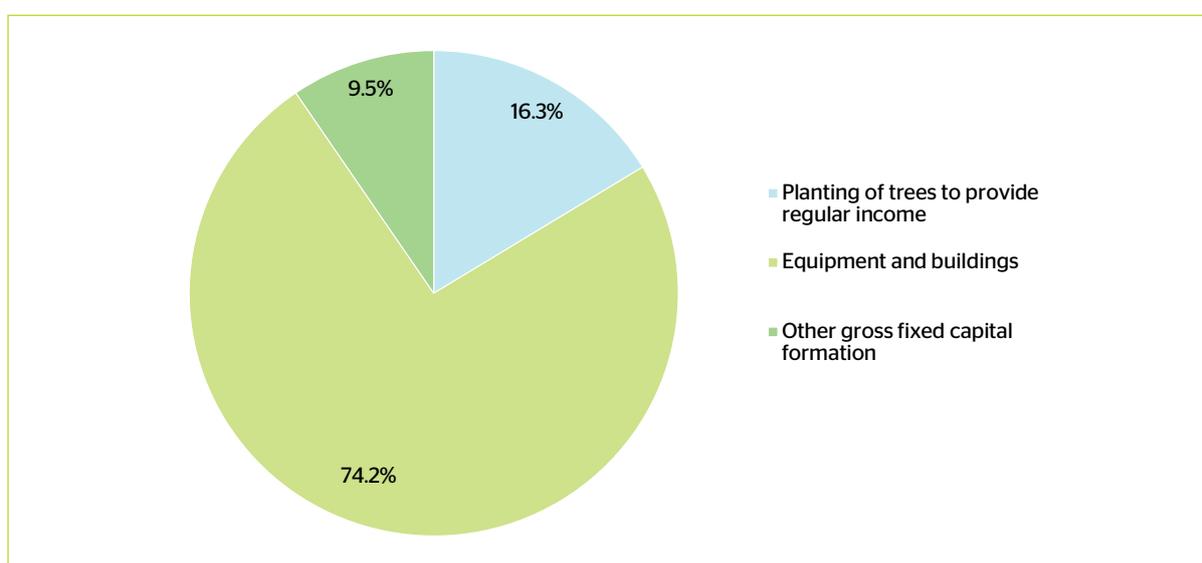


Figure 6.4-1: Distribution of gross fixed capital formation, 2015

Note: Data coverage as % of total regional forest area: 65%.

Table 6.4-2: Trends in distribution of gross fixed capital formation, by region, 2010-2015

Region	Planting		Equipment & building		Other		Total	
	EUR million							
	2010	2015	2010	2015	2010	2015	2010	2015
North Europe	468	460	844	783	80	117	1 392	1 360
Central-West Europe	5	4	598	1 023	62	76	665	1 103
Central-East Europe	0	0	213	271	21	37	234	309
South-West Europe	98	60	118	99	88	69	303	228
South-East Europe	2	2	59	25	4	8	65	35
EU-28	568	522	1 690	2 030	237	278	2 495	2 831
Europe	573	526	1 832	2 202	254	307	2 659	3 035

Note: Data coverage as % of total regional forest area: NE 75%, C-WE 95%, C-EE 50%, S-WE 40%, S-EE 28%, EU-28 77%, Europe 60%.

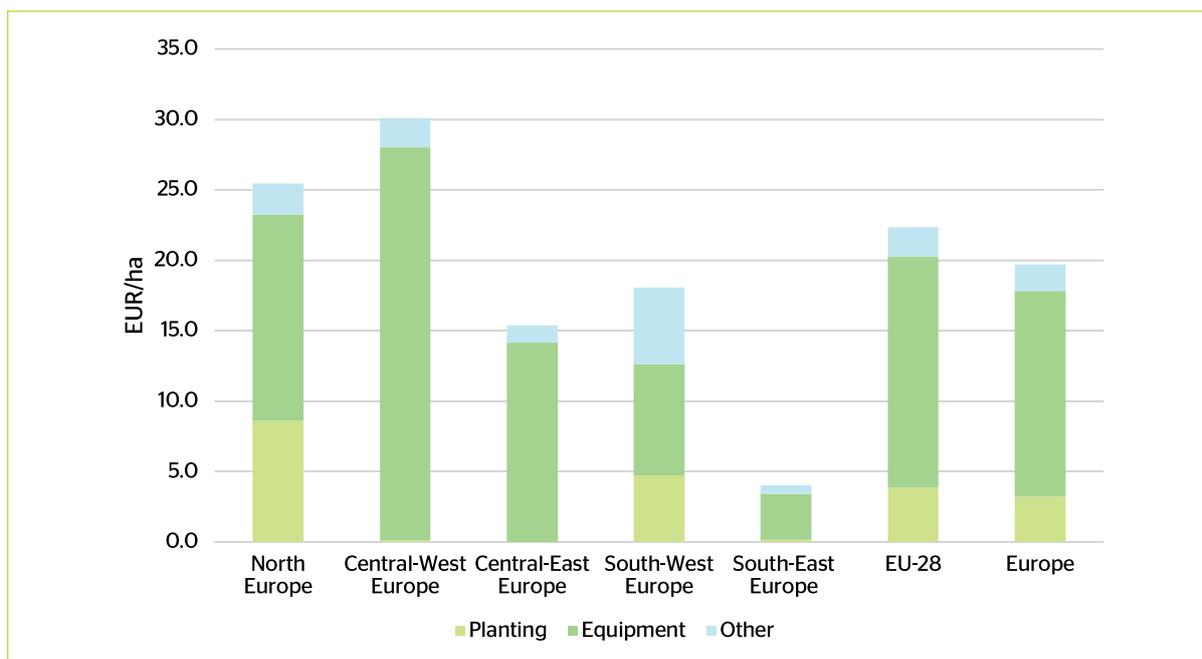


Figure 6.4-2: Structure of gross fixed capital formation per hectare of forest, by region, 2015

Note: Data coverage as % of total regional forest area: NE 75%, C-WE 95%, C-EE 71%, S-WE 40%, S-EE 33%, EU-28 84%, Europe 65%.

Table 6.4-3: Trends in gross fixed capital formation in Europe and EU-28 by sub-categories, 2000-2015

Region	2000	2005	2010	2015
Planting (EUR million)				
EU-28	282	380	348	325
Europe	305	394	353	329
Equipment and buildings (EUR million)				
EU-28	646	647	737	1 018
Europe	721	723	865	1 182
Other gross fixed capital formation (EUR million)				
EU-28	347	234	64	91
Europe	353	248	82	112
Total (EUR million)				
Total of EU-28	1 275	1 260	1 150	1 434
Total of Europe	1 379	1 365	1 299	1 623

Note: Data coverage as % of total regional forest area: EU-28 37%, Europe 31%.

Indicator 6.5 Forest sector workforce

Number of persons employed and labour input in the forest sector, classified by gender and age group, education and job characteristics

Key findings

- There were more than 2.6 million employees in the forest sector (i.e. forestry, wood manufacturing and paper industry) in Europe in 2015.
- In forestry, there is about four employees per 1 000 hectares of forest.
- Employment in the forest sector decreased by about 33% from 2000 to 2015.

Introduction

Forest sector employment comprises the workforce in the sub-sectors of forestry (ISIC/NACE 02), wood manufacturing (ISIC/NACE 16) and paper industry (ISIC/NACE 17). Currently employing more than 2.6 million people in 37 reporting countries, the forest sector workforce plays an important role, especially in rural areas. However, since 2000 employment in this sector decreased by about one third, mainly due to increasing productivity. This change occurred mainly in the wood and paper manufacturing industries. Further, in some countries, the forest sector is a key contributor to the transition towards a sustainable bioeconomy, generating new jobs, some of which require specific skills and drive innovation in processing wood and non-wood products as well as the provision of ecosystem services. The main data source is the labour force survey conducted by the countries, which covers all sectors of the economy. This rich dataset contains information about the gender, age and education level of the respondents. Data covering the period from 2000 to 2015 are available for most sub-sectors. The results are based on the number of persons whose main activity (as employed, self-employed or unpaid family worker) falls into one of these sub-sectors. Some countries, such as Romania, Ukraine and Turkey, did not report the numbers of workers in the wood manufacturing and paper industries in this edition, although numbers might be significant. Only the data of countries continuously reporting during the whole period have been taken into account for trends in this report (see Figure 6.5-2).

Status

The forest sector employs about 1.1% of the total number of workers in Europe. In the highly forested countries of North Europe, an average of 2% of the jobs are in the forest sector (reaching about 5% in Estonia

and Latvia), while in Central-West Europe, the share is just above 0.7%. Nevertheless, the forest sector remains an important employer in rural areas, also providing income to numerous other people working informally in forestry such as non-industrial forest owners and farmers. In general, approximately 36% of the people employed in the overall sector work in the primary sub-sector forestry, nearly 40% in wood manufacturing, and about 25% in the paper industry. However, important differences among regions are noticeable. In Central-West and South-West Europe, more than 80% of the forest sector employment is in the wood and paper industries, generating value added to the primary wood resources extracted locally, but partially also imported.

The labour intensity in forestry ranges from less than one person per 1 000 ha in some North European countries (Norway, Sweden) to more than 10 people per 1 000 ha in some Central-East European countries (Hungary, Republic of Moldova, Slovakia) and in Turkey (Figure 6.5-1). This does not only reflect the degree of mechanisation and the difficulty to access and harvest wood resources, but also the need for appropriate forest management to secure or increase the provision of ecosystem services such as soil and water protection, or recreation. The economic productivity measured in terms of gross value added (GVA) per employed person varies considerably among regions. In North and Central-West Europe, where forest productivity and mechanisation are high, the GVA per forestry worker exceeds 70 thousand EUR/year, whereas, in Southern and Eastern Europe, it remained below 45 thousand EUR/year in most countries. In wood manufacturing and paper industries, important regional differences subsist due to different industrial systems and varying labour costs.

The forest sector workforce is still dominated by men (more than 69% in forestry, 80% in wood manufacturing, and 70% in paper industries, respectively). Recent changes in the working activity due to mechanisation and the use of new technologies (including computer-based machinery and robotics), have not affected the unbalanced gender situation so far. Forestry activities and wood manufacturing are often performed by small-scale enterprises. Self-employed people represent more than 15% of the workforce in these sectors and about 80% of the employees work in small and medium enterprises. The paper industry sub-sector shows a different structure, with only a small share of self-employed persons.

Trends

Employment in the forest sector decreased by about 33.3% from 2000 to 2015 (Figure 6.5-2). The highest reductions occurred in South-East Europe (-44%) and Central-West Europe (-33%), mainly as a result of the reorganisation of the forestry activities and of the increase in productivity in the manufacturing sector. In Central-East Europe, employment in the forest sector started to decrease at the beginning of the millennium, mainly affecting forestry and wood manufacturing activities. In North Europe, the decline in the demand for printing paper combined with gains in productivity led to a restructuring of the pulp and paper industry, and a decrease in employment by 48.1% in this sub-sector. Globally, the negative impact on employment is slightly mitigated by the switch of some wood or paper companies to other lignin-based products (energy and biochemical) not further considered in this context.

After a decrease during the turn of the millennium, employment in forestry is now stabilizing in many countries and in some cases even increasing (Figure 6.5-3). This may be partly due to increasing demand for wood as a source of renewable material and energy, supporting countries in their efforts to reduce greenhouse gas emissions and in the transition to a sustainable, circular bioeconomy.

In accordance with the productivity gains between 2005 and 2015, the GVA per employed person in Europe increased by about 50% in forestry, and by approx. 30% in the wood manufacturing and paper industry sub-sectors. However, this does not apply equally to all regions and countries. Technical development led the sector to employ people with a higher level of education with most employees entering the sector having at least upper secondary education (ISCED level 3 or higher). In the forestry sub-sector, considering 12²⁴ countries representing more than 51% of total regional forest area and providing data on education in the period 2005-2015, the share of workers with a lower secondary education decreased from 39.7 to 29.3% between 2005 and 2015, while the share of people with tertiary education increased from 14.3 to almost 21%. Similar changes are observed in both manufacturing sectors, where the share of people with upper secondary and higher education increased above 8%, replacing workers with lower education levels. These trends in employment reflect the change of qualifications required for jobs in this sector. As a result, of the technological change, productivity as well as the average wage of the people employed in the sector increased.

