Forest Europe growing life

State of Europe's Forests

2020

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State of Europe's Forests 2020

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Foreword

Forests are a key ecosystem on our planet: without them, life as we know it now would not exist. Thus, protecting them is our essential task. Simultaneously, we depend on goods and services provided by forest ecosystems. Therefore, besides protexcting the forests, we have to ensure their sustainable use. That means the use of forests in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfil, now and in the future, relevant ecological, economic, and social functions, at local, national, and global levels, in harmony with other ecosystems.

Sustainable forest management is a dynamic concept which strives for a balance between all those aspects and functions in continuously changing environmental, economic, and social conditions.

For centuries, European forests have provided jobs and livelihoods in rural areas. Taking into account human population in Europe and its historical development, European forests have been shaped by human activities. Only some 2% of them are considered to be undisturbed by man. The majority of forests in Europe are actively managed in the long term. Despite that, in most cases they are semi-natural and, due to their naturalness, large portions have been included in various networks of protected areas with their active management.

Besides commonly occurring changes, which forest ecosystems have existed in and gradually adapted to over the ages, forests and the majority of their functions are today threatened by climate change and the increasing frequency and severity of extreme weather events, leading to large scale forest disturbances. Therefore, to provide a wide scale of benefits for human societies, forests also require our pro-active protection.

Moreover, in Slovakia, but, I believe, also in Europe and worldwide, there is an ongoing societal and political dialogue on possibilities for enhancement of ecosystem protection, as well as wider implementation of close-to-nature approaches in managing forests. A prerequisite, however, is that these ecosystems have to be resilient and able to adapt to extraordinarily fast changes in the environment, which we, as humankind, have caused and are still causing.

Nevertheless, there are challenges and inevitable decisions ahead of us which have to lead to safeguarding European forests and their irreplaceable functions for the benefit of present and future generations.

Such decisions have to be based on the best available information we have. Our next steps should be paved by facts, not emotions.

Internationally agreed pan-European criteria and indicators for sustainable forest management, the core of the State of Europe's Forests report, are important tools enabling provision of relevant and comprehensive information on the main aspects of forests, their functions, and their use by society. Thirty years of forest monitoring according to these criteria and indicators has given valuable information on trends in European forests and their management.

I believe that this new edition of the State of Europe's Forests report will contribute to a constructive and fruitful discussion on forests leading to solutions based on consensus between policy makers, forest owners and managers, science, academia, and other stakeholders within as well as beyond the forest sector, representing diverse societal demands.

Last, but not least, I would like to take this opportunity to thank to all the individuals, institutions, and countries who have contributed to the preparation of this fifth edition of the State of Europe's Forests report.

Ján Mičovský
Minister of Agriculture and Rural Development of the Slovak Republic
Chair of FOREST EUROPE

Sustainable forest management means the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.

Resolution H1 of the Helsinki Ministerial Conference on the Protection of Forests in Europe, 1992

Summary for Policy Makers

If managed sustainably, forests play an indispensable role in climate and biodiversity protection. They protect soils and water resources, provide livelihoods, and contribute to the wellbeing of rural and urban communities.

European forests are multifunctional, providing a range of ecosystem services, including the production of renewable materials that are able to substitute for alternatives with a higher environmental footprint, thus also contributing to climate neutrality and overall sustainability.

Since the 1990s, FOREST EUROPE has been providing an intergovernmental platform for promoting sustainable management of forests in the pan-European region, and, in cooperation with numerous partners, has been monitoring its implementation using an internationally agreed upon set of criteria and indicators.

The State of Europe's Forests 2020 (SoEF 2020) is based on the best available information and the work of over one hundred national correspondents, scientists, and experts; it shows that:

European forests are expanding, storing carbon, and supplying wood on a sustainable basis

The area of forests in Europe[1] has increased by 9% over the last 30 years. At 227 million ha of forests, more than one-third of Europe's land surface is forested.

The volume of wood and the weight of carbon stored in the biomass of European forests have grown by 50% over the last 30 years as forest area expanded and only a part of the increment has been harvested. About three-quarters of the net annual wood increment is felled.

Every year in Europe, forests sequester in their biomass about a tenth of the carbon dioxide emissions produced in other sectors. Carbon stored in harvested wood products also contributes to the reduction of CO_2 emissions.

The volume of wood supply has grown, reaching 550 million m^3, which is 40% more than in 1990.

European forests contribute to biodiversity conservation, employment, and income of rural communities

European forests are predominantly semi-natural and the tree species diversity of forest stands has been increasing since 2005. The amount of deadwood in European forests is also growing.

About 2% of the forests are considered undisturbed by man.

Nearly 24% (almost 50 million ha) of forests are in areas protected for the conservation of biodiversity and landscape, considerably more than several decades ago. The area of forests designated for biodiversity conservation has increased by 65% in 20 years, and the area designated for landscape conservation by 8%.

Forests designated for the protection of soil, water, and other ecosystem services represent about 32% of the forest area.

Populations of common forest bird species have been stable for almost 40 years.

The vast majority of European forests are open to the public, while 6% are primarily designated or managed for public recreation.

Forestry and the wood processing industries provide employment for more than 2.6 million people in Europe. However, employment in the forest sector is steadily declining – by about 33% from 2000 to 2015.

Forestry is still an occupation with a high number of accidents: 24 out of every 1 000 workers suffer an accident at work every year.

A framework for forest policy and governance guarantees implementation of sustainable forest management

European countries confirm having an institutional framework for forestry in place, although its organisational and administrative set-up differs between countries. National forest laws guarantee legal certainty at national levels. Recent challenges include reorganisations and budget restrictions.

National Forest Programmes or equivalents are now a well-established policy instrument across the region, with the aim of facilitating cross-sectoral dialogue on forest related policies. Forest inventories have a central role in forest monitoring.

Governments devote public resources to support sustainable forest management, including through publicly owned forest services and companies, central budget allocations, and systems of grants, subsidies and fiscal measures. Systems of payments for ecosystem services have also been introduced in several countries.

Still, there are significant threats and challenges, mainly to forest health and economic sustainability

Biotic and abiotic forest damage can have a devastating effect on forest ecosystems locally. At the European level, 3% of the forest area was affected by damage in 2015. However, a growing frequency of large-scale forest disturbances has been observed recently, including extreme droughts, heat waves, extensive bark beetle outbreaks, and more extensive forest fires.

Deposition of air pollution has continuously decreased over the last 25 years; however, some pollutants still locally exceed critical loads.

On average, the condition of European forests is deteriorating. Mean foliage loss of trees increased at 19% of monitoring plots, more than double the number of plots where foliage improved in the period 2010-2018.

The relatively low net revenue of forest enterprises poses a risk for forest management, especially in the environment of volatile markets, adverse effects of changing climate, and requirements for more demanding silvicultural systems.

SoEF 2020 demonstrates that many, even most, aspects of European forests have been managed sustainably for many years. Nevertheless, ...

There are significant threats and challenges, notably from forest disturbances and from economic factors. Furthermore, there are increasing demands on forests, for carbon sequestration, for renewable bio-based materials and products which can substitute non-renewable ones, for rural livelihoods, and for recreation, all in the context of a rapidly changing climate. There are calls for modified silviculture to meet the new demands and to adapt to changing climate conditions. There are, undoubtedly, limits to the forests' capacity to respond to these demands, which necessitate trade-offs between them.

The concept of sustainable forest management is based on the idea of fulfilling the ecological, economic, and social functions of forests on a basis which will provide benefits for present generations while not sacrificing the needs of future ones, as defined at the Helsinki Ministerial Conference in 1992.

As shown above, and in the detail below, Europe has been in a state of balance between the components of sustainable forest management for many decades. The new pressures and challenges may, however, lead to changes in this equilibrium. Transition from one state of balance to another would necessitate holistic and evidence-based decisions, to ensure that all aspects of sustainability are fully considered.

SoEF 2020 has presented the status and trends of all aspects of sustainable forest management, using the best available data and building on the support of all governments in the region as well as the scientific community. This report has no mandate to make policy recommendations; however, it provides a sound, objective, and comprehensive basis for the ongoing debate and decisions on the future direction of forest management in Europe.

Forest area has increased by 9% since 1990, although the rate of expansion is slowing down

The 227 million ha of forests in Europe cover 35% of total land area. Other wooded land accounts for an additional 27 million ha.

Forests cover
35%
of Europe's total land area

Around 75% of the forest area is available for wood supply.

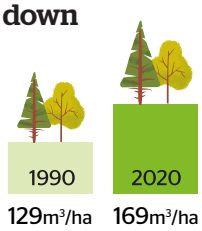
46% of European forests are predominantly coniferous, 37% are predominantly broadleaved, and the rest are mixed.

A quarter of European forests are uneven-aged

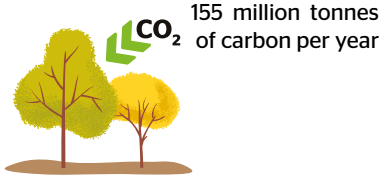
About three-quarters of forests in Europe are even-aged, of which about 64% are beyond the regeneration phase and have not yet reached the mature phase. Nearly a quarter of European forests are uneven-aged.

Growing stock has increased by 50% since 1990, although this trend is slowing down

The total growing stock of European forests adds up to 34 900 million m³, of which about 84% is located in forests available for wood supply. On average, there are 169 m³ of growing stock per ha, which is 40 m³ per ha more than thirty years ago.



European forests are a major carbon sink; carbon stock increases in forests and in wood products



Between 2010 and 2020, the average annual sequestration of carbon in forest biomass reached 155 million tonnes in the European region. In the EU-28, sequestration corresponds to around 10% of gross greenhouse gas emissions. In the period 1990-2015, the carbon stock in harvested wood products increased from 2.5 to 2.8 tonnes of carbon per capita, thus contributing to CO_2 emission reductions.

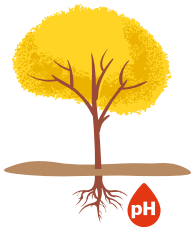
Related policy responses focus on increasing forest area, but its funding and competing land uses remain a challenge

The major challenges and obstacles to achieving policy objectives include the funding of afforestation, reforestation and climate change adaptation activities, competing land uses interests, and effective operation and coordination of all key sectors and key stakeholders, as well as more frequent and more severe weather events resulting from climate change.

Deposition of air pollution has been continuously decreasing since 1997

Despite an overall decrease in deposition of air pollution, forests in Europe are still exposed to excessive levels of nitrogen deposition and tropospheric ozone.

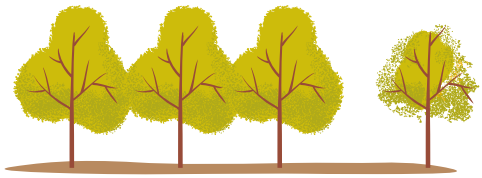
Soil properties show limited changes



A comparison of 2015 data with those from a survey performed in 2009-2012 revealed limited changes in soil properties, with only total nitrogen showing a generalised increase across Europe. Distinct North-South gradients were observed, the most pronounced being for the content of soil organic carbon, C:N ratio, and pH.

Defoliation is increasing

Although defoliation of trees at 72% of monitoring plots remained stable, foliage loss increased at 19% of plots in the period 2010-2018. Overall, the condition of European forests is apparently deteriorating, with increasing mean defoliation of the main tree species.



About 3% of European forests are damaged, mainly by wind, insects, ungulate browsing, and forest fires

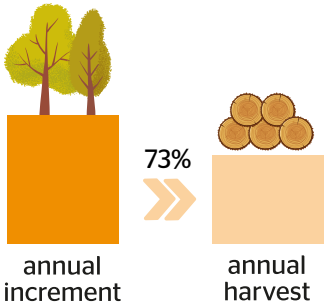
There is a clear regional pattern in specific disturbances: fires occur mostly in the Mediterranean region, and windstorms and heavy snowfalls in central and north-western regions. Ungulate browsing is a European-wide disturbance. Damage by insects fluctuates, while damage by wind and snow has increased. However, an apparent shift in disturbances has been observed recently, suggesting extreme droughts and heat waves, more extensive bark beetle outbreaks, and a wider occurrence of forest fires.

Related policy responses focus mainly on prevention of forest fires, ungulate browsing, and insect outbreaks

Reported measures address the prevention and control of hazards, crisis management, as well as a reduction of soil degradation. The major challenges and obstacles are the increasing threat of damage caused to forests by harmful organisms and extreme weather events, mass dying of forest tree species, and the unclear adaptive potential of tree species.

Increment in European forests substantially exceeds felling

Every year, more wood grows than is harvested in European forests, leading to the accumulation of growing stock in forests. Net annual wood increment is higher than in earlier periods. Since 1990, it has increased by approximately 25%. The volume of timber harvested has been increasing steadily since 1990. On average, 73% of the net annual increment is felled, thus indicating the sustainability of wood supply from European forests.



Europe is an important roundwood-production region

550 million m^3 / year

Roundwood production in Europe has been growing, reaching a maximum of almost 550 million m^3 annually. The reported total value of marketed roundwood is also continuously increasing and reached about EUR 21 000 million annually around 2015. The reported roundwood volumes and values per unit are highly variable across the reporting countries.

Forests and other wooded land are an important source of non-wood goods, such as food and materials

Cork, Christmas trees, chestnuts, fruits, mushrooms, wild meat, and honey represent traditional non-wood goods. These goods are a source of additional income from forests. The reported value of marketed non-wood goods in Europe was about EUR 4 000 million in 2015.

4 000 million €
non-wood goods

Market realisation of forest services remains underdeveloped

500 million €
marketed services

Social services, including hunting and fishing licenses, predominate among marketed services of forest ecosystems, followed by biosphere services. The total reported value of marketed services was around EUR 500 million, although data availability is limited.

Related policy responses aim to improve timber supply by a higher use of increment and of accumulated growing stock

The major challenges and obstacles include low economic efficiency and performance of the forestry sector, a lack of enabling entrepreneurship environment, support for innovations, increasing competition for forest resources and their services, and underdeveloped markets for ecosystem services. Reported measures focus on marketing and promotion of forest products and services.

Stands composed of two or more tree species predominate in European forests

European forests are steadily becoming more diverse in tree species composition. Stands composed of two or more tree species occupy 67% of the forest area. 33% of the forests are composed of stands dominated by single tree species – either monocultures or naturally homogenous forests.

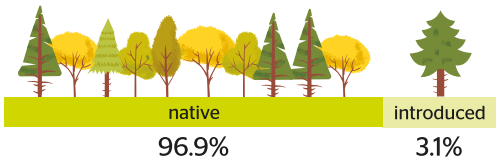
The majority of European forests are naturally regenerated

66% of the total forest area in Europe was regenerated naturally or result from natural expansion, and the share of these forms of establishment is slightly increasing.

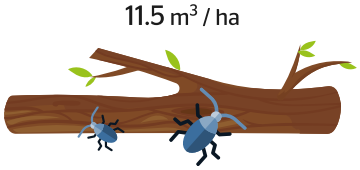
In 2020, plantations covered only 3.8%; Forests undisturbed by man cover 2.2% of European forest area.

Introduced tree species cover 3% of total forest area

Introduced tree species are used quite marginally in European forestry, covering 3.1% of the total forest area. The forest area dominated by invasive alien tree species is about 0.5% of Europe's forests and slightly increasing.



Volume of deadwood corresponds to about 7% of growing stock

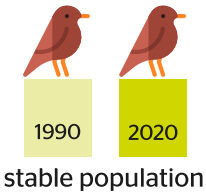


Deadwood provides microhabitats for many animal, fungi, and plant species; it is also an important part of the forest carbon pool and of nutrient cycles. The average volume of deadwood was 11.5 m³ per ha in 2015.

The number of genetic conservation units has increased about 10 times since 1990

Further effort is needed to fill the gaps in geographical representativeness of conserved populations of tree species.

Populations of common forest bird species are generally stable



There were only minor fluctuations in the common forest bird index over the last 37 years. The fact that populations of common forest bird species are stable indicates the overall stability of the forest environment and biodiversity.

Over the past 20 years, the area of forests designated for biodiversity conservation increased by about 65%

Protected forests account for almost a quarter of the total forest area

23.6%
of Europe's forests
are in protected areas

In 2015, the reported protected forest area was 49.3 million ha (23.6% of total forest area in reporting countries) and 4.1 million ha of other wooded land was also protected (20.5% of total other wooded land) in 2015. About 15% (or 31 million ha) of European forests are protected, with the main objective of conserving biodiversity, while about 9% (18 million ha) aim at protection of landscapes and specific natural elements.

Related policy responses focus on integrated forest management, conservation of high conservation value forests, and enhanced cross-sectoral cooperation

Targets include increasing protected forest areas and deadwood volumes, as well as halting the loss of species diversity. Reported measures focus on the integration of biodiversity protection into forest management planning, conservation of forests of high conservation value, and enhanced coordination of and collaboration between respective offices on biodiversity issues, as well as on the conservation of forest genetic resources. Major challenges and obstacles include limited effectiveness of biodiversity conservation and protection, more demanding management systems, and a lack of convergence of nature conservation and forest policy objectives.

Protective Functions in Forest Management (notably soil and water)

Protective forests prevent soil erosion, preserve water resources, and maintain other ecosystem services

Protective forests form
32%
of Europe's forests

Protective forests designated for prevention of soil erosion, preservation of water resources, and maintenance of other ecosystem services represent about 32% of forest area in countries reporting on this indicator.

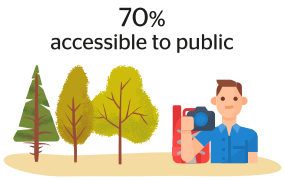
Protective forests designated to protect infrastructure and managed natural resources are reported on about 2% of forest area, while on forest and other wooded land it amounts to 2.6%.

The area of protective forest is increasing in Europe. In addition, the protective functions are often also integrated into multifunctional forestry outside of areas specifically designated for this purpose.

Related policy responses focus mainly on better provisions of the protective functions of forests

Measures mainly include implementation of legal and financial policy tools. The major challenges and obstacles to achieving the policy objectives are seen in reduced funding and staff, pollutants originating from other sectors, and ageing protective forests which can no longer sufficiently fulfil protective functions.

70% of forests and other wooded land are available for public recreation



In the majority of countries, more than 90% of forests are accessible to the public, with the average around 70%. About 6% of forests are primarily designated or managed for public recreation. The average intensity of recreation is estimated at 16 visits per inhabitant per year.

Forest area in public and private ownership is roughly balanced in Europe

About 53% of forests in Europe are in public ownership and 47% in private ownership. Private holdings are, in general, much smaller than public ones.

The forest sector contributed about 0.7% to GDP in Europe

The forest sector consists of forestry, the wood industry, and the pulp and paper industry. The forest sector contributed 2% to gross domestic product in North Europe, reflecting regional differences.

Net revenue in forestry is volatile

Net revenue represents a source of income for forest owners. In an environment of volatile markets and adverse effects of changing climate, low net revenue poses a risk to forest management.

Investments in forestry show a slightly positive trend

The capacity of forests to produce goods and services is influenced by investments in forests and forestry. Gross fixed capital investments decreased, in nominal terms, in the period 2000-2010 and showed an increase in 2015 reaching about EUR 22 per ha.

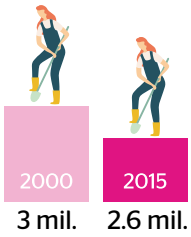
About 1.1 m^3 of wood is consumed annually per capita in Europe

Wood consumption comprises sawn wood, wood-based panels, paper, paperboard, and energy wood. Per-capita annual wood consumption varies between European regions, ranging from 0.7 m^3 in South-East Europe to 2.6 m^3 in North Europe in 2015, with an average of 1.1 m^3.

Wood consumption increased in all regions between 1990 and 2015, except Central-West Europe where, however, it is still the second highest after North Europe.

There are more than 2.6 million employees in the forest sector

In 2015, about 4 employees worked per 1 000 ha of forest. In the forest sector (including forestry, wood manufacturing, and the paper industry), there were more than 2.6 million employees. Employment in the forest sector decreased by about 33% from 2000 to 2015.



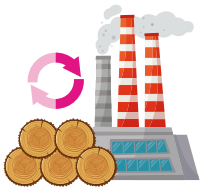
The reported number of fatal accidents in forestry decreased markedly

Working in forestry is still dangerous. In 2015, 149 fatal and almost 21 000 non-fatal accidents were reported in Europe, corresponding to about 24 accidents per 1 000 forest workers.

Europe is a net exporter of primary wood and paper products

The trade of forest products comprises exports and imports of roundwood, energy wood, sawn wood, wood-based panels, and pulp, as well as paper and paperboard. Europe is a net exporter of these wood and paper products, with an European trade surplus of about 30 million m^3 roundwood equivalents or EUR 5 500 million in 2015. Having doubled from 1990 to 2005, export volume stagnated in the period 2005-2015.

Renewable energy from wood covers about 6.4% of total energy consumption



Wood is one of the renewable sources of energy, covering 6.4% of total primary energy supply in Europe in 2015. Reflecting the state of development in the wood processing sector, about half of the energy from wood is supplied directly from the forest, significantly complemented by co-products and residues of wood processing industries and by post-consumer recovered wood.

Related policy responses focus on education and training, improved access to forests and recreation opportunities, as well as financial support and communication to stakeholders

Most countries have policy objectives focussing 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. Reported measures include support of research, education and training, improved access to forests and increased recreation areas, safety and health protection campaigns and training. The major challenges and obstacles relate to continuing depopulation of rural areas, difficulties in ensuring occupational safety and health, pressures from increasing recreation use, but also to limited access infrastructure, volatile wood markets, and inefficient use of woody biomass.

Introduction

The first of the State of Europe's Forests reports was issued by the Ministerial Conferences on the Protection of Forests in Europe (FOREST EUROPE) in 2003, under the chairmanship of Austria. Similarly, this fifth report of the series is published under the chairmanship of the Slovak Republic in the FOREST EUROPE process for the Eighth Ministerial Conference.

The State of Europe's Forests 2020 report (SoEF 2020) presents recent official figures and information on European forests, their management, policies, institutional and legal frameworks in the FOREST EUROPE signatory countries.

The data collection and preparation of this report was coordinated by the FOREST EUROPE Liaison Unit Bratislava with support from many partners, authors and other contributors acknowledged in a dedicated section.

The data presented has been provided by individual countries through the joint FOREST EUROPE/ UNECE/FAO Questionnaires and by international data providers, namely European Forest Genetic Resources Programme (EUFORGEN), the Statistical Office of the European Union (EUROSTAT), the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests), the Joint Research Centre of the European Commission, Pan-European Common Bird Monitoring Scheme (PECBMS) and the United Nations Economic Commission for Europe (UNECE).

Within the data collection process, the countries were asked to provide data for the whole period from 1990, comparable to the latest data supplied. Depending on the specific indicator and countries' conditions, the data availability and the completeness of reporting vary. Therefore, for most of the regional analyses, it is indicated for which proportion of the total regional forest area current data apply. When analysing trends, only those countries that have provided a complete time series are considered. Due to methodological changes in data collection and varying completeness of data submission, the information and analyses presented here might not be directly comparable with the results of previous reports.

Figure A: Grouping of the European countries into regions presented in SoEF reports

For this and previous SoEF reports, the FOREST EUROPE signatory countries, forming the pan-European region, were grouped into 6 groups to allow for comparison of possible regional specifics (Figure A). The Russian Federation alone has represented a separate region for which updated information was not delivered, thus it could not be included in SoEF 2020, except Annex tables containing information provided in earlier reporting campaigns, and the remaining 5 regions are summed up to the European total.

The data for the report was collected in the period 2018-2019. At that time, data for the year 2015 were already available and, for some indicators, correspondents could project data for 2020. However, e.g. the most recent developments in forests of some European countries, caused by storms, drought, or insect outbreaks, which lead to alarming mortality of trees and significant amounts of salvage timber, could not be systematically covered and included in the report. A clear note of the critical situation with bark beetle infestation in spruce forests was delivered e.g. by the Czech Republic.

Considering these new developments, and the generally high growing stock levels, the increase in biomass stocks may become reduced in the nearest future in Europe. In the longer run, increased use of harvested wood products, specifically of those with a long lifespan, can, therefore, maintain or temporarily increase carbon sink capacity linked to European forests.

The report is structured around the pan-European criteria and indicators for sustainable forest management (SFM), which are the basic tool to monitor, assess and report progress towards SFM. The first pan-European set of criteria and indicators for SFM was adopted at the Ministerial Conference held in Lisbon 1998 and then revised in 2003 and 2015. The current report utilised the most recent update of the pan-European set of criteria and indicators for SFM endorsed by the ministers at the 7th Ministerial Conference in Madrid 2015 as Annex 1 to the Madrid Ministerial Declaration. This update of the pan-European indicators for SFM respected the framework of the existing six criteria and created a linkage between the qualitative and the quantitative indicators. Now, the structure of the updated set is formed by an overarching policy framework of the set, named "Forest policy and governance", and by the set of indicators under the six pan-European criteria for SFM, aligning the specific policies and instruments under each criterion and the related quantitative indicators.

The key findings are presented in the summary for policy-makers at the beginning of the report. The main report is divided into two main parts. The first part reflects the current state and changes over time for indicators on the policy framework and on the indicators of the six criteria for SFM, i.e. forest resources and their contribution to global carbon cycles; forest ecosystem health and vitality; productive functions of forests; biological diversity in forest ecosystems; protective functions in forest management; and other socio-economic functions and condition. The second part of the report presents country-wise main trends in forest management, formulated in 2019 as a result of the dialogue with national correspondents and may contain further updates to the information provided in the first part. Therefore a few of the data presented in this second part might not be directly comparable with the first part. The report is complemented by the Annex tables.

The overall aim of this report is to provide policy and decision-makers and stakeholders with updated information on the status and trends in forests and sustainable forest management in Europe. As it presents the most recent harmonised and objective data related to the sustainability of forest management in Europe, it can also provide a solid basis for future political commitments on forests and forest-related issues.