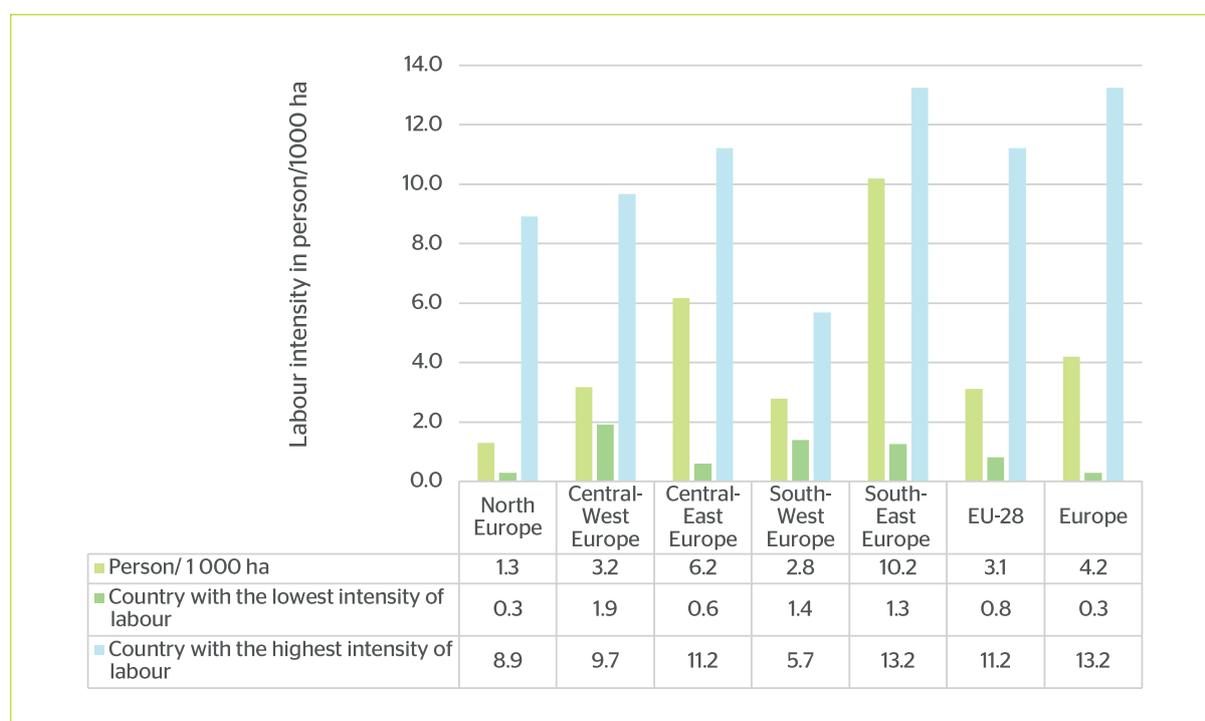


Figure 6.5-1: Labour intensity in forestry (ISIC/NACE 02), by region, 2015

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 100%, S-EE 84%, EU-28 100%, Europe 97%.

²⁴ Data on education in forestry sector reported by Turkey are not included here due to their exceptional trend: more than 8 times increased employment reported in ISCED 0-2 category in the period 2005-2015.

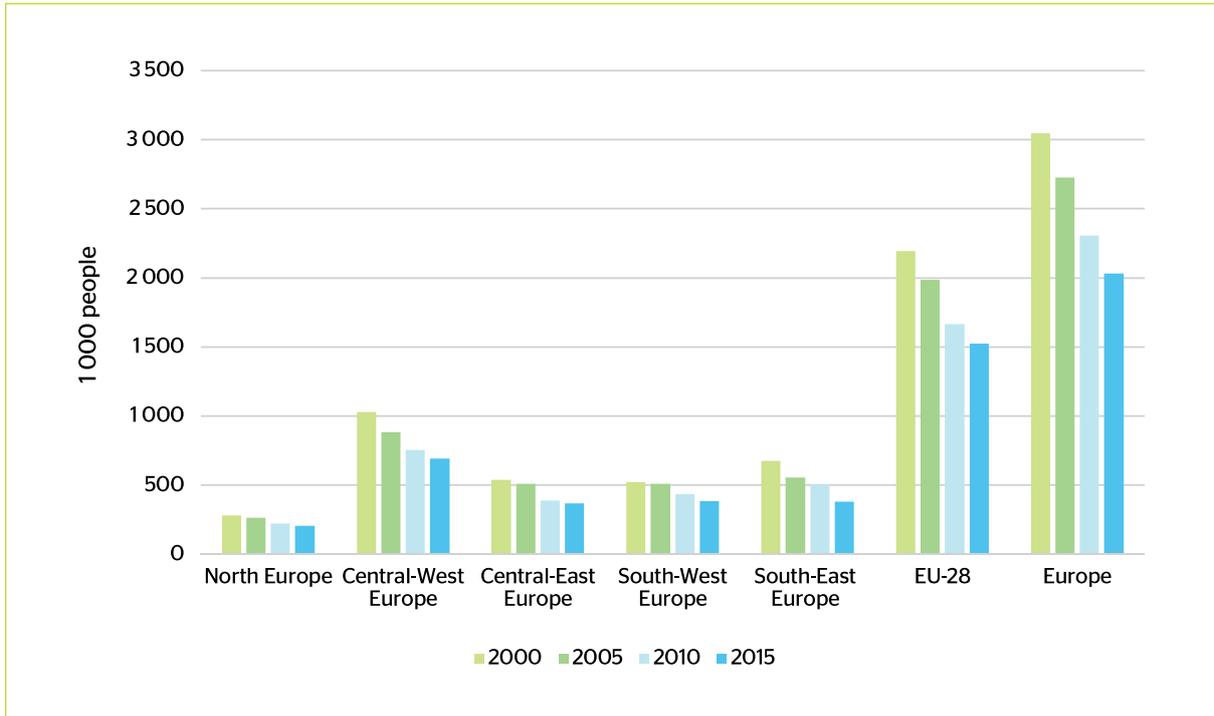


Figure 6.5-2: Trends in total forest sector employment, by region, 2000-2015

Note: Data coverage as % of total regional forest area: NE 92%, C-WE 97%, C-EE 72%, S-WE 89%, S-EE 76%, EU-28 87%, Europe 86%. Romania, Turkey and Ukraine are included although they reported only on employment in the primary sector.

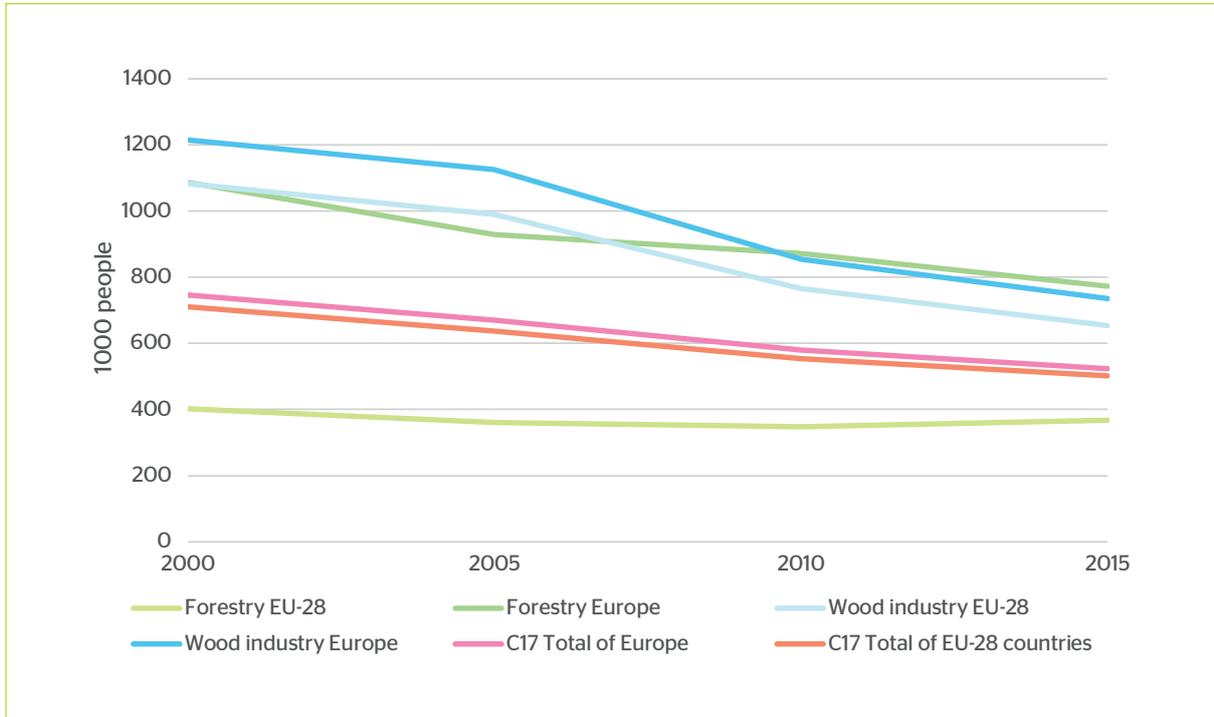


Figure 6.5-3: Trends in employment in forestry (ISIC/NACE 02), wood industry (ISIC/NACE 16) and in paper industry (ISIC/NACE 17), 2000-2015

Note: Data coverage as % of total regional forest area: NE 92%, C-WE 97%, C-EE 72%, S-WE 89%, S-EE 76%, EU-28 87%, Europe 86%. Included only countries reporting data for all years: 2000, 2005, 2010 and 2015.

Indicator 6.6 Occupational safety and health

Frequency of occupational accidents and occupational diseases in forestry

Key findings

- Working in forestry is still dangerous with 149 fatal and almost 21 thousand non-fatal accidents reported in Europe in 2015, which is about 24 accidents per 1 000 employees.
- With the exception of South-West Europe, there has been a marked decrease of fatal accidents in all regions between 2000 and 2015.
- Per 1 000 m³ of harvested timber, the lowest rates of accidents are found in North Europe. The highest rates of non-fatal accidents are found in Central-West Europe, and of fatal accidents in Central-East Europe.

Introduction

Working in forestry is a dangerous occupation. Many operations are associated with a high risk to safety and health. Forest workers are exposed to heat, cold and rain. Repetitive work patterns and heavy physical work can lead to strain injuries and postural deformities. Noise, vibrations and exhaust fumes from motor-driven tools are another source of health hazards. The forest sector has a range of chemical and biological hazards, including the exposure to herbicides and pesticides and the potential to allergic reactions to pollen, plants and insect bites. When fighting forest fires, forest workers are exposed to heat and toxic fumes and can face severe and life-threatening burns.

Chainsaws are still the most dangerous working tool for forest workers, causing many serious and fatal accidents while felling, crosscutting and delimiting trees. The risk of accidents at work is significantly increased by terrain and site factors as well as by the processing of wind throws. Wood harvesting machinery, such as harvesters, processors or skidders, reduces the risk of accidents but can be used only in suitable terrain and not for larger stem diameters. Skidding, loading and transport of timber are also subject to a variety of hazards. Safety equipment, as well as intensive training, mitigate the dangers to human health and safety.

The quantitative data presented here refer to fatal and non-fatal accidents. They, therefore, represent only a part of the threats to safety and health but are

a good indicator of working conditions. In countries where the use of chainsaws as the standard method of timber harvesting has been replaced by highly mechanised systems, there has been a general decline in the number of accidents. However, the processing of wind throws and other calamities still require substantial manual work with chainsaws under the most difficult conditions and are, therefore, serious threats to occupational safety and health.

Status

27 countries reported data on fatal or non-fatal occupational accidents, which represent 90.2% of total forestry employment in Europe. The data reported for fatal and non-fatal accidents clearly show that forestry is still a dangerous profession. In 2015, almost 21 thousand non-fatal accidents happened in Europe (Table 6.6-1). In the same period, each year around 150 forest workers lost their lives during work, with the highest figure reported in Central-West Europe.

A comparison of the accident frequencies between regions requires the inclusion of the underlying working hours and amounts of timber harvested as a reference. Per 1 000 workers, the lowest accident rate is observed in South-East Europe, the highest rate in Central-West Europe. In Europe, 238 non-fatal accidents per 1 000 employees were observed. Related to the amount of timber harvested, the highest number of non-fatal accidents is again found in Central-West Europe, the lowest number in South-East Europe. However, it should be noted that for South-East Europe data were submitted only for 62% of the total forest area. Among the regions, the differences in accident frequencies are less pronounced in relation to timber harvesting than in relation to the number of workers.

The figures should be interpreted with some caution. It is unclear whether they reflect actual circumstances or whether bias is caused by the nature of national recording systems. At country level, a maximum of 0.12 non-fatal accidents per 1 000 m³ fellings or 288.2 accidents per 1 000 employees was reported by Germany - a figure that differs substantially from all other countries. However, those figures also include absenteeism due to illnesses that are not only related to occupational accidents. Despite the uncertainties regarding the reporting method, it is evident that forest work remains an accident-prone occupation.

Table 6.6-1: Fatal and non-fatal accidents in forestry, by region, 2015

Region	Fatal accidents	Non-fatal accidents	Non-fatal accidents per 1 000 workers	Non-fatal accidents per 1 000 m ³ fellings
North Europe	14	876	9.5	0.00
Central-West Europe	61	13 457	115.6	0.08
Central-East Europe	52	1 057	3.9	0.01
South-West Europe	12	4 760	60.5	0.00
South-East Europe	9	480	1.6	0.01
EU-28	123	19 854	43.6	0.03
Europe	149	20 630	23.8	0.03

Note: Data coverage as % of total regional forest area:

Fatal accidents: NE 100%, C-WE 97%, C-EE 94% S-WE 89%, S-EE 62%, EU-28 92%, Europe 90%;

Non-fatal accidents per 1 000 m³ of fellings: NE 95%, C-WE 97%, C-EE 30% S-WE 0%, S-EE 62%, EU-28 67%, Europe 64%.

Trends

The percentage development of fatal accidents between 2000 and 2015 in relation to the base year 2000 (100%) is shown in Figure 6.6-1. With the exception of South-East Europe, there has been a marked decrease in all regions. The increase in South-East Europe in 2015 can be traced back to just one country (Turkey). The largest decrease in fatal accidents took place in North Europe and South-West Europe.

Further insights into the development of accident risks can be found by comparing accident frequencies with the number of workers and timber harvested (in 1 000 m³). The lowest rates of non-fatal and fatal accidents per 1 000 m³ harvested timber are

found in North Europe (Figure 6.6-2; Figure 6.6-3). Most non-fatal accidents per 1 000 m³ fellings are found in Central-West Europe, most fatal accidents in Central-East Europe. The number of non-fatal accidents decreased continuously in all regions between 2000 and 2015 (Figure 6.6-2). For fatal accidents, the development is rather heterogeneous between regions.

Nevertheless, since 2005 a continuous decrease in fatal accidents per 1 000 m³ fellings can be observed in Europe and the EU-28 (Figure 6.6-3). Due to the increased volume of fellings, the difference in fatal accidents between 2000 and 2015 is less remarkable in South-East Europe region.

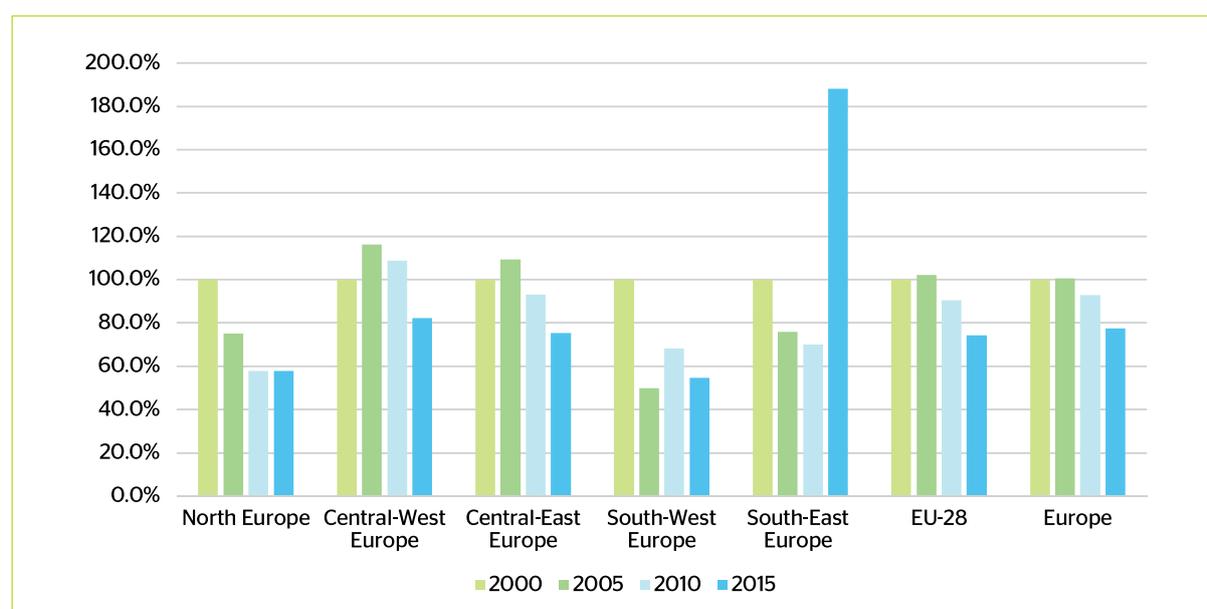


Figure 6.6-1: Trends in fatal accidents expressed as a percentage of the reference year 2000 (100%), by region, 2000-2015

Note: Data coverage as % of total regional forest area: NE 92%, C-WE 99%, C-EE 71%, S-WE 89%, S-EE 62%, EU-28 89%, Europe 83%.

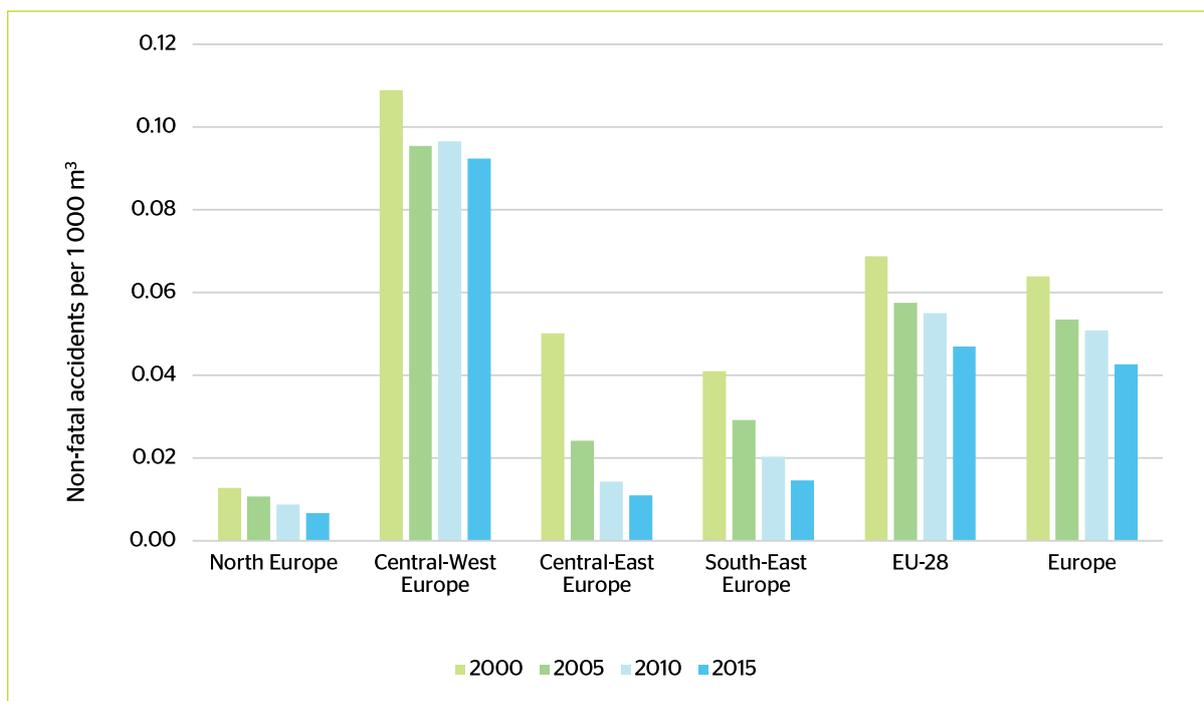


Figure 6.6-2: Trends in non-fatal accidents per 1 000 m³ fellings, by region, 2000-2015

Note: Data coverage as % of total regional forest area: NE 53%, C-WE 53%, C-EE 30%, S-WE 0%, S-EE 62%, EU-28 38%, Europe 43%.

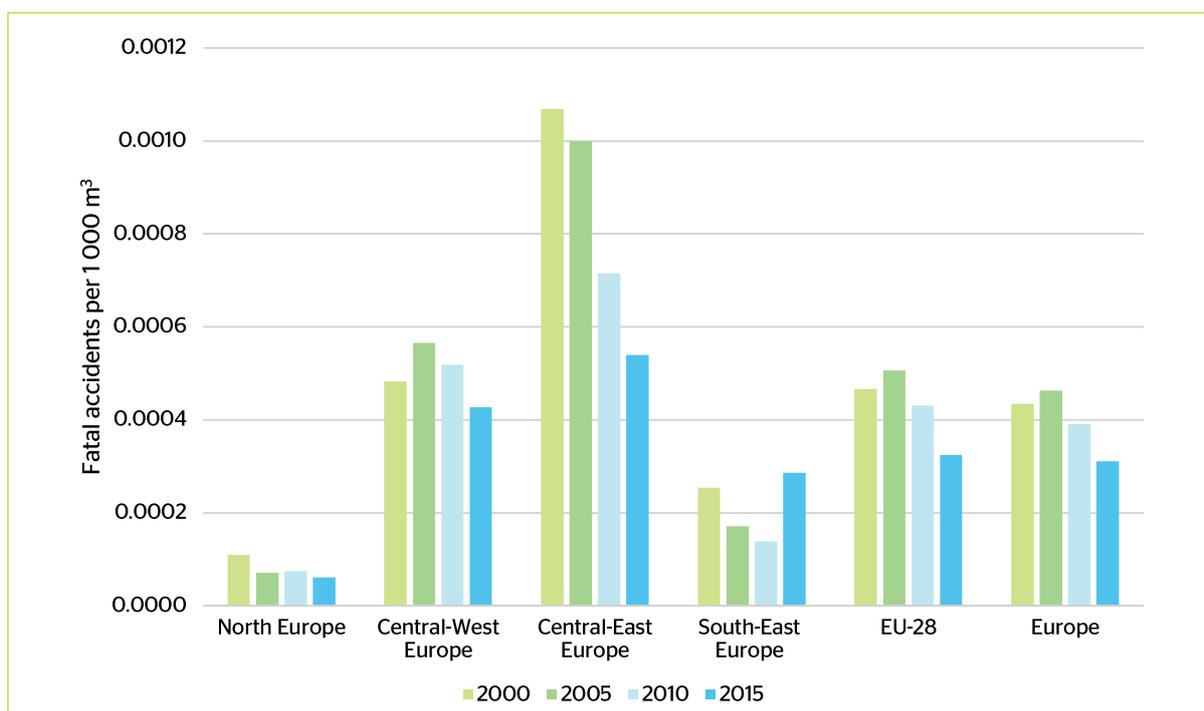


Figure 6.6-3: Trends in fatal accidents per 1 000 m³ fellings, by region, 2000-2015

Note: Data coverage as % of total regional forest area: NE 53%, C-WE 53%, C-EE 30%, S-WE 0%, S-EE 62%, EU-28 38%, Europe 43%.

A similar trend can be observed in the frequency of accidents in relation to working hours (Figure 6.6-4, Figure 6.6-5). Between 2000 and 2015 the

largest decrease in fatal accidents per 1 000 FTE was recorded in North Europe, Central-West Europe and South-West Europe.

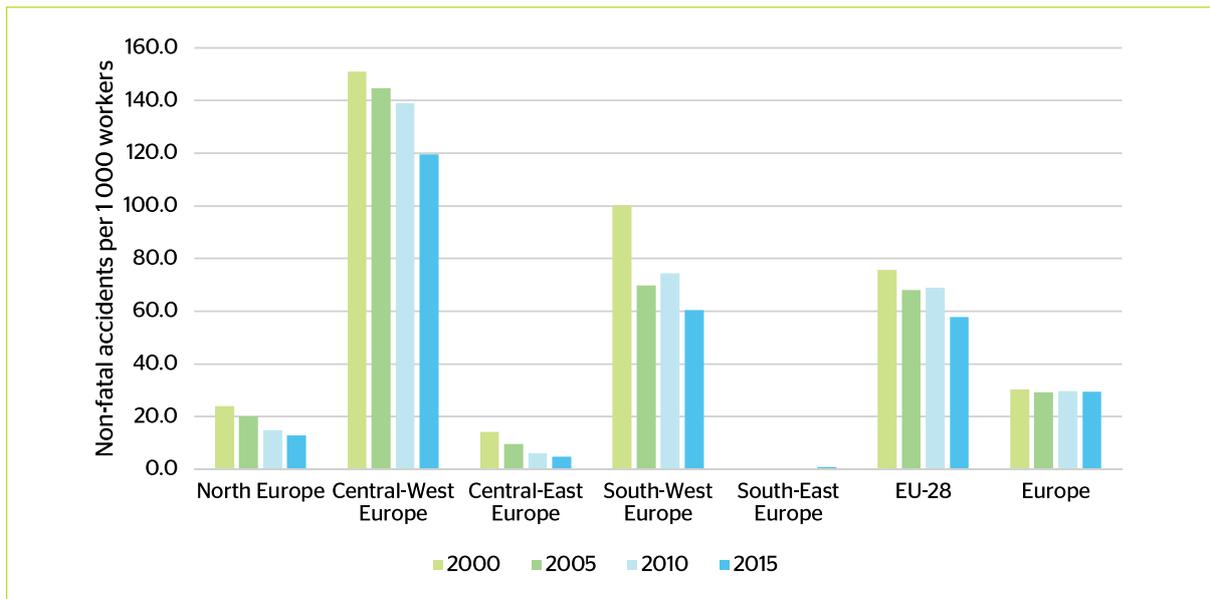


Figure 6.6-4: Non-fatal accidents per 1 000 workers, by region, 2000-2015

Note: Data coverage as % of total regional forest area: NE 92%, C-WE 95%, C-EE 50%, S-WE 89%, S-EE 57%, EU-28 81%, Europe 78%.