Part I
Status and trends in European forests characterised by the Updated pan-European indicators for sustainable forest management

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Criterion 1

Criterion 1: Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles

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Data sources: **National reports on the pan-European indicators for SFM (1.1, 1.2, 1.3, 1.4, C.1)**

Forest resources represent a substance for the provision of all forest products and ecosystem services. Characterised by the area of forests, volume of wood, age structure, and forest carbon, they provide an overall picture of the situation in land use and forest management related trade-offs.

Key messages

- Both the forest area and the volume of growing stock have continued to increase in all regions in Europe, but with a decreasing rate of expansion.
- Forests in Europe continue to act as major terrestrial carbon sinks, removing about 10% of greenhouse gas emissions from other sectors. However, there are signs of declining sink capacity.
- Policy tools have been put in place to reach the objectives related to maintenance and enhancement of forest resources, as well as their adaptation to climate change. These include national forest acts, codes, regulations, national forest programmes or strategies, funding programmes, information campaigns, and communication strategies. Challenges in achieving policy objectives comprise the funding of afforestation, reforestation and climate change adaptation activities, competing land use interests, and effective operation and co-ordination of all key sectors and stakeholders.

Indicator 1.1 Forest area

Area of forest and other wooded land, classified by forest type and by availability for wood supply, and share of forest and other wooded land in total land area

Key findings

- Forest area in Europe is still increasing. It currently amounts to about 227 millon ha in FOREST EUROPE countries, without the Russian Federation, and accounts for almost 35% of the total land area. However, the annual forest expansion has slowed down in all regions in the last ten years. In addition, 27 million ha or above 4% of land area were reported as other wooded land.
- About 46% of European forests are predominantly coniferous, 37% are predominantly broadleaved and the remainder is mixed. However, the distribution by forest types varies considerably by region.
- At almost 92%, Central-West Europe has the highest share of forests available for wood supply while South-East Europe has the lowest share at about 53%. The area of forest available for wood supply is increasing between 1990-2020 and 2010-2020, with the exception of North-Europe where the area of forest available for wood supply has declined.

Introduction

The extent and changes in forest area and other wooded land (OWL) are basic, yet key, information for assessing the sustainability of forests management. The indicator provides a general overview of current state and changes of European forest area, the share of forest types and also how much of the forest area is available for wood supply. The demands on forests include product supply, a role in bioeconomy as well as role of forests and other wooded land (FOWL) in climate change mitigation and provision of many other ecosystem services like purification of air and water, biodiversity, and recreation. It is therefore vital to gather and analyse information about the forest area in Europe and its development.

Estimates of forest area and OWL area are available for all countries in the European region for the years 2015 and 2020. For 13 countries the data reported for 2015 or earlier period were simply duplicated for 2020. One other country could not provide data on forest area and OWL prior to 2015.

Four countries did not report data on forest available for wood supply (FAWS) for the whole time series. Moreover, two countries were unable to provide a full-time series but reported data on FAWS from 2005 respectively 2010 onwards.

Ten countries, which account for 5.8% of the European forest area, were not able to provide information on area by forest types for 2020. The availability of data did not allow for an analysis of the whole time series.

Data on other lands with tree cover are still rather sparse and were only reported by 22 countries for 2020.

Status

Forests cover 227 million ha in Europe, which is 34.8% of Europe's land area. However, the forest area is unequally distributed over the European territory and there are significant differences in the percentage of forest in different European countries. The majority (51%) of the countries have between 30 and 45% of their land area covered with forests (Figure 1.1-1). Large forest areas are typical for countries in the North Europe region (Table 1.1-1). In Finland, almost three-quarters of the total land area is covered by forests. Sweden follows in second place with a forest area of 68.9%. Slovenia and Montenegro are the only countries in the South-East Europe region with more than 60% forest cover. Central-East and Central-West Europe are the regions which have the lowest share of forest land (27.3% and 27.9% forest area). Other countries with very low forest cover are Malta and Iceland (1.1 and 0.5% respectively).

OWL represents 27 million ha, which is 10 million ha less than reported previously in SoEF 2015. The reason is that Turkey has reclassified large areas to forests which were previously considered as sparse woody vegetation. Montenegro did the same for smaller parts of OWL. Thus, OWL represents a small proportion of the total land area in European regions (from 0.6 to 4.7%) except in South-West Europe (14.4%) (Table 1.1-1). Four countries in Central-West and Central-East Europe (Germany, Netherlands, Czech Republic and Poland) reported zero values for OWL, which explains the very low share of OWL of less than 1% in these two European regions.

Around 46% of the forest in Europe is dominated by coniferous trees and 37% by broadleaved trees. Mixed stands cover 17% of Europe's forest area (Figure 1.1-2). The larger share of stands dominated by coniferous trees mainly results from the dominance of coniferous trees in North Europe (66.9%) where boreal forests predominate. Finland and Sweden are the countries with the highest percentage of coniferous trees (78.7% and 73.9% respectively). A greater share

of broadleaves dominated stands is found in other parts of Europe. The South-West Europe region has the highest share of broadleaved stands (61.4%). Ten European countries report coverage of more than 60% of broadleaved trees. The Republic of Moldova, Croatia, and Hungary are the countries with the highest percentage of broadleaved trees (100%, 82%, and 80.3% respectively). The highest share of mixed forests is found in Central-West Europe, representing 24.1% of the forests.

The area of FAWS in Europe amounts to 170 million ha in 2020 (Table 1.1-1). This corresponds to 76.6% of the forest area of countries reporting on FAWS. In Central-West Europe, the share is the highest at about 92%. In Central-East Europe and North Europe less than 80% (72.4 and 77.7%, respectively) are FAWS. South-East Europe is the region with the lowest share of FAWS (53.2% of the reported forest area).

The highest figures on forest area per capita (Table 1.1-2) are found in North Europe (2.16 ha per capita), which has by far the lowest population density in rural areas (4.33 people per km^2). Finland and Sweden reported 4.09 and 2.81 ha forest area per capita. The Central-West Europe region has the lowest forested area per capita (0.15 ha) with a rural population density of 37.8 people per km^2. The United Kingdom, Netherlands and Malta have less than 0.05 ha forest area per capita.

Table 1.1-1: Area of forest and other wooded land, by region, 2020

Region	Forest		FAWS		OWL	
	1 000 ha	% of land area	1 000 ha	% of forest area	1 000 ha	% of land area
North Europe	71 299	53.8	55 424	77.7	5 706	4.3
Central-West Europe	38 966	27.9	35 728	91.9	1 170	0.8
Central-East Europe	44 735	27.3	32 382	72.4	973	0.6
South-West Europe	31 466	35.5	27 733	88.2	12 791	14.4
South-East Europe	40 887	31.5	19 124	53.2	6 098	4.7
EU-28	162 422	38.3	137 799	84.9	21 052	5.0
Europe	227 353	34.8	170 390	76.6	26 737	4.1

Note: Data coverage on forest available for wood supply as % of total regional forest area: North Europe (NE) 100%, Central-West Europe (C-WE) 100%, Central-East Europe (C-EE) 100%, South-West Europe (S-WE) 100%, South-East Europe (S-EE) 88%, EU-28 100%, Europe 98%.

Table 1.1-2: Forest area per capita and population density, by region, 2020

Region	Forest area	Population density in rural areas
	ha per capita	people per km^2
North Europe	2.16	4.33
Central-West Europe	0.15	37.80
Central-East Europe	0.31	31.63
South-West Europe	0.27	35.02
South-East Europe	0.33	26.87
EU-28	0.32	29.68
Europe	0.33	26.93

Note: Data coverage as % of population: 100%.

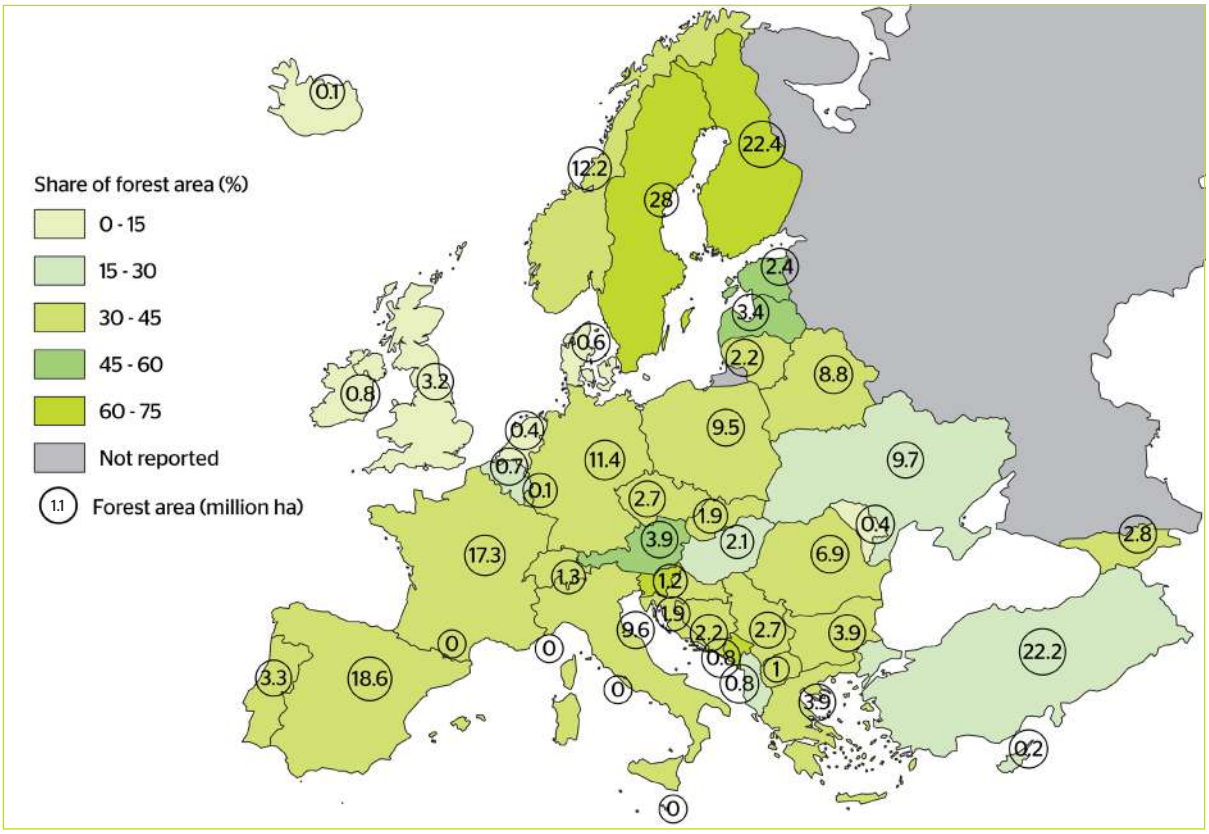

Figure 1.1-1: Forest area (in million ha) and share of forest area in total land area, by country, 2020

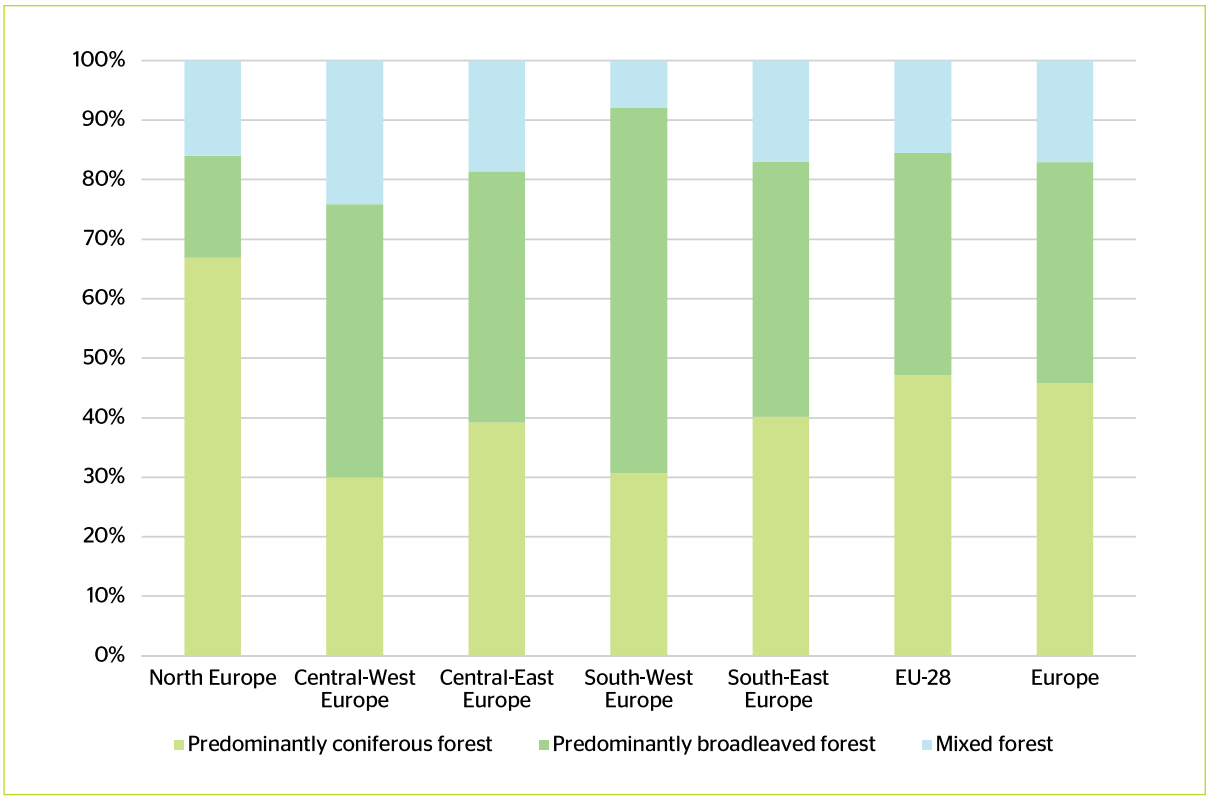

Figure 1.1-2: Forest area by forest types, by region, 2020

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 89%, S-EE 76%, EU-28 95%, Europe 94%.