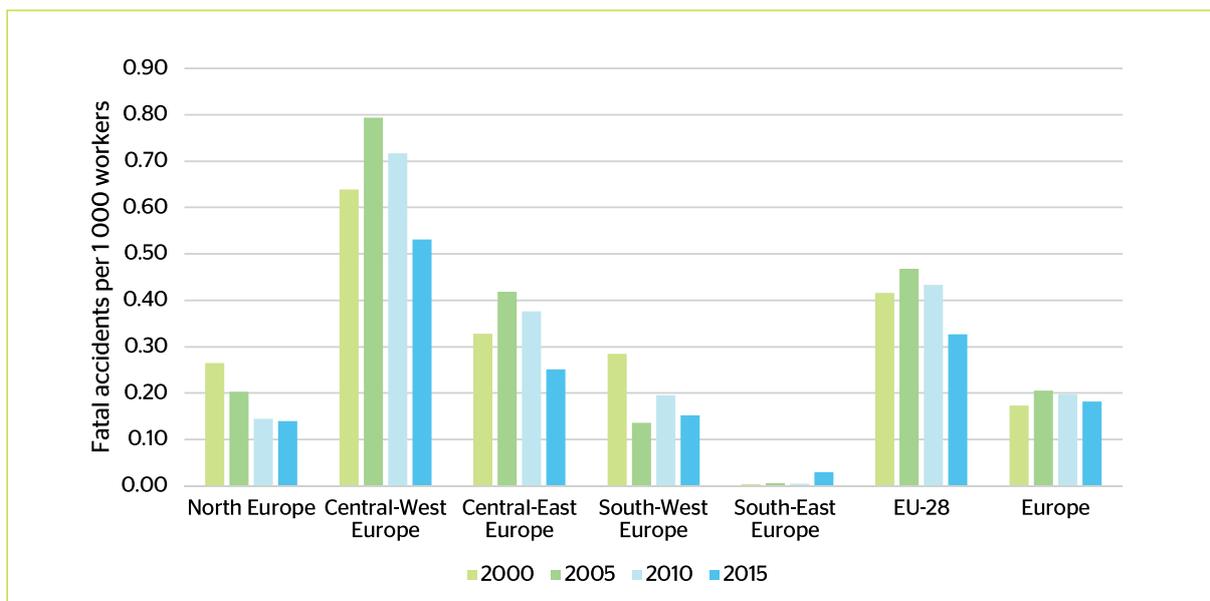


Figure 6.6-5: Fatal accidents per 1 000 workers, by region, 2000-2015

Note: Data coverage as % of total regional forest area: NE 92%, C-WE 97%, C-EE 50%, S-WE 89%, S-EE 57%, EU-28 82%, Europe 78%.

In particular, the increases in fatal accidents in some regions between 2005 and 2010 are a matter of concern. In South-West Europe, fatal accidents per 1 000 workers even increased again between 2005 and 2015. This development shows that although occupational safety has improved over

time, constant efforts are needed to reduce the risk of accidents. This can be achieved by training and improved safety equipment on the one hand, and by replacing the accident-prone work with chainsaws by fully mechanised logging systems on the other.

Indicator 6.7 Wood consumption

Consumption per head of wood and products derived from wood

Key findings

- In Europe, about 1.1 m³ of wood is consumed per capita a year, ranging from 0.7 m³ in South-East Europe to 2.6 m³ in North Europe in 2015.
- Between 1990 and 2015, wood consumption increased in all regions, except in Central-West Europe, with growth rates ranging from 0.4% in South-West Europe to 2.7% in Central-East Europe.

Introduction

Wood consumption comprises sawnwood, wood-based panels, paper and paperboard as well as energy wood. It is estimated based on the volumes of wood consumed in each region, which is based on the comparison of local production level and net trade (exports and imports). The data are reported in cubic meters of roundwood equivalent (RWE) per 1 000 inhabitants.

The consumption of roundwood and all of its products and by-products are important factor in the sustainable development of the forest sector. Profitability in most forests depends on selling roundwood, and, to a growing extent, sales of forest residues for energy. Revenues from wood sales support most activities and treatments in forests. The price of sawlogs is particularly important for the profitability of forest operations. Further, the demand for solid wood products plays a crucial role in the mobilisation of pulpwood and forest residues. In this context, it is worth noting that the recognition of the environmental benefits of using wood in the construction sector is slowly increasing throughout Europe. This could result in much higher consumption in the future. The construction sector is still the most important consumer of sawnwood and timber products. Due to innovative developments, the demand for timber increases in Europe and worldwide. A boost to build medium- and high-rise timber buildings enable the timber to gain even greater market shares in the construction sector. Green building, which is often promoted by both governments and the forest sector, is based on the enhanced use of wood in structural applications as well as for insulation and decorative purposes.

Status

The wood consumption level varies among countries (Figure 6.7-1) and the European regions, ranging from 706 m³ RWE per 1 000 inhabitants in South-East Europe to 2 574 m³ RWE in North Europe in 2015 (Figure 6.7-2). This variation is due to several factors, including availability of timber resources, disposable income, investment level in the timber processing sectors as well as cultural differences in the use of wood.

Trends

The trends in wood consumption mainly depend on the overall economic development. Here, the construction sector is of particular importance, while further impact stems from the packaging and paper industry, as well as from energy demand. Wood consumption increased in all regions between 1990 and 2015, except in Central-West Europe. However, growth rates differ among regions, ranging from 0.4% in South-West Europe to 2.7% in Central-East Europe. This development was partly supported by public policies, encouraging the use of wood for construction and renovation through the implementation of energy efficiency policies. Wood consumption was also driven by European policies for the promotion of renewable energy sources. Indeed, woody biomass represents one of the most important sources for achieving the 20-20-20 Targets²⁵ set by the European Union. However, despite these favourable policies, between 2005 and 2015 wood consumption decreased in Europe as a whole. This trend is not identical in all regions: while wood consumption increased in regions with low per-capita wood consumption (Central-East and South-East Europe, Figure 6.7-2), it decreased in the other regions. This development is mostly due to the financial and economic crisis of 2008-2009, which had a strong negative impact on the demand. Particularly decisive was the drop in the house construction sector and the ensuing fall in the demand for construction timber. The downturn of the markets for graphic papers, especially newsprint, had a further negative impact. The technical development of new products (e.g. laminated veneer lumber (LVL) and high-rise building systems) and strong demand for packaging, mainly stemming from online traders of consumer goods, led to a partial recovery of demand in the last years.

²⁵ https://ec.europa.eu/clima/policies/strategies/2020_en, setting targets of 20% cut in greenhouse gas emissions (from 1990 levels), 20% of EU energy from renewables, 20% improvement in energy efficiency.

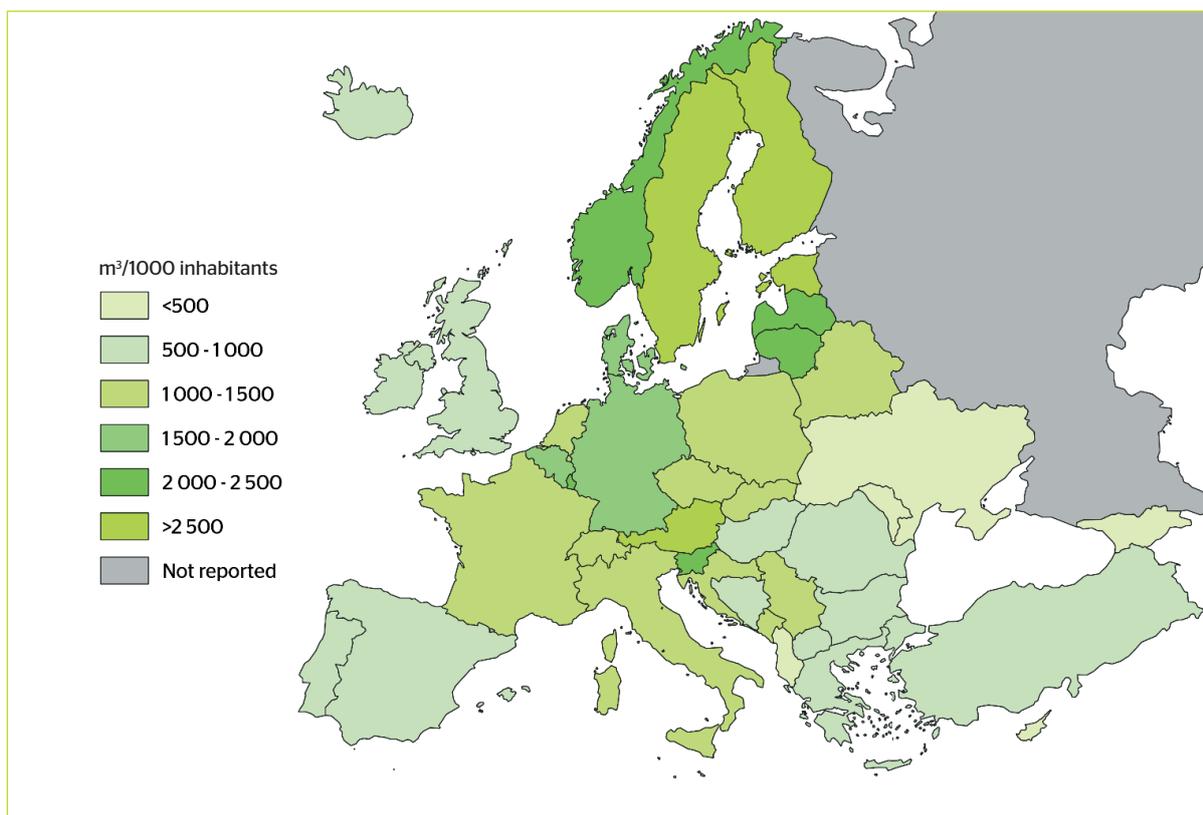


Figure 6.7-1: Wood consumption per 1 000 inhabitants, by country, 2015

Notes: Data used for the reference year 2015 - an average of 2013-2017. Expressed in roundwood equivalent volume.

Table 6.7-1: Trends in wood consumption, by region, 1990-2015

Region	Annual change rate			
	1990-2015	1990-2000	1990-2005	2005-2015
	%			
North Europe	1.32	4.14	3.37	-1.28
Central-West Europe	-0.14	0.74	0.69	-1.20
Central-East Europe	2.70	1.29	3.57	1.57
South-West Europe	0.40	3.62	2.64	-2.45
South-East Europe	1.50	0.98	2.11	0.71
EU-28	0.57	2.02	1.87	-1.09
Europe	0.66	1.70	1.81	-0.81

Note: Data coverage as % of total regional forest area: for all regions 100%.

Data used for the reference years as follows: 1990 - data from 1992; 2000 - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

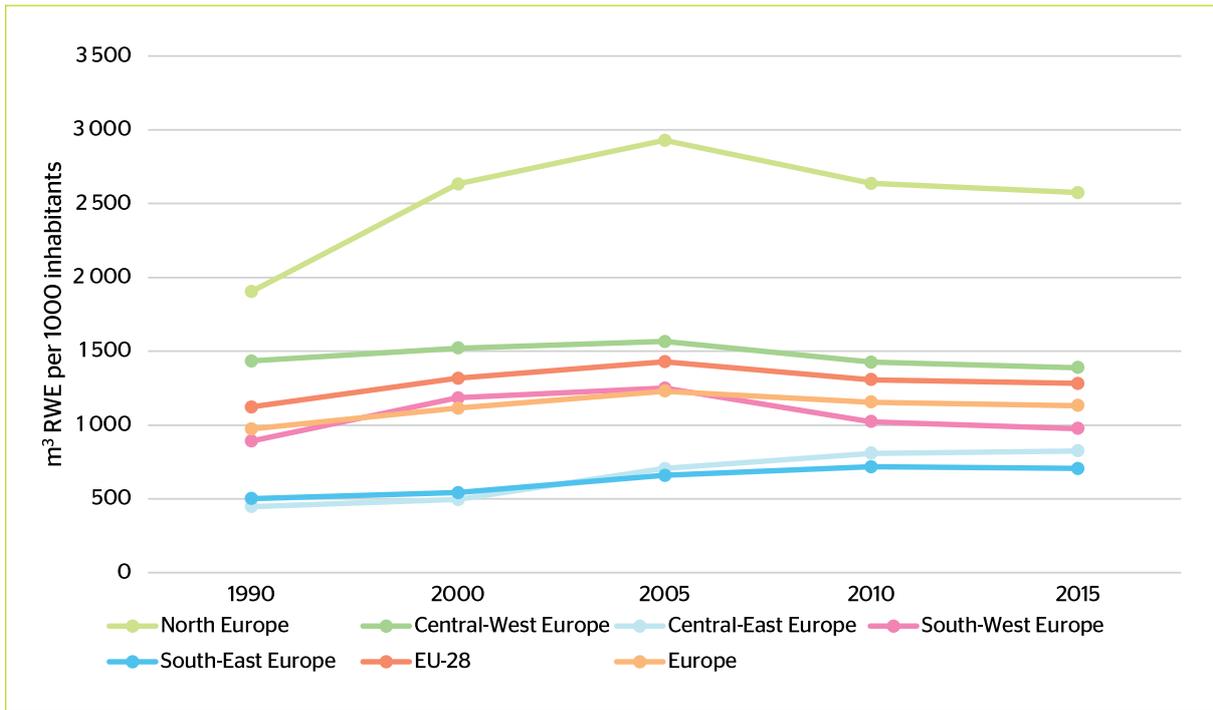


Figure 6.7-2: Trends in wood consumption, by region, 1990-2015

Notes: Data coverage as % of total regional forest area: for all regions 100%.