Trends

The forest area in Europe expanded by 19.3 million ha over the last 30 years. On average, Europe's forest area increased by 643 thousand ha (0.30%) per year from 1990 to 2020. The presented changes in forest area are net changes and are the combined results of afforestation, natural forest expansion and deforestation. On average, all European regions continuously gained forest area over the last 10 and 30 years, although the rate of gain is decreasing. With an annual increase of 218.5 thousand ha (0.78%) over the last 30 years, forest expansion was highest in South-West Europe, followed by South-East Europe at 147.6 thousand ha (0.38%) and Central-West Europe at 131.5 thousand ha (0.36%) per year (Figure 1.1-3 and Table 1.1-3).

For all European regions, the average annual increase in forest area was higher during the period 1990-2020 (643 thousand ha in Europe´s forests) than in the period 2010-2020 (443.9 thousand ha). This indicates that the intensity of forest expansion has decreased in all regions in recent years, and consequently there is an overall decline in the expansion rate at the European level.

The total forest area expansion for the period 1990-2020 is highest in Spain at 155.6 thousand ha per year, France at 93.9 thousand ha per year, and Turkey at 81.2 thousand ha per year. The annual rate of change expressed as a percentage of the total forest area is highest for Iceland (3.74%), Ireland (1.77%) and Spain (0.97%) for the period 1990-2020 (Figure 1.1-4), and for Iceland (1.40%), Ireland (0.82%) and Denmark (0.69%) for the period 2010-2020.

For a few countries the reported data indicate a net decrease in forest area (Portugal, Bosnia and Herzegovina, Albania and Sweden) throughout the period 1990-2020. Netherlands, Slovenia, Sweden, Belgium, and Cyprus reported a decrease for the period 2010-2020.

The trend for FAWS is slightly different from the general increase in the forest area. In North Europe, the FAWS decreased on average by 116 000 ha per year for the period 1990-2020 (Table 1.1-4). But again, the decrease was higher in the period 1990-2010 than in the period 2010-2020. All other regions reported an increase in the area of FAWS for both time periods. Central-East Europe is the only region where the annual increase was higher in 2010-2020 than in 1990-2020. All over Europe, nine countries reported a decrease for the period 1990-2020 and period 2010-2020. The decrease of FAWS may be related to the extension of areas subject to environmental (such as the extension of protected areas), economic or social restrictions, while an increase of FAWS is rather related to the overall increase of forest area.

Table 1.1-3: Forest area and annual change in forest area, by region, 1990-2020 and 2010-2020

Region	1990	2000	2005	2010	2015	2020	Annual change 1990-2020	Annual change 2010-2020
	1 000 ha						%	
North Europe	69 943	70 823	70 767	70 926	71 202	71 299	+0.06	+0.05
Central-West Europe	35 020	36 382	37 178	37 864	38 447	38 966	+0.36	+0.29
Central-East Europe	41 731	42 773	43 280	43 841	44 471	44 735	+0.23	+0.20
South-West Europe	24 910	28 760	30 162	30 841	31 176	31 466	+0.78	+0.20
South-East Europe	36 459	37 339	38 210	39 442	40 196	40 887	+0.38	+0.36
EU-28	147 971	154 754	157 592	159 673	161 413	162 422	+0.31	+0.17
Europe	208 062	216 077	219 597	222 914	225 493	227 353	+0.30	+0.20

Note: Data coverage as % of total regional forest area: 100%; data cover all countries, for those not reporting on the year 2020 the last available information was used.

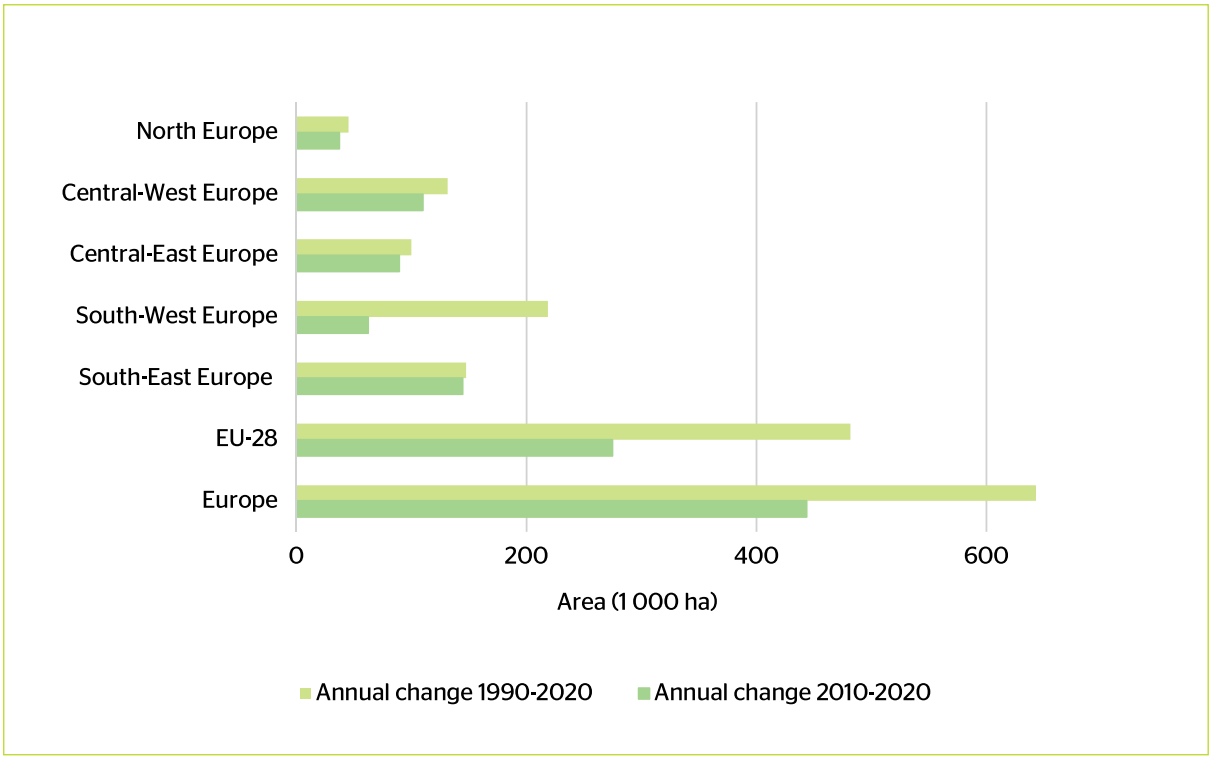

Figure 1.1-3: Annual change in forest area, by region, 1990-2020 and 2005-2020

Note: Data coverage as % of total regional forest area: 100%; data cover all countries, for those not reporting on the year 2020 the last available information was used.

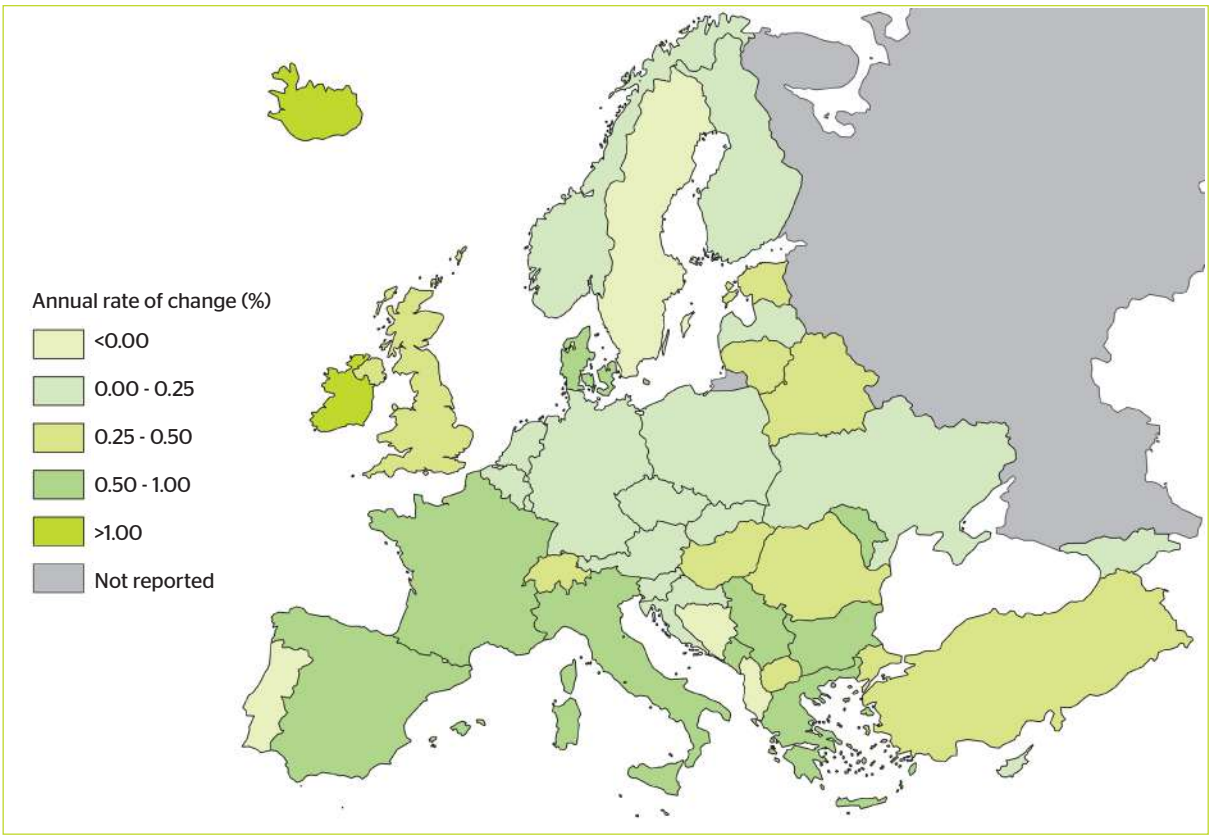

Figure 1.1-4: Annual change in forest area, by country, 1990-2020

Table 1.1-4: Area and average annual change in forest available for wood supply, by region, 1990-2020

Region	1990	2000	2005	2010	2015	2020	Annual change 1990-2020	Annual change 2010-2020
	1 000 ha						%	
North Europe	58 903	56 932	56 221	55 466	55 534	55 424	-0.20	-0.01
Central-West Europe	32 609	33 546	34 187	34 472	34 787	35 121	+0.25	+0.19
Central-East Europe	30 929	32 719	32 508	31 769	31 506	32 382	+0.15	+0.19
South-West Europe	8 947	9 569	9 935	10 121	10 416	10 654	+0.58	+0.51
South-East Europe	17 931	18 206	18 703	18 893	19 387	19 124	+0.21	+0.12
EU-28	119 166	118 480	119 331	118 739	119 129	120 113	+0.03	+0.12
Europe	149 319	150 972	151 554	150 720	151 630	152 703	+0.07	+0.13

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 98%, C-EE 100%, S-WE 41%, S-EE 88%, EU-28 88%, Europe 89%.

Indicator 1.2 Growing stock

Growing stock on forest and other wooded land, classified by forest type and by availability for wood supply

Key findings

- The total growing stock of European forests adds up to about 35 thousand million m³, of which about 84% is located in forests available for wood supply.
- The average area-related growing stock in Europe amounts to above 169 m³/ha and ranges from about 60 m³/ha in South-West Europe to 255 m³/ha in Central-East Europe.
- Over the last 30 years, the growing stock increased by almost 1.4% each year, but less in the last decade (about 1.1%) than before.
- During the last 30 years, the growing stock of broad-leaved trees increased at a higher rate than that of coniferous trees (about 1.6% and 1.2% each year, respectively).