Data used for the reference years as follows: 1990 - data from 1992; 2000 - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

Indicator 6.8 Trade in wood

Imports and exports of wood and products derived from wood

Key findings

- Europe is a net exporter of primary wood and paper products.
- The European trade surplus was 30 million m³ roundwood equivalent, or EUR 5.5 thousand million in 2015.
- While doubled from 1990 to 2005, export volume stagnated in the period 2005-2015.

Introduction

The trade of wood products reflects the international exchange of wood and products derived from wood due to diverging locations of production and consumption as well as price differences. It comprises exports and imports of roundwood, energy wood, sawnwood, wood-based panels, pulp as well as paper and paperboard. A trade of wood products enables to match the supply of renewable resources with the demand of consumers in Europe and other regions. However, forestry is often characterised as a 'low-value-added' sector, with a respective moderate impact on the sustained economic development of the sector. Notwithstanding, export quantities and values rose in nearly all regions over the 25 years.

Status

Europe is a net exporter of primary wood and paper products. In 2015, there was a trade surplus of 30 million m³ round wood equivalent (RWE) or EUR 5.5 thousand million, which contrasts with the former annual trade deficit in terms of quantity and value until the year 2000 (Figure 6.8-1 and 6.8-2). However, considerable differences exist among the European regions.

The surplus is mostly due to the development in the Nordic countries, which export a considerable share of their national production (e.g., sawnwood and paper products) to other European countries and, increasingly, outside the European Union (e.g., to China). In contrast, all other regions are net importers of wood and paper products in terms of volume and value, except Central-East Europe with a net export of

12 million m³ but still facing a trade deficit of EUR 142 million.

Trends

The export volume of roundwood and wood product in most regions, and in Europe as a whole, suffered a downturn during the economic crisis as construction activity slowed down. While doubled from 1990 to 2005, export volume stagnated in the period 2005-2015. South-East and South-West as well as Central-East Europe coped best with the economic slowdown, and even recorded an export growth, albeit at lower rates than before the crisis (Table 6.8-1). The export value also showed a slight increase in the period 2005 to 2015 in both the EU-28 and Europe as a whole. The Central-East, South-West and South-East regions were responsible for this (albeit minor) growth while North and Central-West Europe recorded slightly decreasing exports in terms of value (Table 6.8-2).

As in the case of exports, imports were negatively affected by the 2008-2009 economic crisis both in most regions and in Europe as a whole, following significant increases until 2005. As can be deduced from Table 6.8-3, the contraction in import volumes for the EU-28 and Europe as a whole during the period from 2005 to 2015 was greater than for exports. The eastern European regions were the only ones to record any growth in import volumes during the 2005-2015 period (Table 6.8-3).

Europe has developed from a net-importer to a net-exporter of wood and paper products. For the EU-28 and Europe as a whole, this shift occurred from 2005 on, chiefly as a result of the contraction in consumption and imports. The development of import values largely mirrors that of import volumes, with contractions in all regions except the eastern European ones. As apparent from Table 6.8-4, import values remained largely unchanged for Europe as a whole. The European Union has instituted policies to halt the trade of illegal timber through the Forest Law Enforcement, Governance and Trade programme (FLEGT) and its Timber Regulation (EUTR). These policies aim to increase the legal trade in sustainably produced forest products. It is still too early to say what kind of impact these policies will finally have on trade patterns.

Table 6.8-1: Trends in exports of primary wood and paper products in volume, by region, 1990-2015

Region	Exports (million m ³)				Annual change (%)			
	2000	2005	2010	2015	2000-2005	2005-2010	2010-2015	2000-2015
North Europe	105.9	163.6	177.8	162.0	161.4	1.85	4.06	-0.96
Central-West Europe	109.3	157.3	202.7	197.0	190.4	2.44	4.87	-0.63
Central-East Europe	13.0	35.5	51.4	57.0	61.4	6.99	11.17	1.80
South-West Europe	19.5	29.9	39.0	44.6	45.6	3.76	5.47	1.57
South-East Europe	5.8	8.8	14.2	17.8	18.6	5.22	7.17	2.73
EU-28	236.2	367.5	449.3	444.9	443.1	2.77	5.07	-0.14
Europe	253.5	395.1	485.1	478.4	477.4	2.79	5.12	-0.16

Notes: Data coverage as % of total regional forest area: for all regions 100%.

Volume expressed in roundwood equivalents. Data used for reference years as follows: 1990 - data from 1992; - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

Table 6.8-2: Trends in exports of primary wood and paper products in value, by region, 1990-2015

Region	Exports (EUR million)				Annual change (%)			
	2000	2005	2010	2015	2000-2005	2005-2010	2010-2015	2000-2015
North Europe	15 075	23 795	25 013	24 487	24 612	2.15	3.97	-0.16
Central-West Europe	17 405	30 161	34 972	35 106	34 378	3.00	5.51	-0.17
Central-East Europe	1 040	3 651	5 928	7 492	7 961	9.25	14.32	2.99
South-West Europe	3 074	5 781	7 305	8 291	8 345	4.44	6.88	1.34
South-East Europe	707	1 160	1 690	2 353	2 474	5.60	6.94	3.88
EU-28	34 868	60 553	70 599	73 426	73 368	3.29	5.58	0.39
Europe	37 301	64 548	74 908	77 729	77 769	3.25	5.51	0.38

Notes: Data coverage as % of total regional forest area: for all regions 100%.

Data used for the reference years as follows: 1990 - data from 1992; 2000 - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

Table 6.8-3: Trends in imports of primary wood and paper products in volume, by region, 1990-2015

Region	Imports (million m ³)				Annual change (%)			
	2000	2005	2010	2015	2000-2005	2005-2010	2010-2015	2000-2015
North Europe	27.6	52.6	62.4	47.1	45.5	2.19	6.46	-3.11
Central-West Europe	204.7	240.5	264.3	249.5	244.0	0.77	1.98	-0.80
Central-East Europe	6.1	24.8	39.9	48.2	49.2	9.47	15.47	2.13
South-West Europe	58.1	82.8	90.5	77.1	74.9	1.11	3.47	-1.88
South-East Europe	10.7	19.7	29.9	33.9	33.7	5.11	8.20	1.22
EU-28	291.6	392.0	449.4	415.8	407.4	1.46	3.38	-0.98
Europe	307.3	420.4	486.9	455.8	447.3	1.65	3.60	-0.85

Notes: Data coverage as % of total regional forest area: for all regions 100%.

Volume expressed in roundwood equivalents. Data used for the reference year as follows: 1990 - data from 1992; 2000 - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

Table 6.8-4: Trends in imports of primary wood and paper products in value, by region, 1990-2015

Region	Imports (EUR million)				Annual change (%)			
	2000	2005	2010	2015	2000-2005	2005-2010	2010-2015	2000-2015
North Europe	3 191	5 463	6 782	6 156	5 924	2.73	5.97	-1.34
Central-West Europe	31 137	41 295	42 874	41 965	41 290	1.23	2.49	-0.38
Central-East Europe	552	3 806	6 125	7 949	8 103	12.39	20.33	2.84
South-West Europe	7 868	12 393	13 314	11 807	11 464	1.65	4.13	-1.48
South-East Europe	1 608	3 235	4 408	5 451	5 473	5.47	8.07	2.19
EU-28	41 475	61 354	67 552	66 248	65 057	1.98	3.82	-0.38
Europe	44 356	66 192	73 502	73 327	72 254	2.14	3.96	-0.17

Notes: Data coverage as % of total regional forest area: for all regions 100%.
 Data used for the reference years as follows: 1990 - data from 1992; 2000 - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

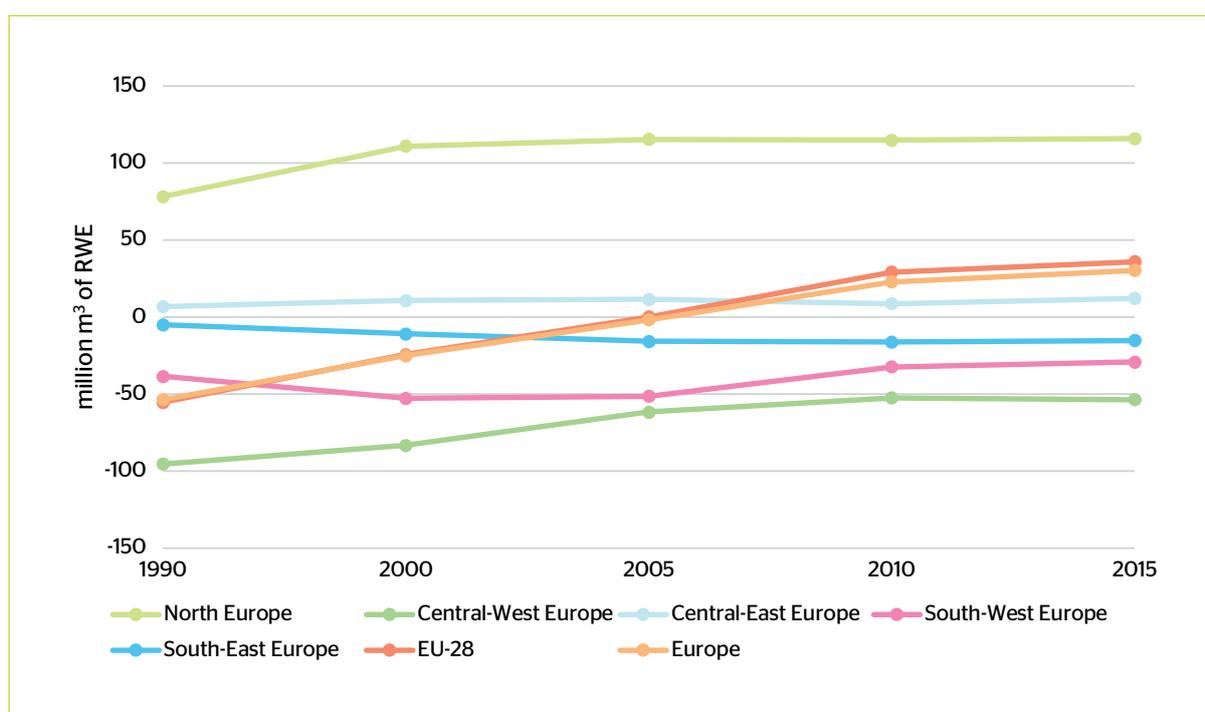


Figure 6.8-1: Trends in net trade of primary wood and paper products in volume, by region, 1990-2015

Notes: Data coverage as % of total regional forest area: for all regions 100%.
 Volume expressed in roundwood equivalents. Data used for the reference years as follows: 1990 - data from 1992; 2000 - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

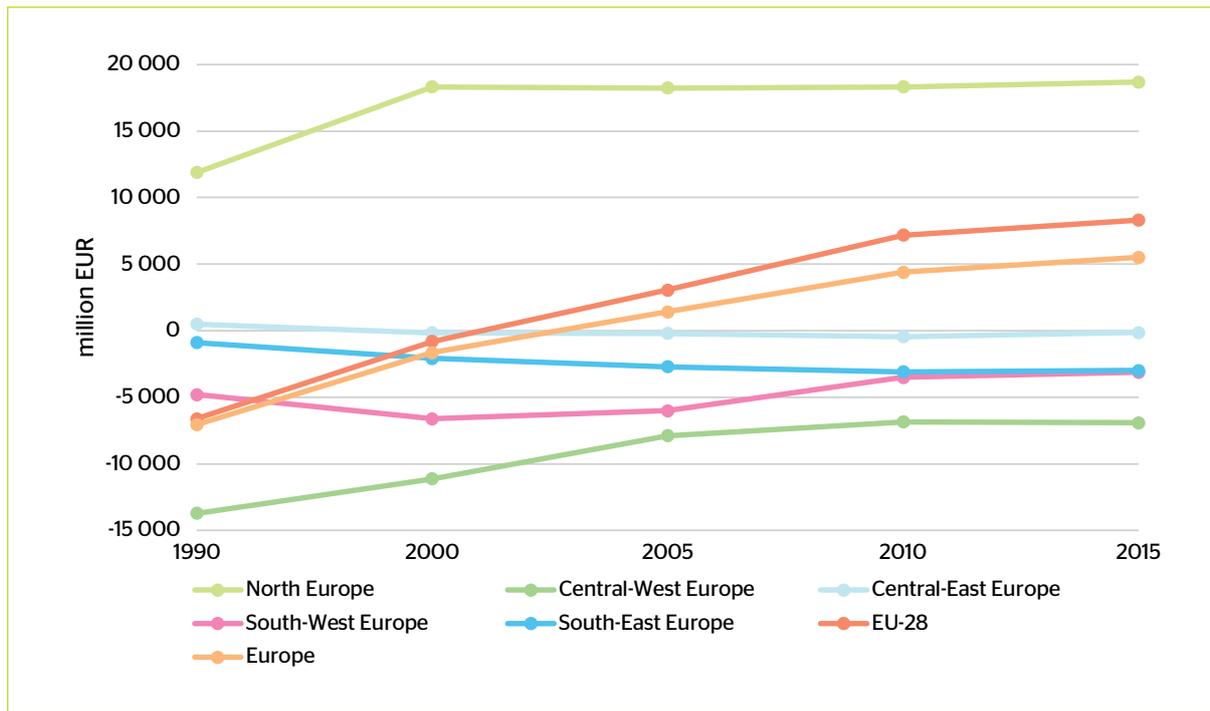


Figure 6.8-2: Trends in net trade of primary wood and paper products in value, by region, 1990-2015

Note: Data coverage as % of total regional forest area: for all regions 100%.

Data used for the reference years as follows: 1990 - data from 1992; 2000 - an average of 1998-2002; 2005 - an average of 2003-2007; 2010 - an average of 2008-2012; 2015 - an average of 2013-2017.

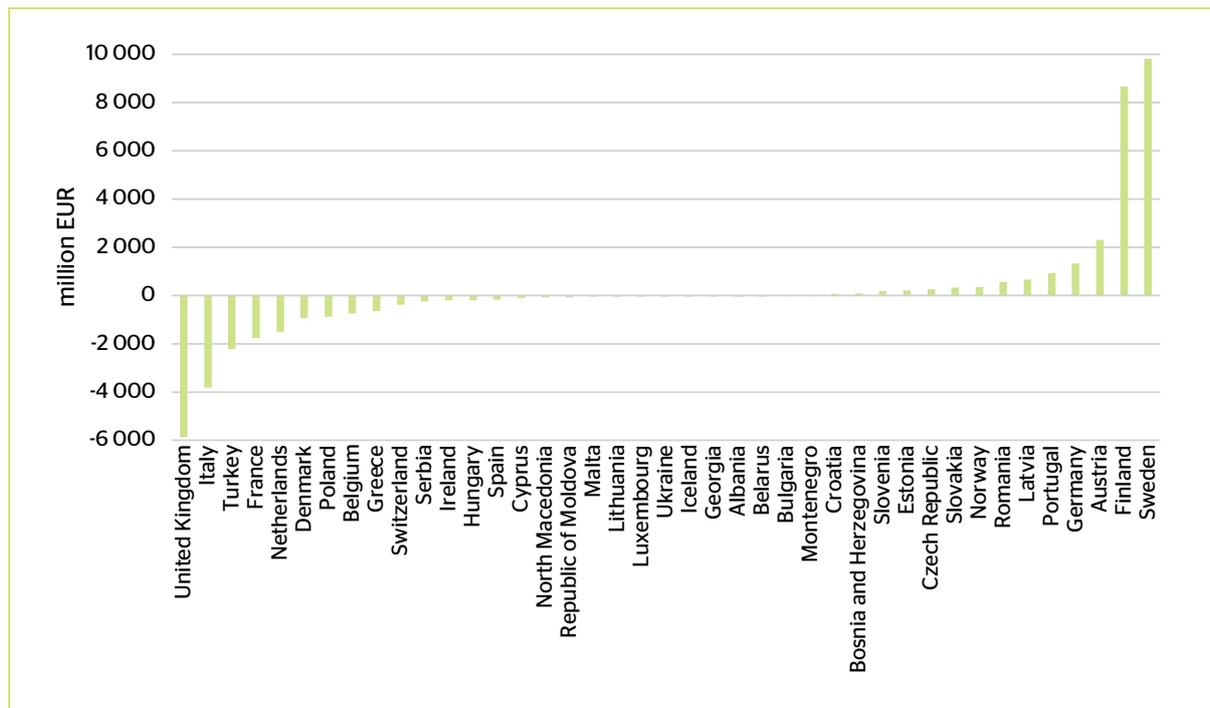


Figure 6.8-3: Net trade of primary wood and paper products, by country, 2015

Note: Data used for the reference year 2015 - an average of 2013-2017.

Indicator 6.9 Wood energy

Share of wood energy in total primary energy supply, classified by origin of wood

Key findings

- Wood, as one of the sources of renewable energy, covers above 6% of total energy consumption in Europe in 2015.
- The average annual consumption of wood for energy in Europe is less than 0.5 tonnes of dry matter per capita.
- North Europe has the highest per capita consumption with almost 2 metric tonnes dry wood matter used for energy, while direct wood fibres represent only 26% compared to 49% European average.
- In general, there is a positive trend in wood energy consumption, while the share of wood energy in the total energy consumption increases.

Introduction

Fossil fuels account for the majority of anthropogenic greenhouse gases (GHG) emissions. Renewable energy can replace non-renewable energy and may contribute to climate change mitigation. Wood is one of the major sources of renewable energy. At the global level, more than half of all wood removal is used for energy purposes (FAO 2016). In many countries, its importance is often underestimated due to measurement problems and missing data. In the last years, some issues have been raised concerning the sustainability of increasing wood energy use, e.g., particulate emission, land-use change, long-distance wood transport.

Wood energy can have many different forms and origins. Wood fuel can be solid, liquid or gaseous and derive from many different sources. In addition to the traditional firewood, specially processed wood fuels are now increasingly used, such as pellets, briquettes, torrefied wood and charcoal. Forests are only one wood source for energy among many others, such as other wooded land (OWL) and trees outside forests,

residues from wood processing, or postconsumer-recovered wood.

The objective of Indicator 6.9 is to measure the relative importance of wood energy for both the energy and forestry sectors. The available data provide sufficient information about North and Central-West Europe, as data for 2015 were submitted by all countries in these two regions (100% and 96% of the forest area, respectively). The information for Central-East Europe and South-East Europe is limited and data cover less than half of the countries and account for less than one-third of the regional forest area. Data about wood energy for South-West Europe are completely missing for both 2013 and 2015. Data for the years 2009, 2011, 2013 and 2015, constitute the basis for the following analysis. The reporting categories for the indicators are consistent with the main categories requested by the Joint Wood Energy Enquiry (JWEE - <https://www.unece.org/forests/jwee.html>) and JWEE data were prefilled in reporting forms for countries that replied to the JWEE.

Status

According to the data available for the year 2015²⁶, the total wood energy consumption expressed in the amount of dry matter was in North Europe almost 55 million tonnes, in Central-West Europe almost 75 million tonnes, in Central-East Europe above 32 million tonnes and in South-East Europe almost 8 million tonnes (see the footnote on the data coverage). In the North and Central-West Europe consumption represents about 1.2 tonnes per hectare of forest. Central-West Europe, population of which is 7.6 times larger, consumes around 42% more wood-based energy than North Europe. North Europe has a much higher per capita consumption than all other regions (Figure 6.9-1), which reflects both the abundance of forest resources and the active wood processing industry in this region. In fact, most of the northern countries are characterised by a high per capita consumption (Figure 6.9-2).

²⁶ Data coverage for the year 2015 as % of inhabitants: NE 100%, C-WE 94%, C-EE 42%, S-WE 0%, S-EE 15%, EU-28 64%, Europe 53%.

Table 6.9-1: Trend in wood energy consumption, by region, 2009-2015

Region	Total wood energy consumption			
	2009	2011	2013	2015
	million metric tonnes of dry matter			
North Europe	47.1	52.0	54.6	50.7
Central-West Europe	56.4	65.2	74.1	72.7
Central-East Europe	3.8	4.1	4.7	5.6
South-West Europe	-	-	-	-
South-East Europe	4.1	4.1	4.3	4.3
EU-28	104.0	117.7	129.9	126.7
Europe	111.4	125.5	137.8	133.3

Note: Data coverage as % of total inhabitants: NE 84%, C-WE 88%, C-EE 7%, S-WE 0%, S-EE 9%, EU-28 51%, Europe 41%.

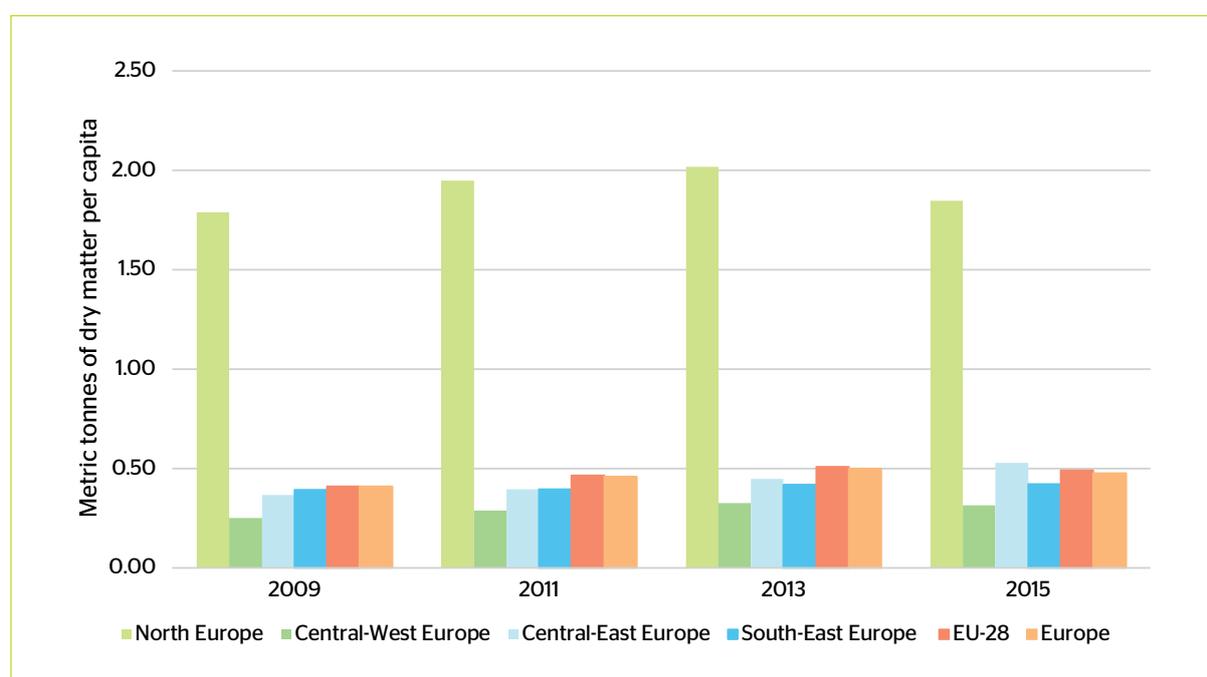


Figure 6.9-1: Trend in annual wood energy consumption, by region, 2009-2015

Note: Data coverage as % of total inhabitants: NE 84%, C-WE 88%, C-EE 7%, S-WE 0%, S-EE 9%, EU-28 51%, Europe 41%.