Introduction

Growing stock, the stem volume of living trees, is a basic variable in forest inventory. The estimates for total growing stock (m³) and for growing stock density in forests (m³/ha) by forest type, the availability for wood supply, and the change in these indicators over time, provide basic information for the assessment of the sustainability of forest management. Growing stock information is also used as a basis for estimating the amount of carbon accumulated in living trees, allows the assessment of harvesting possibilities and informs on an important capital of forest owners.

Figures for the growing stock in the forests of the region were provided by 34 countries for the year 2020. Thus, 91% of the European forest area is covered by growing stock data (Table 1.2-1). Slightly fewer data were available on growing stock in forest available for wood supply (FAWS). Missing data mainly concern the South-West and South-East Europe regions.

Data for growing stock on other wooded land (OWL) only cover 31% of European OWL area, as 21 countries did not provide such estimates. Practically all countries with data available for the year 2020 provided figures on growing stock composition by forest types (predominantly coniferous, predominantly broadleaved and mixed), conifers and broadleaves, as well as by the 10 tree species with the largest shares in terms of stock volume. Figures for growing stock in forest for all reporting years were provided by 31 countries covering 78% of Europe's forest area.

Status

The total growing stock of European forests adds up to 34.9 thousand million m³, of which 28.7 thousand million m³ or about 84% are located in FAWS (Table 1.2-1). Of this growing stock in FAWS, 31.4% is located in the Central-West Europe region, 30.8% in the Central-East Europe region and 26.7% in the North Europe region. In relation to population, the total growing stock in Europe's forest is about 59 m³ per capita. In the North Europe region, the growing stock per capita is by far the largest at about 279 m³/inhabitant, indicating the great socio-economic potential of forest resources there. The values for the other regions vary between about 24 and 79 m³ per capita.

The reported total growing stock on OWL amounts to 0.13 thousand million m³ only. When interpreting these data, it is important to keep definitions in mind. Growing stock refers only to the stem volume of living trees with a minimum diameter of 10 cm at the breast height. As OWL is mostly formed by a considerable proportion of shrubs, bushes and/or trees with a height below 5 m and diameter below 10 cm "in situ" the attributed growing stock is very low as a rule. Further, in many countries, the growing stock data are missing for OWL.

The average growing stock density (Table 1.2-1) in European forests is 169.1 m³/ha. The highest values arise in the Central-East Europe region with 254.6 m³/ha and in the Central-West Europe region with 242.1 m³/ha; the lowest density results for the South-West Europe region with 59.7 m³/ha. The variation between countries is high: Liechtenstein with 409.0 m³/ha, Switzerland with 353.9 m³/ha, Romania with 339.8 m³/ha and Germany with 320.8 m³/ha report the highest growing stock densities, and Iceland with 16.0 m³/ha, Spain with 59.7 m³/ha and Turkey with 74.0 m³/ha report the lowest. The growing stock density on European OWL is 16.2 m³/ha (Table 1.2-1). Different growing stock densities can be explained mainly by ecological conditions that favour tree growth (site quality, climate), by forest protection measures, by management practices and, locally, by terrain conditions that hinder harvesting possibilities.

Conifers account for 58.6% of the growing stock in European forests. The stem volume of living trees in European forests is evenly distributed between broadleaved and coniferous tree species in almost all regions with the exception of the North Europe

region where 74.4% of growing stock is coniferous (Figure 1.2-1). Six genera of tree species represent 83.8% of growing stock: pine, spruce, fir, beech, oak and birch. Pine (29.6%) and spruce (23%) account for the largest proportions, followed by beech (11.9%) and oak (10%). That of birch is 6.6% and fir 3.2% (Figure 1.2-2).

Of the total growing stock in Europe's forests, 83.9% is located in FAWS (Table 1.2-1). The highest percentage is reported for the Central-West Europe region (95.9%), the lowest for South-East Europe (71.1%). Particularly low percentages are reported for Georgia (20.6%), Turkey (50%), Ukraine (65.5%) and Sweden (74.4%).

The noticeable differences between countries can partly be explained by the fact that countries have defined FAWS in varying ways.

Table 1.2-1: Total growing stock on forest, forest available for wood supply and other wooded land, by region, 2020

Region	Growing stock					
	Forest		FAWS		OWL	
	million m^3	m^3/ha	million m^3	Proportion to total growing stock (%)	million m^3	m^3/ha
North Europe	9 195	129.0	7 659	83.3	47	8.2
Central-West Europe	9 433	242.1	9 014	95.9	1	4.4
Central-East Europe	11 391	254.6	8 841	77.6	24	31.4
South-West Europe	1 109	59.7	979	88.3	-	-
South-East Europe	3 855	115.7	2 195	71.1	61	40.5
EU-28	26 470	182.0	22 682	88.4	46	10.8
Europe	34 983	169.1	28 688	83.9	133	16.2

Notes: Data coverage as % of total regional forest area:
Forest: NE 100%, C-WE 100%, C-EE 100%, S-WE 59%, S-EE 81%, EU-28 90%, Europe 91%;
FAWS: NE 100%, C-WE 100%, C-EE 100%, S-WE 59%, S-EE 72%, EU-28 87%, Europe 89%.
Data coverage as % of total regional OWL area: NE 100%, C-WE 20%, C-EE 79%, S-WE 0%, S-EE 25%, EU-28 20%, Europe 31%.

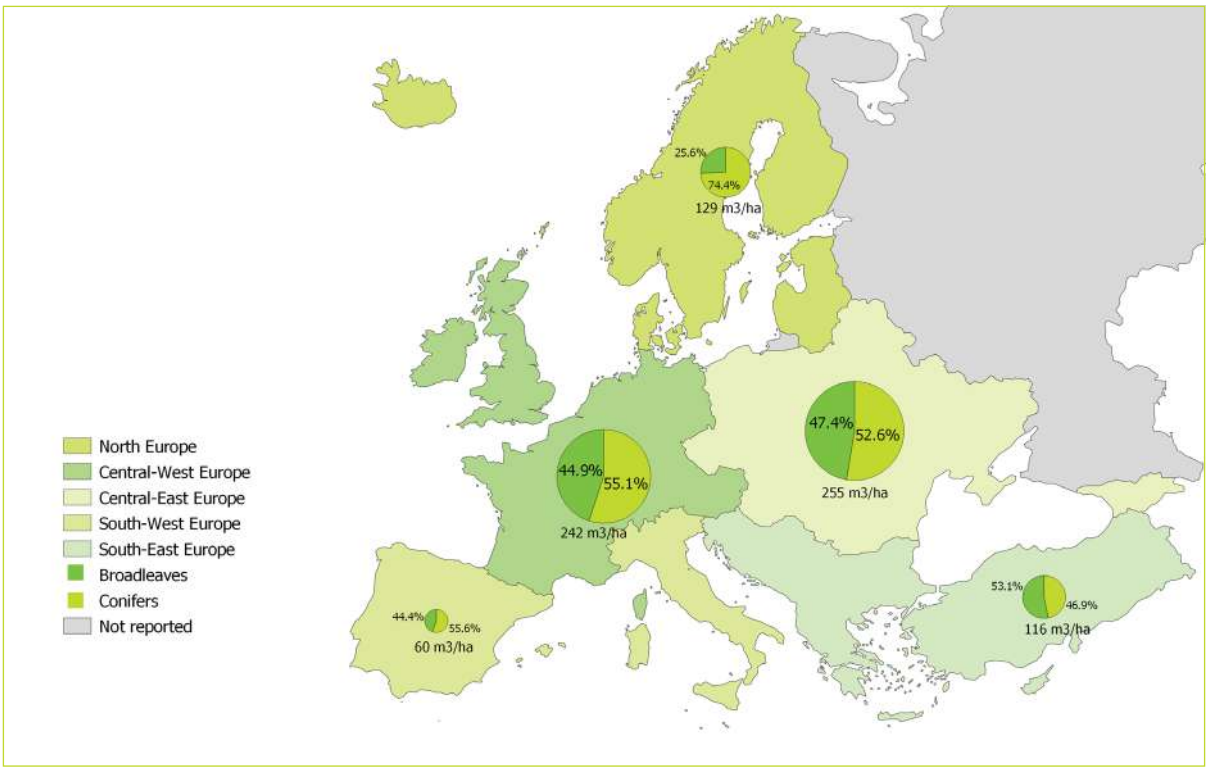

Figure 1.2-1: Growing stock in forest divided into conifers and broadleaves and growing stock density, by region, 2020

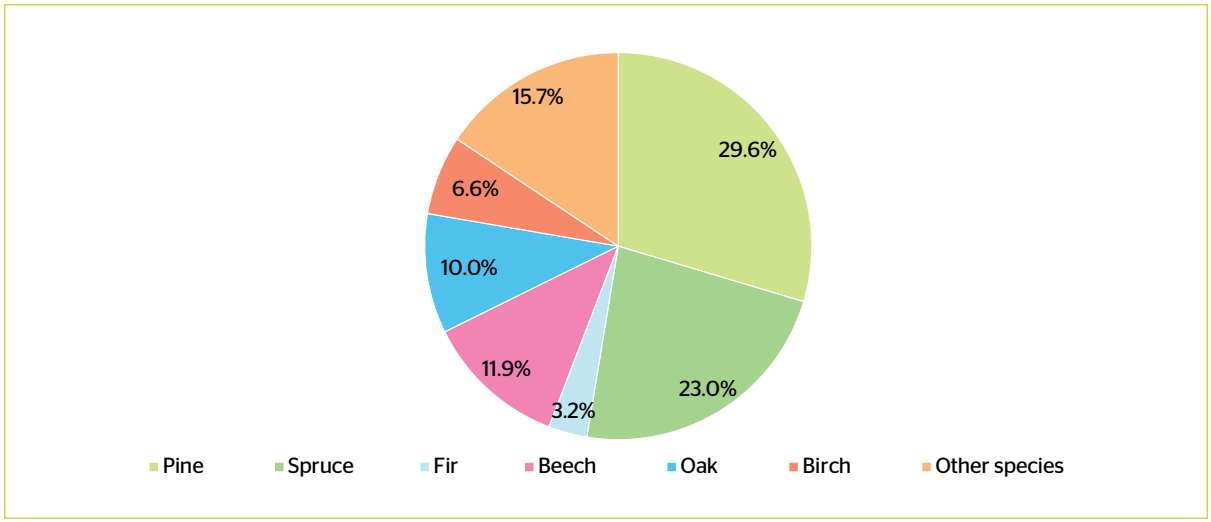

Figure 1.2-2: Europe's growing stock by main tree species, 2020

Trends

Over the last 30 years, i.e. 1990 -2020, the growing stock in Europe increased by 10.4 thousand million m³, in average 347.4 million m³ per year. This corresponds to an annual rate of change of 1.37% (Table 1.2-2). When interpreting these results, it should be noted that they refer only to 78% of the forest area for which growing stock data were available in all surveys between 1990 and 2020. The actual increase in total growing stock is therefore higher. The increase over this period was maintained, both in the whole Europe and in all regions. An analysis of growing stock accumulation for 1990 to 2020 by tree species reveals that the growing stock of broadleaved trees accumulated at a higher rate than that of coniferous trees (about 1.6% and 1.2% each year, respectively).

In absolute terms, the increase in total growing stock was highest in the Central-East region of Europe, where it amounted to 4.3 thousand million m³ over the last 30 years, followed by Central-West Europe (2.5 thousand million m³) and North Europe region (1.6 thousand million m³). Over the same period, i.e. 1990-2020, the average rate of increase in growing stock was highest in the South-West Europe region with 2.30% each year and lowest in the Central-West (1.06%) and North Europe regions with 1.11% (Table 1.2-2). The increase in growing stock depends on a few factors. Partly it is due to the expansion of forest area in all regions, most in South-West Europe.

However, the increase in growing stock in forests was higher than the expansion of forest area during the period 1990 to 2020 (Figure 1.2-3). This means that the growing stock density has increased during the period in all European regions. Another important factor is the development of age structure, with rising proportion/area of intermediate and mature development phases (see indicator 1.3).

The growing stock accumulation in European forests over the last 30 years is the result of the difference between the total amount of stem volume that was produced (grown) in forests (and gained through forest area expansion) and the total amount of stem volume that was removed from forests during this period, either through direct human activities, such as harvesting of wood and the thinning of forest stands or through losses of living stems due to mortality from causes other than human-induced, e.g. natural mortality, diseases, insects attacks, fire, windthrows or other natural events (e.g. landslides, avalanches).

The reasons for growing stock accumulation in European forests are manifold and complex, and the causes and effects vary in importance between the different European regions. Since 1990 the amount of fellings has markedly increased in all European regions except South-West Europe (Indicator 3.1). At the same time, the growing stock has increased because the rate of increase for volume increment has been higher than for fellings. The low levels of harvesting activity (compared to increment) may be the result of the age structure of forests, market conditions, reduced dependence on income from timber selling, constantly reducing the share of forestry in the national economies and increased societal awareness of the multi-functional role of forests. Further, the combined effects of CO_2 concentration and N deposition may lead to increased growth rates at least in some regions.

Table 1.2-2: Trends in total growing stock, by region, 1990-2020

Region	1990	2000	2005	2010	2015	2020	Annual change 1990-2020		Annual change 2010-2020	
	million m³						million m³	%	million m³	%
North Europe	3 980	4 483	4 730	5 115	5 417	5 541	+52.0	+1.11	+ 42.6	+ 0.80
Central-West Europe	6 787	7 849	8 346	8 708	9 036	9 312	+84.2	+1.06	+60.4	+ 0.67
Central-East Europe	7 111	8 272	8 763	9 573	10 815	11 391	+142.7	+1.58	+181.8	+ 1.75
South-West Europe	560	906	946	1 035	1 059	1 109	+18.3	+2.30	+7.4	+ 0.69
South-East Europe	2 226	2 819	3 058	3 302	3 594	3 734	+50.2	+1.74	+43.1	+ 1.24
EU-28	15 280	17 707	18 796	20 198	21 881	22 694	+247.1	+1.33	+249.7	+1.17
Europe	20 664	24 330	25 843	27 733	29 920	31 086	+347.4	+1.37	+335.3	+1.15

Note: Data coverage as % of total regional forest area: NE 61%, C-WE 98%, C-EE 100%, S-WE 59%, S-EE 79%, EU-28 72%, Europe 78%.

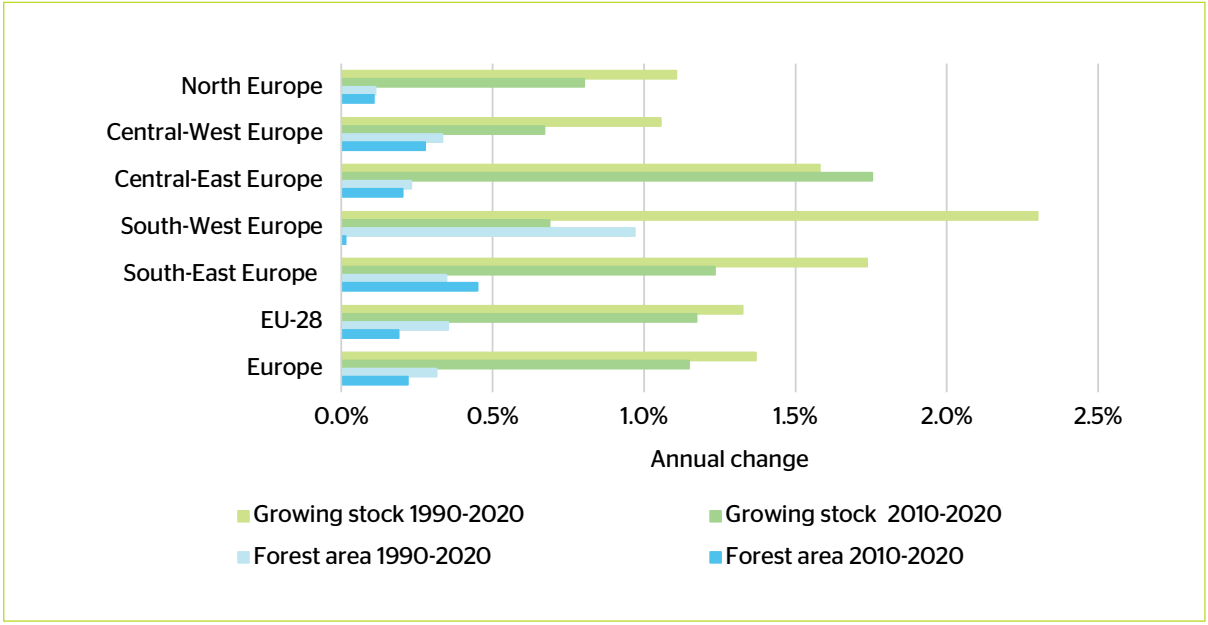

Figure 1.2-3: Annual change in total growing stock in forest and forest area, by region, 1990-2020 and 2010-2020

Note: Data coverage as % of total regional forest area: NE 61%, C-WE 98%, C-EE 100%, S-WE 59%, S-EE 79%, EU-28 72%, Europe 78%.

At the European level, the rate of accumulation of growing stock in forests over the period 1990-2020 shows variations due to different regional developments (Figure 1.2-4). The annual increase in the growing stock was relatively stable in all regions, and except Central-East Europe shows a trend towards smaller increases. The changes in the growing stock of Central-East Europe reflect growing stock increase in Romania by 0.8 thousand million m³ between 2010 and 2015, mainly affected by changes in the type of inventory.

In the last decade (2010-2020) the rate of annual growing stock increase for Europe's forests was 1.15%, which is below the long-term average of 1.37% for the period 1990-2020 (Table 1.2-2). The slowing down of growing stock accumulation may be attributed to a combination of factors like slowing down of forest area expansion, the age structure of forests, increasing utilisation rates of the net annual increment and forest damage by various agents.

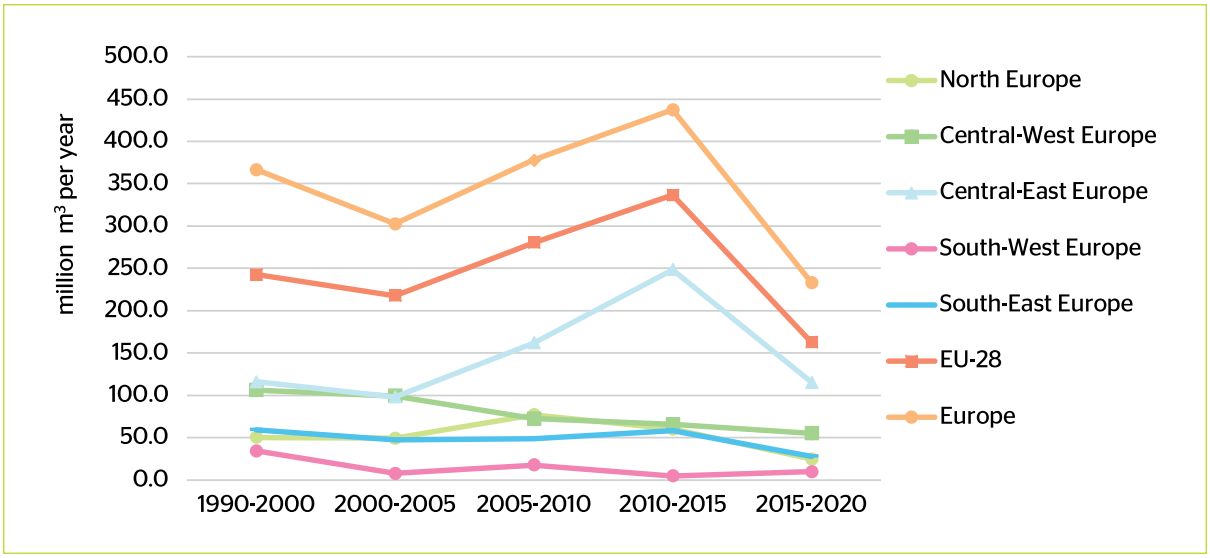

Figure 1.2-4: Annual change in growing stock, by region, 1990-2020

Note: Data coverage as % of total regional forest area: NE 61%, C-WE 98%, C-EE 100%, S-WE 59%, S-EE 79%, EU-28 72%, Europe 78%.

Indicator 1.3 Age structure and/or diameter distribution

Age structure and/or diameter distribution of forest and other wooded land, classified by availability for wood supply

Key findings

- About 3/4 of forest area in Europe are even-aged forest and 1/4 uneven-aged forests.
- The area of forest available for wood supply in Europe is dominated by even-aged forest, that are beyond the regeneration phase and have not yet reached the mature phase.
- The growing stock in the uneven-aged forest available for wood supply in Europe is dominated by the diameter class 21-40 cm.

Introduction

This indicator refers to the age-class structure of forest available for wood supply (FAWS) and the distribution of growing stock in FAWS across different development phases and diameter classes (for more info about FAWS see indicator 1.1). This information is important for understanding the history of forests and their likely future development and potential. For example, from a traditional forest management point of view the area of the development phase "regeneration" provides insights about the needs for silvicultural activities and the corresponding figure for the "mature" development phase about harvesting potentials. The indicator also provides insights about the provision of other ecosystem services, such as biodiversity and recreation, which are generally more favourable in uneven-aged and mature even-aged forests compared to young even-aged forests.

Three development phases have been considered to report the results of this indicator in even-aged forests: regeneration, intermediate and mature. The regeneration phase comprises even-aged forests between 0 and 20% of the recommended rotation age, and the mature phase even-aged forests older than 90% of the recommended rotation age. Even-aged stands between the regeneration phase and the mature phase, are defined as intermediate. It should be noted that this is a relative system, hence the actual ages in the different categories vary between countries.

Status

The age structure of the European FAWS area in 2015 is shown in Figure 1.3-1. Overall, even aged forests dominate. The local and regional differences in proportion of even-aged and uneven-aged forests partially reflect the differences in national inventory methodologies, not only the actual differences in forest structures. For Europe as a whole, more than 70% of FAWS is reported as even-aged, in which the intermediate development phase dominates (with more than 60%), while the mature phase and regeneration phase amount to about 18% each. Uneven-aged forests cover almost 30% of the FAWS area in Europe. Some countries reported only aggregated information without distinguishing even-aged and uneven-aged forests.

The composition of European growing stock by development phases in FAWS in 2015 is shown in Figure 1.3-2. The growing stock in even-aged forests dominates Europe. However, the growing stock in uneven-aged forest dominates South-West and Central-West Europe. For Europe, more than 70% of the growing stock in FAWS is reported as even-aged and the growing stock in the intermediate development phase dominates. The growing stock in the mature phase amounts to 28.0% of the growing stock in even-aged FAWS.

The composition of European growing stock by diameter in FAWS in 2015 is shown in Figure 1.3-3. For Europe as a whole, the diameter class 21-40 cm dominates in the uneven-aged forest; about 8% of the growing stock is constituted of trees larger than 60 cm diameter at breast height (DBH).

Trends

The data for the analysis of trend is limited and covers only 15% of FAWS in Europe for the period 2000-2015. The trend for this subset of countries indicates continuous decrease of even-aged stands in the period 2000-2015. Only limited change in distribution of development phases was observed for even-aged FAWS, showing a decrease of regeneration phase in favour of intermediate phase in the period 2000-2015 (Figure 1.3-4). The share of stands in the intermediate development phase is highest (>62%) and shows a modest increase between 2000 and 2015. In this development phase the increment of growing stock is highest. This corresponds to the development of total growing stock at the European level (see Indicator 1.2).

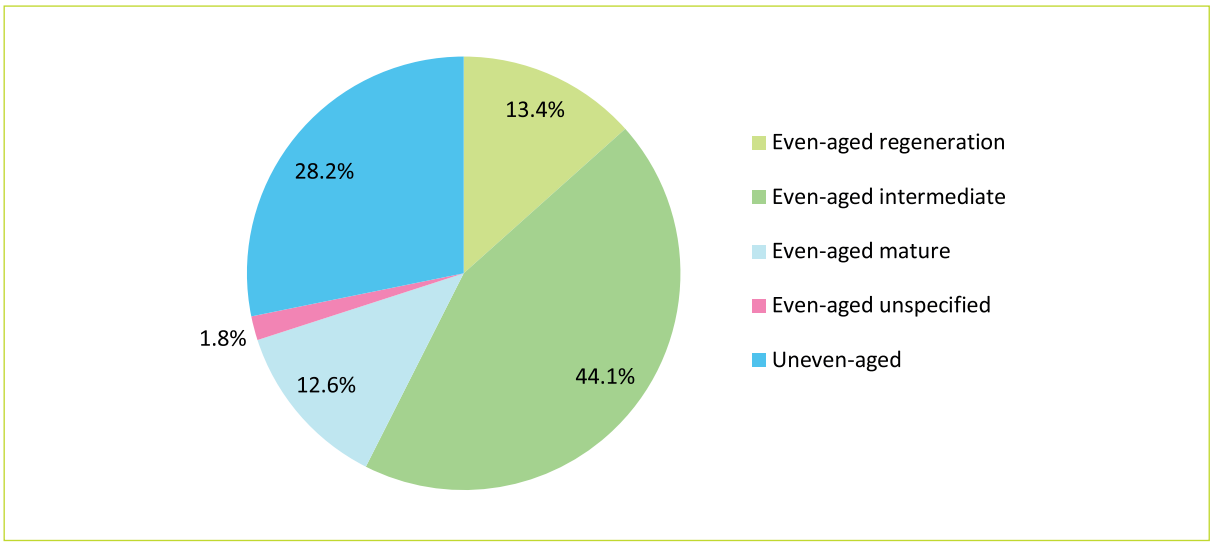

Figure 1.3-1: Share of the area of even-aged forest development phases and of uneven-aged forest in FAWS, 2015

Note: Data coverage as % of total regional FAWS area: 53%; For countries not providing information on total FAWS area the total forest area was used as proxy in calculation of data coverage.