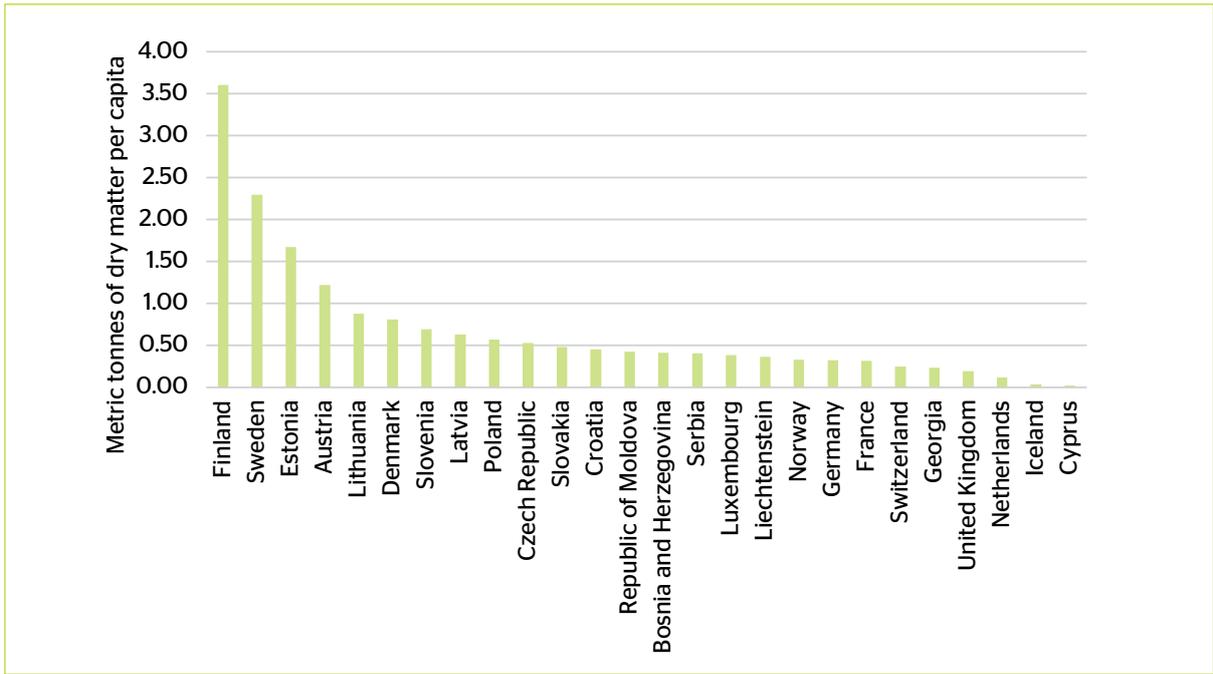


Figure 6.9-2: Annual wood energy consumption, by country, 2015

Patterns in use of wood fibre in energy production reflect to some degree the importance of the wood-based industry (Figure 6.9-3). Hence, regions with well-developed wood-based industries, such as

North Europe and Central-West Europe, have a comparatively higher proportion of by-products and residues in their wood-based energy production than other regions.

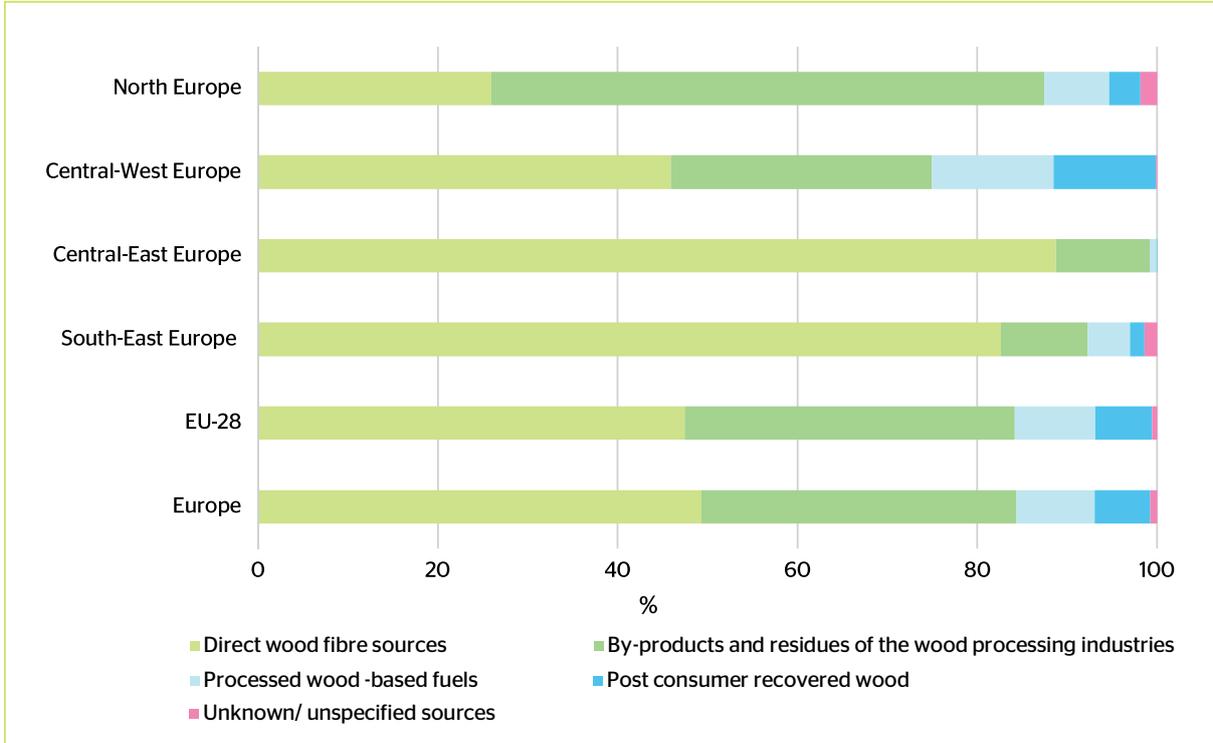


Figure 6.9-3: Shares of wood fibre sources used for energy production, by region, 2015

Note: Data coverage as % of total inhabitants: NE 100%, C-W-E 94%, C-E-E 42%, S-W-E 0%, S-E-E 15%, EU-28 64%, Europe 53%.

In North Europe, the production of energy from wood represents about 19% of total energy production, i.e. the share of about 1% higher than all the other renewable sources. The lowest share of wood energy is recorded in Central-West Europe with about 4% of

the total energy production (Figure 6.9-4). In Central-East Europe and in South-East Europe, the share of wood in the total energy production is about 7 and 9%, respectively.

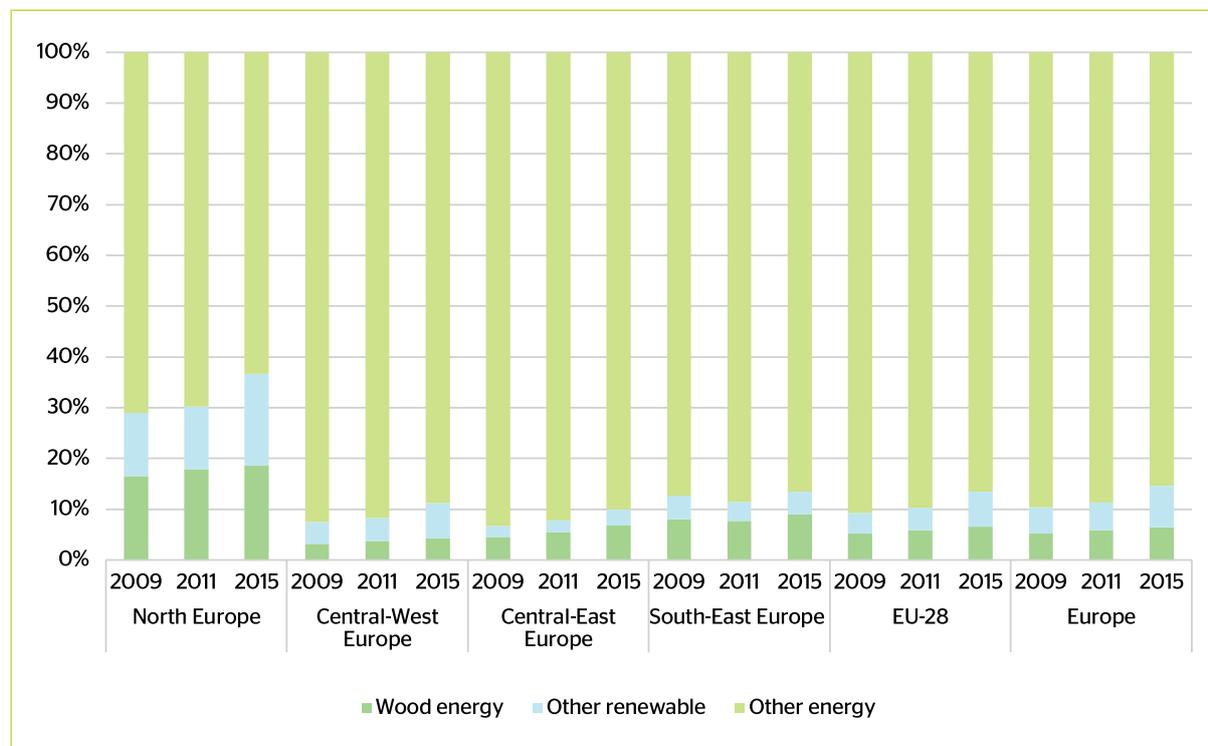


Figure 6.9-4: Trends in wood energy as a share of total energy consumption, by region, 2009-2015

Note: Data coverage as % of total inhabitants: NE 93%, C-WE 88%, C-EE 11%, S-WE 0%, S-EE 9%, EU-28 52%, Europe 42%.

Trends

In general, there is an increasing trend in wood energy consumption. Accordingly, the share of wood energy in the total energy consumption increases in all the regions, and wood represents the most important source among all renewable energy sources (Figure 6.9-4). Between 2009 and 2015, the greatest increase in the share of wood energy consumption (+2.3% points) is recorded for Central-East Europe (calculation based on Figure 6.9-4). However, the absolute level of wood energy consumption is still comparatively low (8.2 million tons). In the same period, the wood energy consumption share increased by about 2% points from 16.5 to 18.6% in North Europe, including a peak of about 54 million tons in 2011 and a slight decline

to 53 million tons in 2015. In Central-West Europe and South-East Europe, the share of wood energy consumption increased by about 1% point, though reflecting different absolute levels with an increase up to 73 million tons in Central-West and just about 4 million tons in South-East Europe. These increments in wood used for energy purposes correspond to an increase of per capita consumption by 43.8% in Central-East Europe, 25.9% in Central-West Europe, 71% in South-East Europe and 3.2% in North Europe. Recently, there are evident efforts to accelerate the substitution of the energy produced from non-renewable resources by the energy produced from renewable ones²⁷.

²⁷ <https://www.umweltbundesamt.de/en/topics/climate-energy/renewable-energies/renewable-energies-in-figures>

Indicator 6.10 Recreation in forests

The use of forests and other wooded land for recreation in terms of right of access, provision of facilities and intensity of use

Key findings

- 70% of Europe's forests and other wooded land are available for public recreation, in the majority of countries there is more than 90% available.
- About 6% of forest and other wooded land are primarily designated or managed for public recreation.
- Changes in the availability of forest and other wooded land for public recreation are marginal.

Introduction

There are various reasons why people choose forests for recreation. Whether organised or spontaneous, recreation in forests is primarily motivated by

- the accessibility of forests,
- the infrastructure supporting recreation, and
- the positive effects on physical and mental human health.

Specific characteristics contribute to the attractiveness of forest recreation, such as varying vegetation structures, good air quality, quietness and aesthetical aspects, as well as the availability of wild fruits and mushrooms, and the presence of

animal wildlife (e.g. birdwatching). As a result, forests contribute to a good quality of life. Often, visits are enabled by the common occurrence of forests in the countryside and their vicinity to settlements. The accessibility of forests as a precondition for recreation may result from legislative norms, customary rights and other forms of access. The intensity of recreational use can be measured, e.g. in million visits per year, and provides an indication of how important forest are for recreational purposes.

Status

Information on the forest area publicly available for recreational purposes in 2015 was reported by 30 countries, covering nearly 75% of forests and other wooded land (FOWL) in Europe. The FOWL available for public recreation represented 70% of their total FOWL area (Table 6.10-1). While the percentage varies between individual countries from nearly 10 to 100%, in 22 countries, including Austria, Germany, and Switzerland, it is more than 90%. In North Europe, almost all FOWL (nearly 99%) are available for public recreation, in Central-West and Central-East Europe it is more than half and in South-East Europe nearly 38.7%. Information on South-West Europe was not reported. The area of FOWL primarily designated or managed for public recreation is about 5.9% of total FOWL area in 25 reporting countries.

Table 6.10-1: Forest area available for public recreation and area managed for recreational use, by region, 2015

Region	Percentage of FOWL area available for the public for recreational purposes	Percentage of FOWL area primarily designated or managed for public recreation
	%	
North Europe	98.9	3.9
Central-West Europe	57.9	2.0
Central-East Europe	69.7	8.8
South-West Europe	-	-
South-East Europe	38.7	8.1
EU-28	84.1	4.5
Europe	70.0	5.9

Note: Data coverage as % of total regional FOWL.

FOWL with access available to the public for recreational purposes: NE 100%, C-WE 100%, C-EE 85%, S-WE 0%, S-EE 73%, EU-28 68%, Europe 75%;

FOWL primarily designated or managed for public recreation: NE 82%, C-WE 45%, C-EE 100%, S-WE 0%, S-EE 65%, EU-28 60%, Europe 62%.