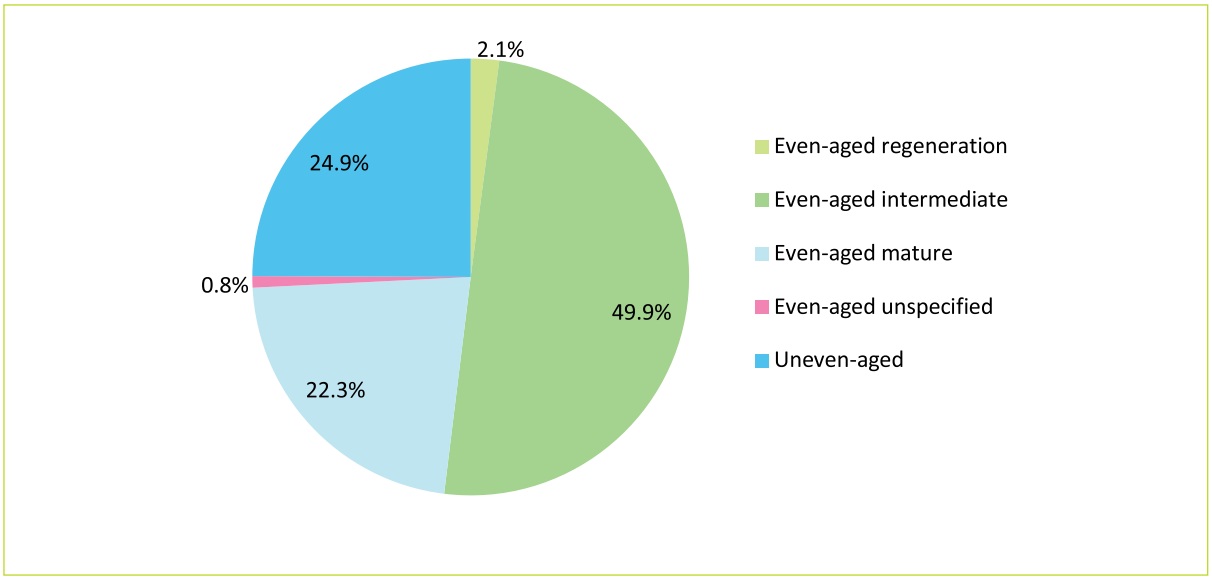

Figure 1.3-2: Share of growing stock in even-aged forest development phases and in uneven-aged forest in FAWS, 2015

Note: Data coverage as % of total regional FAWS area: 55%; For countries not providing information on FAWS area the total forest area was used as proxy in calculation of data coverage.

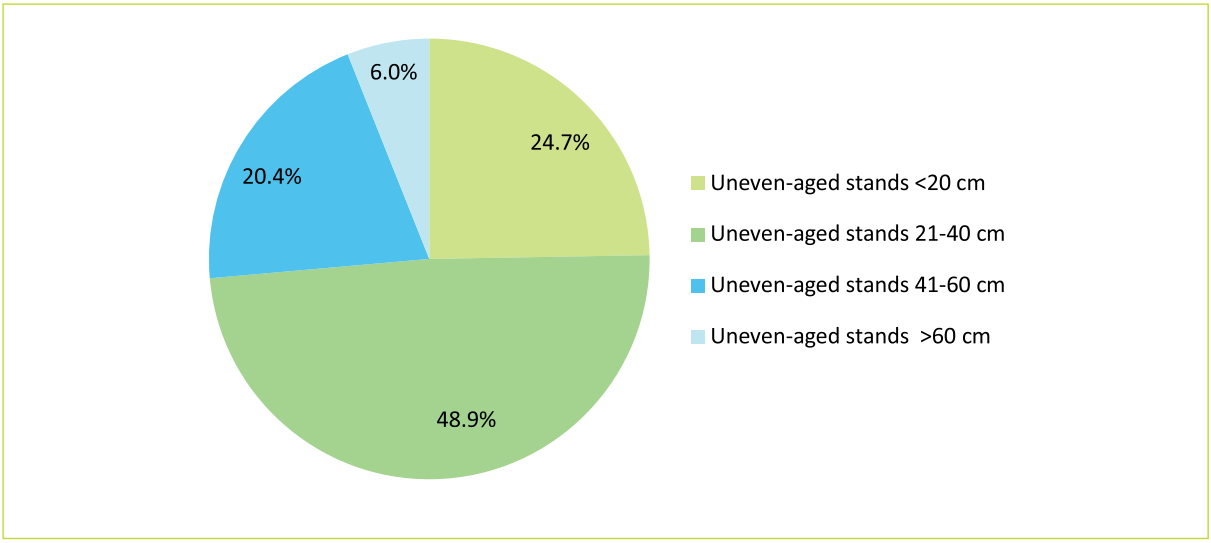

Figure 1.3-3: Share of growing stock in diameter classes in uneven-aged FAWS, 2015

Note: Data coverage as % of total regional FAWS area: 53%; For countries not providing information on FAWS area the total forest area was used as proxy in calculation of data coverage.

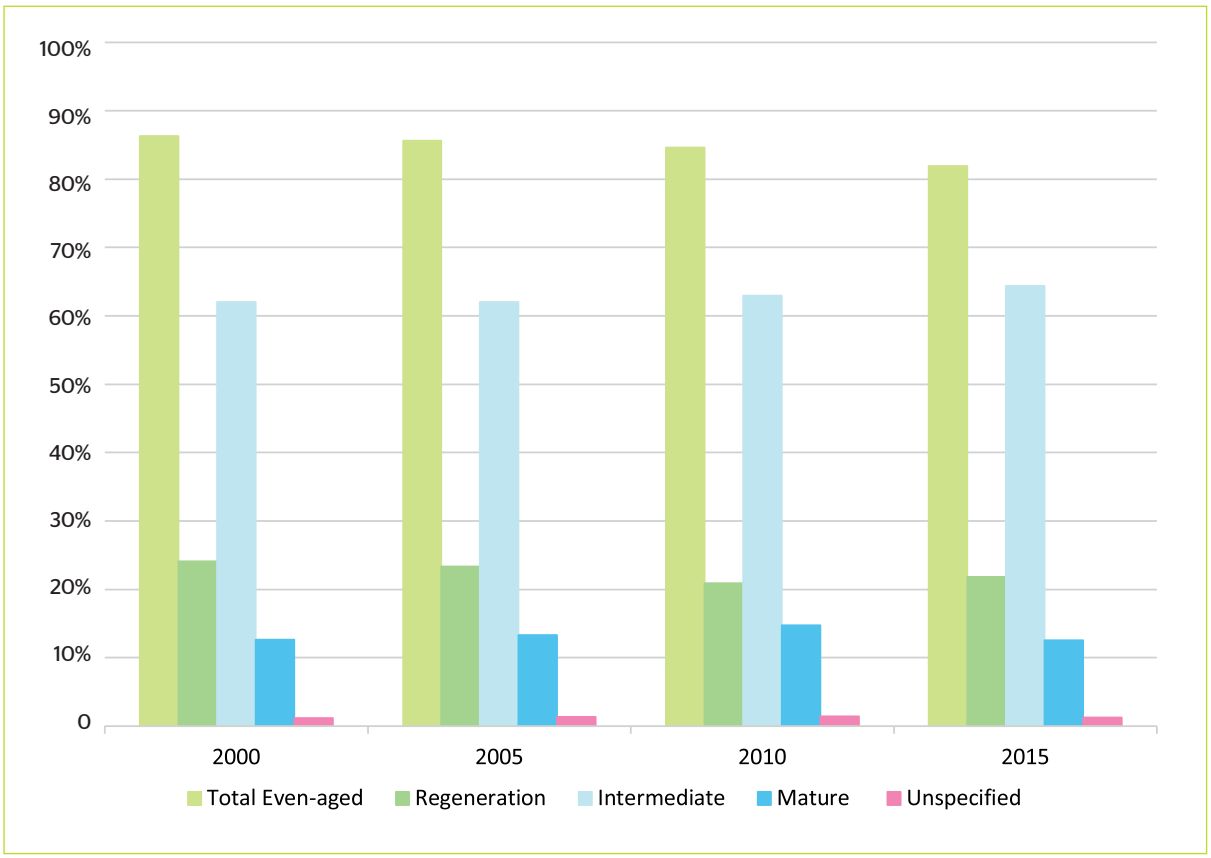

Figure 1.3-4: Trend in area of development phases of even-aged forests available for wood supply, 2000-2015

Note: Data coverage as % of total regional FAWS area: 15%.

Indicator 1.4 Forest carbon

Carbon stock and carbon stock changes in forest biomass, forest soils and in harvested wood products

Key findings

- Carbon stock in forest biomass in Europe is increasing, representing a significant sink of CO_2 emissions.
- Between 2010 and 2020 the average annual sequestration of carbon in forest biomass reached above 155 Mt C.
- Living woody biomass represents around 35.9% of the total carbon stock in forests.
- Carbon stored in biomass per hectare is the highest in Central-West and Central-East Europe, whereas forests in the Southern regions and North Europe contain half of that quantity.
- Estimated carbon stock in harvested wood products increased from 2.5 to 2.8 tons of carbon per capita and thus contributes to CO_2 emission reductions in European countries.

Introduction

This indicator is linked to society's efforts to mitigate climate change by reducing the net emissions of greenhouse gases to the atmosphere. Carbon is sequestered in biomass through tree growth. As a result, forests contain large stocks of carbon in biomass, dead organic matter and soil, which can either increase or decrease, depending on forest management practices and on frequency and severity of natural disturbances. By determining the trends in forest carbon stocks, it is possible to assess whether forests are carbon dioxide sources or sinks and to what extent forests compensate for or contribute to greenhouse gas emissions in other sectors.

Under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, and the Paris Agreement parties are obliged to submit reports on greenhouse gas emissions and removals through different land-use categories and carbon pools. In this context, forest land is an important land-use category in many European countries. While this indicator focuses on the carbon stocks within forests, forestry also helps to reduce greenhouse gas emissions in other ways. For example, fossil fuel consumption can be partly reduced through the use of wood-based biofuels. Furthermore, the wood in harvested wood products (HWPs) acts as a carbon sink by replacing more energy-consuming materials in various industrial sectors and by storing carbon in structures with a long lifespan, such as timber buildings.

Reporting of the carbon balance associated with HWPs is mandatory under the UNFCCC. In the reporting under the Kyoto Protocol, a distinction is made between biomass (above- and below-ground), dead organic matter (deadwood and litter) and soil (mineral and organic). However, in this report trend analysis is only carried out for the biomass pool as it may change markedly over short periods of time in response to growth, harvest and disturbances. Changes in the other pools tend to be slower and the data is incomplete or poorer in quality. As a new item, this report includes information about carbon stocks in HWPs in European countries.

Status

Table 1.4-1 presents the biomass carbon stocks in different European regions. It can be observed that biomass carbon expressed per hectare of forest land is highest in Central-West and Central-East Europe, whereas only about half of that quantity is present in Southern regions and North Europe. An analysis was carried out to assess the relative share of different forest carbon pools (i.e. above- and below-ground biomass, deadwood, litter, and soil organic carbon) based on data from countries that reported all five pools. The results are shown in Figure 1.4-1. More than half of the total forest carbon is stored in soils, while 35.9% is stored in living woody biomass.

Table 1.4-1: Carbon stocks in biomass divided into below- and above-ground components, by region, 2020

Region	Carbon in above-ground biomass		Carbon in below-ground biomass		Carbon in total biomass	
	Mt C	tonnes/ha	Mt C	tonnes/ha	Mt C	tonnes/ha
North Europe	2 614	36.7	783	11.0	3 397	47.6
Central-West Europe	2 936	75.4	689	17.7	3 625	93.0
Central-East Europe	3 420	76.4	698	15.6	4 117	92.0
South-West Europe	507	27.3	206	11.1	714	38.4
South-East Europe	1 116	33.5	270	8.1	1 386	41.6
EU-28	7 782	53.5	2 020	13.9	9 802	67.4
Europe	10 593	51.2	2 647	12.8	13 240	64.0

Note: Data coverage as % total regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 59%, S-EE 81%, EU-28 90%, Europe 91%.