The intensity of use assessed in terms of the number of visits was reported by ten countries representing 31.5% of FOWL and 40.5% of the population in the region. The number of visits in these countries in 2015 was estimated at 4 438 million, resulting in an average of 16 visits per inhabitant.

A variety of facilities for recreation was reported by 13 countries. In 11 of them, representing 32% of FOWL, forest roads and paths available for public recreation sum up to 2.8 million km, corresponding to 35 m of such facilities per hectare. Other facilities supporting recreation in forests were reported, e.g., campsites, forest houses and cottages, viewpoints, fireplaces and picnic sites, birds and wildlife watching localities, and adventure parks. The areas with restricted access to recreation include, e.g., nature reserves, game enclosures as well as forests with access restricted due to military purposes.

Trends

In the majority of the reporting countries, changes in the proportion of FOWL available for recreational purposes are marginal. The general public's access to forests for recreation is often based on legislative norms.

Since 1990, the area of FOWL primarily designated or managed for public recreation steadily increased in South-East and Central-East Europe (Figure 6.10-1). In North Europe, forest area primarily designated for recreation dropped in the period 1990-2000 mainly due to changes in availability reported by Latvia. Here, public forests are designated for public recreation by forest law. However, the share of public forests dropped significantly in the mentioned period but has been increasing since then.

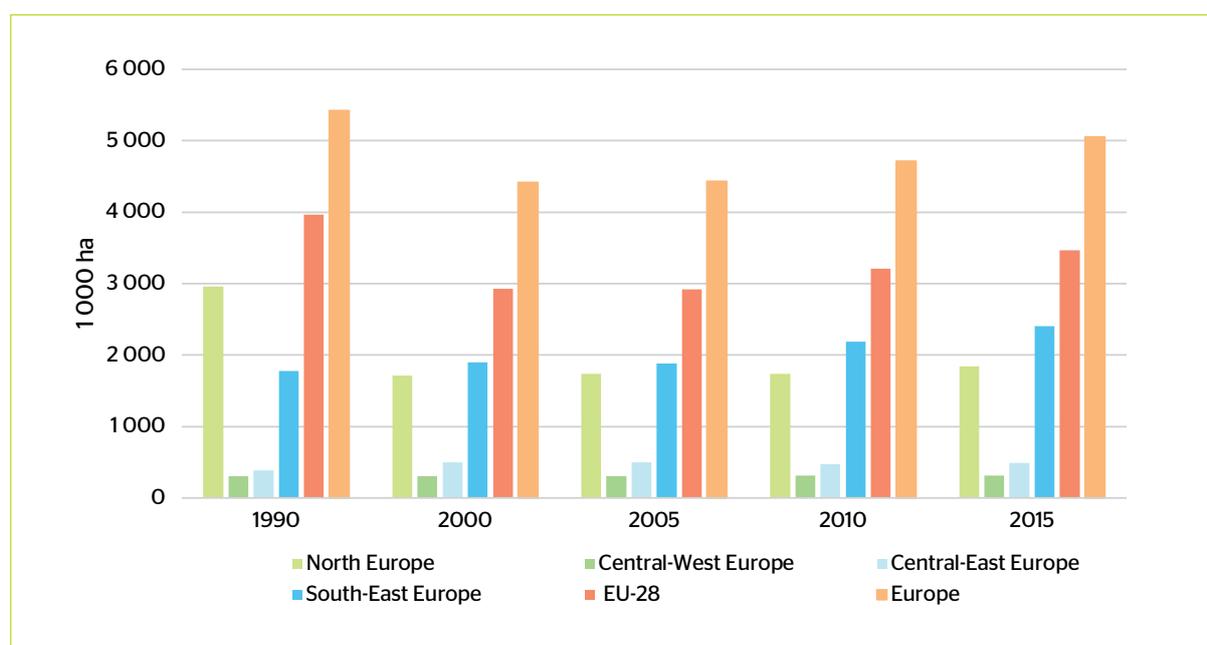


Figure 6.10-1: Trends in area primarily designated or managed for public recreation, by region, 1990-2015

Data coverage as % of total FOWL: NE 9%, C-WE 40%, C-EE 21%, S-WE 0%, S-EE 62%, EU-28 21%, Europe 24%.

Indicator C.6: Policies, institutions and instruments to maintain other socioeconomic functions and conditions

Key findings

Most countries have **policy objectives** on the maintenance of other socio-economic functions and conditions focussing among other things on ecosystem services, free access to forests, forest-related value chain contribution to GDP, favourable employment opportunities, forest biomass for energy production, investments in innovation and on sustainable wood consumption. **Quantitative targets** related to the policy objectives were indicated by only one-fifth of the reporting countries, however, the targets are numerous and cover social and economic aspects in terms of jobs, revenue and recreation. Many **institutional measures** implemented to achieve these objectives were reported and comprise the support of research, education and training, improved access to forests and increased recreation areas, safety and health protection campaigns and training. **Policy tools** put in place to achieve these objectives include legal tools with a focus on public access and recreation in forests, public financial support also through the Rural Development Programme and public dissemination actions primarily on recreational issues. **Achievements** over the past five years differ across countries, comprising some increase in incomes from forest products and from the recreational services and implementation of new wood processing investment projects. The major **challenges** and **obstacles** to maintain other socio-economic functions and conditions relate, among other things, to continuing depopulation of rural areas, to ensuring occupational safety and health, to pressures of increasing recreation use but also to limited connection infrastructure, volatile wood markets and efficient use of woody biomass.

Most countries have policy objectives on the maintenance of other socio-economic functions and conditions focussing, among other things, on ecosystem services, free access to forests, contribution to GDP, favourable employment opportunities, forest biomass for energy generation, investments for innovation and sustainable consumption.

25 out of 30 reporting countries reported on specific policy objectives to enhance the socio-economic functions and conditions covering almost all the aspects of the ten related indicators, ranked below according to the frequency in national reports:

- maintaining and preserving ecosystem services, particularly focusing on recreational opportunities and values of cultural history in the forests, was reported by ten countries,
- securing the productive potential of the forests to improve the economic viability of the forest owners and to enable the whole sector to grow and expand, reported by seven countries also due to increased importance of value-creation based on renewable resources and in the context of the green economy,
- maintaining synergies between forestry and wood-based industries was also mentioned in this regard,
- creating favourable employment opportunities was reported by seven countries, comprising attractive working environments, particularly for rural populations and the forest education system providing high-quality experts and managers, and research supporting innovation, development and knowledge transfer about particularly socioeconomic aspects of sustainable forest management,
- promoting and fostering the use of forest biomass for energy generation was reported by three Central-West and Central-East European countries,
- providing incentives for sustainable forest management was reported by two countries. In this regard, investments in innovations to meet new opportunities were mentioned.
- the use of wood as a renewable resource shall be recognised by the society leading to a sustainable consumption behaviour was reported by two countries,
- ensuring occupational safety and health protection was reported by one Central-West European country,
- due to an import- and export-oriented wood industry, one Central-West European country reported ensuring international responsibility for sustainable forest management.

Quantitative targets related to the policy objectives were indicated by only one-fifth of the reporting countries, however, the targets are numerous and cover social and economic aspects in terms of jobs, revenue and recreation.

Quantitative targets for the assessment of the policy objectives were reported by five countries (Table C.6-1).

Many institutional measures implemented to achieve these objectives were reported and comprise the support of research, education and training, improved access to forests and increased recreation areas, safety and health protection campaigns and training.

18 countries reported on institutional measures implemented to achieve most of the objectives mentioned above (not mentioned were e.g. revenue, investments, woodfuel, trade). Seven countries supported forest-relevant research and education at the university level and training for employees along the whole forest-based value chain. Six countries reported on activities for awareness-raising on the health effects of forests and improved also access to forests and increased recreation areas in forests. Awareness-raising campaigns were conducted for

forestry workers to inform about work safety and health protection requirements and related courses for forestry workers were offered in two countries. Promotion and secured provision of wood used for biofuel production were reported by two countries. The implementation of cross-sectoral initiatives to benefit the sector as a whole and inter-ministerial efforts to stimulate industrial renewal and encourage sustainable use of wood and at the same time balancing the diverse interests and demands on the forests were reported by two Central-West European countries. Also, two Central-West European countries reported on developing integrated management plans for sites with cultural heritage values and an increased consultation and collaboration with the agency responsible for heritage.

Table C.6-1: Country-specific targets on the maintenance of socioeconomic functions and conditions.

Country	Target
Austria, Estonia Finland, Slovakia	Increasing the value-adding of the forest sector
Austria, Estonia, Hungary	Maintenance or increase of the forest sector workforce and of green jobs
Austria	Reduction of occupational accidents over the medium term; No fatal accidents
Austria	Increase of the per-capita consumption of wood and wood products
Austria, Slovakia	Foreign trade surplus
Estonia, Hungary	Increase of renewable wood fuels as a resource of energy
Finland	Increase of nature tourism and recreation facilities
Slovakia	Support of EUR 25 million in 2015-2020 for specific forms of business, services and marketing in forestry

Policy tools put in place to achieve these objectives include legal tools with a focus on public access and recreation in forests, public financial support also through the Rural Development Programme and public dissemination actions primarily on recreational issues.

Various legal, financial and informational policy tools were reported by 21 countries from all over Europe.

Legal tools: Constituents focussing on aspects of access and possibilities for recreation in forests were reported by seven countries from all regions as essential parts of their Forest Acts. Four countries reported on legal act constituents to combat illegal logging and associated trade of forest products.

Two Central-West European countries reported guidelines in their forest acts on the preservation and enhancement of the cultural dimensions of sustainable forest management.

A national action plan for energy production from woody biomass was also reported next to technical norms, standard manuals and strategies focussing on socio-economic functions of forests in five countries.

Financial tools: Public financial grants and subsidies for the implementation of the socio-economic aspects covered by Criterion 6 were reported by eight countries. Respective measures also financed by Rural Development Program funds were mentioned by six countries. Rural



Development Program activities, particularly for the improvement of recreational infrastructure applied in order to better respond to the social needs of society, were reported by three countries.

Socio-economic functions of forests primarily secured through forest owners' funds and through payments for forest ecosystem services were reported by two South-East European countries. One North European country reported that a public scheme for investment in-bioenergy has contributed to an increased number of bioenergy producers in the last decade. One Central-West European country reported on a public 75% co-funding towards skills training and 100% for knowledge transfer activities. This provided a tool for operators to update and develop their working skills. As a supportive measure tax advantages are granted by one North European country for various implementation activities related to Criterion 6. One South-East European country reported that legal and natural persons, other than small forest owners, are obliged to pay 5-10% of their forest-related revenues to the local government to support regional development.

Communication tools: Public dissemination actions were reported by seven countries from all European regions. The focus was put on education and training of the forest sector workforce, communication and networking between the stakeholders and promotion of well-being and recreational aspects.

Achievements over the past five years differ across countries, comprising some increase in incomes from forest products and from the recreational services and implementation of new wood-processing investment projects.

16 European countries reported on achievements regarding many socio-economic aspects covered under Criterion 6. Three Eastern European countries reported some increase in revenues and incomes from wood and non-wood forest products and services. Seven countries reported achievements on forest accessibility, including for an increased recreational demand regarding eco-tourism, exercising, hunting or nature education leading also to an additional income source for the rural population. Seven countries reported on achievements regarding the forest and wood-processing workforce, including

increased employment and new job opportunities along the forest-based value chain in one country and targeted skills and training programmes. Numerous investment projects related to the wood processing industry have been implemented in four countries. A positive investment atmosphere was also evident as the market value of listed forest-based businesses has increased. Two Central-East European countries reported an increased annual fuelwood consumption.

The major challenges and obstacles in maintaining other socio-economic functions and conditions relate, among other things, to continuing depopulation of rural areas, occupational safety and health, pressures of increasing recreation use as well as limited connection infrastructure to urban forests, volatile wood markets and efficient use of woody biomass.

18 countries reported on major challenges in the area of Criterion 6 and on major obstacles to achieving the policy objectives. Six countries reported a need to adapt the forest-related education system constantly to emerging challenges and its ability to guarantee sufficient numbers of highly qualified experts on all levels. Further training and exchange of information in the area of occupational safety, health and working conditions are seen necessary. The development of international know-how consulting and transfer is also seen essential. Some countries reported a continuing depopulation of rural areas and that large parts of their populations do not have access to forests close to urban areas. On the other hand, it was mentioned by six countries that the increasing leisure and recreation use of forests is respected only partly and increasingly causes conflicts with other forest purposes as wood harvesting or conservation of biodiversity. Due to the free access to forest, additional measures for biodiversity, in particular the generation of more dead wood, can lead to risks for forest owners. The volatile wood market was highlighted by six countries as challenging for the socio-economic situation of the forest owners. Four countries mentioned a certain lack of knowledge on the available woody biomass resources from forests and waste wood production suitable for energy production and on the efficient use of woody biomass to obtain best revenues.