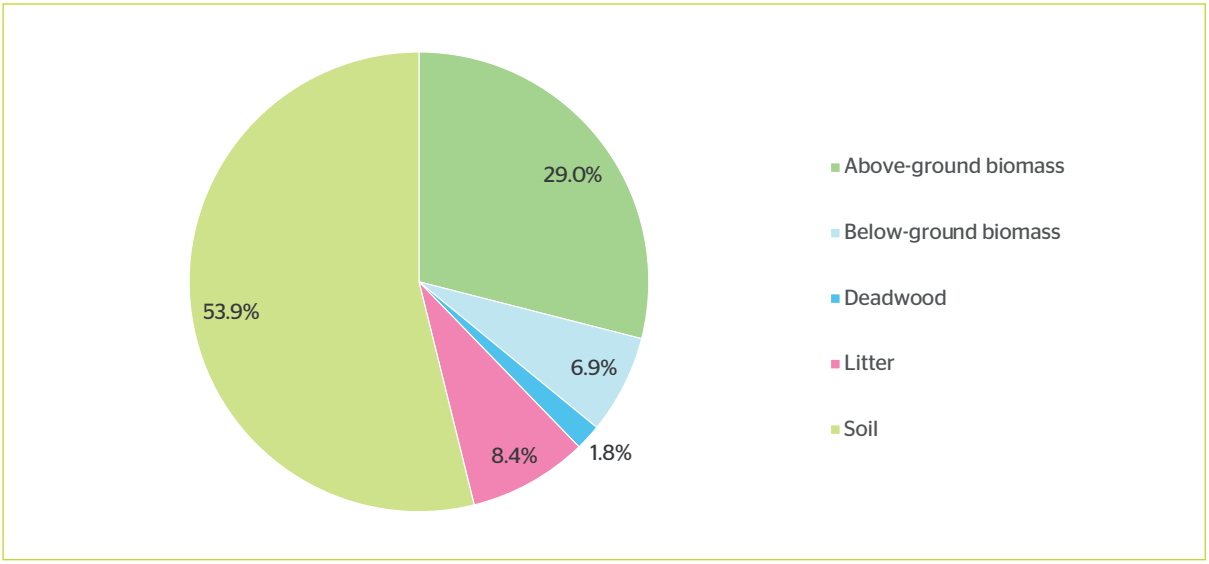

Figure 1.4-1: Proportions of forest carbon pools in Europe, 2020

Note: Based on data from countries that reported on all five carbon pools. Data coverage as % of total forest area in Europe is 52%.

Trends

The biomass carbon stocks in European forests from 1990 to 2020 are presented in Table 1.4-2 using only data from countries that reported for all years. The carbon stocks in biomass increased steadily in all regions from 1990 to 2020. The overall increase in biomass carbon stocks between 2010 and 2020 remains substantial. For all European countries, it amounts to 155.2 Mt C or 569.7 Mt CO_2 per year for the period 2010-2020. For the EU-28, the corresponding figures are 119.9 Mt C or 439.9 Mt CO_2 per year, which amounts to around 10% of the gross greenhouse gas emissions during the corresponding period.

The major reason for the observed changes is that growth exceeded cuttings and mortality. However, since 2015 some countries have experienced an exceptional drought-related decline of forest stands that may not as yet be fully reflected in the reported numbers of carbon stock changes. There is a generally increasing trend in HWPs use per capita in Europe, as shown in Figure 1.4-2.

Due to missing data and other uncertainties, no data are presented for changes in non-biomass carbon pools. However, the available data appear to suggest that these pools are also increasing, albeit not as markedly as the biomass pool. Although there are uncertainties, it can be concluded that European forests remain important from a climate change mitigation perspective and that the ecosystem service provided by forests is important, although not currently reflected in financial flows.

Table 1.4-2: Annual change in total forest biomass carbon stocks, by region, 1990-2020

Region	1990	2000	2005	2010	2015	2020	Annual change 1990-2020		Annual change 2010-2020	
	Mt C						Mt C	%	Mt C	%
North Europe	2 576	2 768	2 935	3 087	3 296	3 397	+27.4	+0.93	+31.0	+0.96
Central-West Europe	2 411	2 761	2 962	3 115	3 294	3 470	+35.3	+1.22	+35.5	+1.08
Central-East Europe	2 183	2 640	2 833	3 150	3 708	3 905	+57.4	+1.96	+75.5	+2.17
South-West Europe	-	-	-	-	-	-	-	-	-	-
South-East Europe	858	949	1 026	1 092	1 179	1 225	+12.2	+1.19	+13.3	+1.16
EU-28	6 207	6 867	7 300	7 784	8 619	8 983	+92.5	+1.24	+119.9	+1.44
Europe	8 028	9 118	9 756	10 445	11 476	11 997	+132.3	+1.35	+155.2	+1.40

Note: Data coverage as % total regional forest area: NE 100%, C-WE 100%, C-EE 94%, S-WE 0%, S-EE 70%, EU-28 76%, Europe 79%.

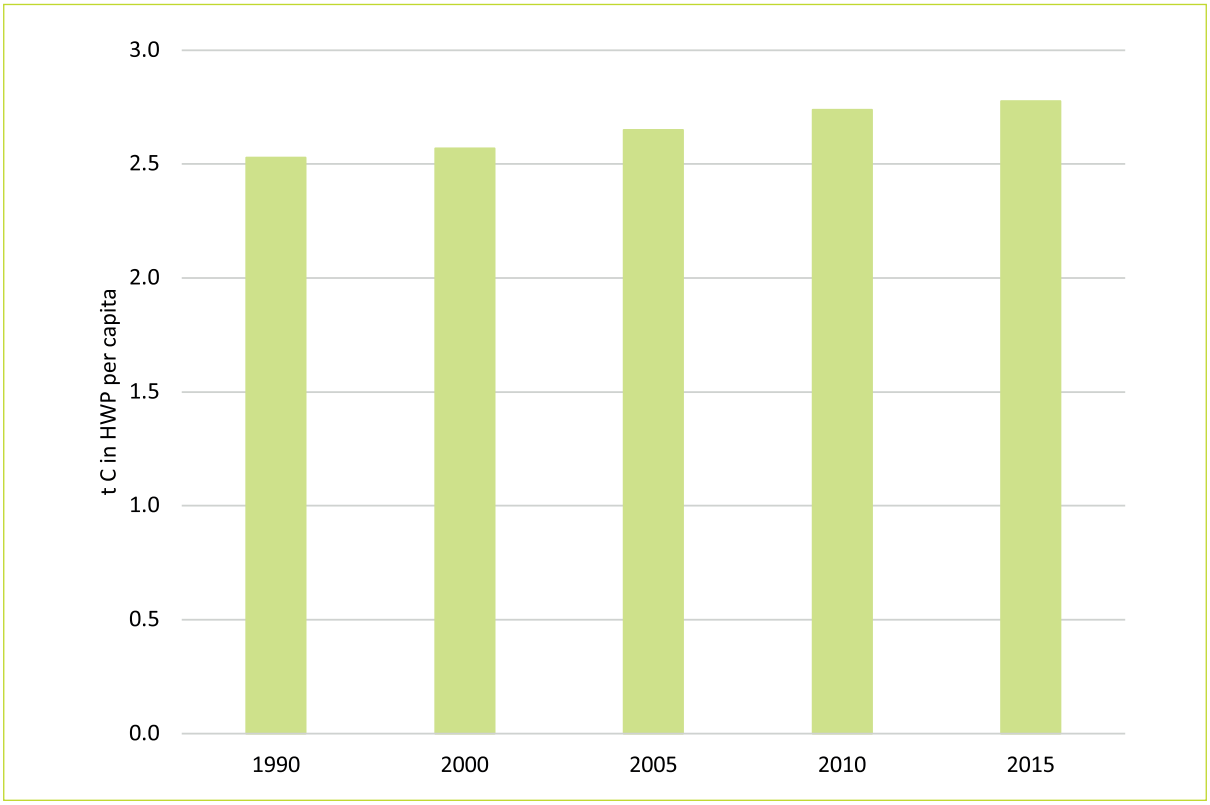

Figure 1.4-2: Carbon stock in harvested wood products in Europe, 1990-2015 (tonnes per capita)

Note: Data coverage as % of total population: 50% of the population in Europe.

Indicator C.1: Policies, institutions and instruments to maintain and appropriately enhance forest resources and their contribution to global carbon cycles

Key findings

Almost all countries have specific **policy objectives** in relation to the forest resources and their contribution to global carbon cycles. **Quantitative targets** related to the policy objectives were mainly focusing on increasing the forest area. The **institutional framework** supports related regulatory, supervision and stimulation measures to achieve objectives, providing public land and funding for afforestation and reforestation as well as on building capacity for related monitoring and reporting. Legal, financial and communication **policy tools** have been put in place to reach the objectives, among them, national forest acts, codes, regulations, national forest programmes or strategies, funding programmes, information campaigns and communication strategies. **Achievements** over the past five years have included increased forest areas, growing stocks and related carbon stocks as well as novel legal frameworks to face climate change adaptation. The major **challenges** and **obstacles** to achieve the policy objectives comprise the funding of afforestation, reforestation and climate change adaptation activities, competing land-use interests and effective operation and coordination of all key sectors and key stakeholders as well as more frequent and more damaging events due to climate change which threaten the maintenance of the forest resources and their contribution to global carbon cycles.

Almost all countries have specific policy objectives in relation to their forest resources and their contribution to global carbon cycles.

The national policy objectives in relation to the maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles (as reported by 27 countries out of 31) include following topics according to the national reports:

- increasing the forest sectors contribution to mitigating climate change by increasing the carbon stock by carbon sequestration in biomass and soils and by increasing the use of wood as renewable resource to substitute non-renewable materials, including fossil fuels,
- maintaining or increasing the forest area and prohibiting deforestation or the reduction of forest area,
- maintaining and enhancing sustainable forest management,
- balancing ecological functions,
- supporting the adaptation of forests to climate change,
- ensuring the timber supply.

Quantitative targets related to the policy objectives were indicated by nearly half of the reporting countries mainly focusing on increasing forest areas.

The aims to meet the Paris Agreement targets were mentioned by some of the reporting countries. Under EU legislation adopted in May 2018, EU Member States shall ensure that greenhouse gas emissions from land use, land-use change and forestry sector are offset by at least an equivalent removal of CO_2 from the atmosphere in the period 2021 to 2030. A few countries reported targets on increasing carbon sequestration.

Specific targets on increasing the forest area by afforestation or reforestation within a timeframe given were reported by nine countries (see Table C.1-1).

Institutional measures taken to achieve policy objectives focus on the provision of public land and funding for afforestation and reforestation as well as on capacity building for related monitoring and reporting.

To maintain and enhance the forest area and to particularly achieve related carbon sequestration targets, 19 countries reported state authorities to support related regulatory, supervision and stimulation measures. The land was made available for afforestation and reforestation in 13 countries across Europe. Capacity building for improved monitoring and reporting were reported by four countries e.g. on status and changes of forest area, forest health or climate change adaptation measures. For the elaboration of new forest or climate strategies or National Forest Programmes and adaptation programmes, participatory processes were launched in eight countries aiming to engage relevant stakeholders and to coordinate and collaborate with other policy fields.

Table C.1-1: Country-specific targets on the enhancement of forest resources

Country	Target
Austria	Increase in the forest area in regions with low forest cover until 2030
Bulgaria	2013–2020: Forestations of 2 000 ha bare forest lands and afforestation of 2 500 ha of an abandoned agricultural land and on land eroded or threatened by erosion
Denmark	Before the end of the 21st century, forested landscapes cover 20-25 % of the total area
Estonia	Increase the total volume of growing stock
Georgia	35 000 ha of afforestation & reforestation until 2030
Ireland	The principal objective of the Forestry Programme 2014-2020 is to plant an additional 44 000 ha of forests
Lithuania	Afforestation of 30 000 ha according to the National Forestry Sector Development Programme for 2012-2020
Slovakia	Develop a methodology for setting functional types and subsequent management optimisation of other land with tree cover (288 thousand ha)
Spain	Nearly 4 million ha increase of forest area by 2032.

Legal, financial and communication policy tools put in place to reach the objectives include changes to forest law, new strategies and programmes, new funding programmes, and information campaigns.

Legal: Forest laws are the main policy instruments in European countries for guiding and supporting the maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles. In 15 reporting countries, new strategies and programmes focusing on forest resources, climate change mitigation, adaptation, rural development or research were adopted.

Financial: Specific funding programmes, e.g. from Rural Development Funds, to support the achievement of the objectives, were reported by 16 countries from all European regions.

Communication: Information campaigns for private landowners as well as the development of a respective communication strategy were reported by four countries from Northern and Central Europe.

Achievements focused over the past five years on increased forest areas and related carbon stocks as well as on novel legal frameworks to face climate change adaptation.

40% of the reporting countries, mainly from Central- and South-East Europe, reported on considerable afforestation and increased forest areas leading to increased carbon sequestration. About one-third of the reporting countries reported on new, adapted or amended policy tools, i.e. legal frameworks, strategies and programmes since 2014. This was mostly made to take due account of climate change adaptation necessities. In this regard, three countries informed about adaptation efforts and increased resilience of forest ecosystems to the negative effects of climate change.

The major challenges and obstacles to achieve the policy objectives comprise the funding of afforestation, reforestation and climate change adaptation activities, competing for land-use interests, effective operation and coordination of all key sectors and key stakeholders as well as more frequent and more damaging events due to climate change.

For nine reporting countries, the major challenge in achieving the policy objectives is securing stable and foreseeable financing of the above-identified measures, particularly afforestation and reforestation as well as efforts towards adaptation to climate change. The existence of competing interests like construction land versus agricultural and forest land, and in particular the competition between agriculture and forest policy on the same abandoned

land, which can be used for afforestation but also for farming, is seen as challenging by six reporting countries, mainly from Central-East and Central-West Europe. It was also mentioned by six countries (mainly from Central-East and South-East Europe), that effective operation and coordination of all key sectors and key stakeholders (essentially from forestry, environment, finance and state administration) is challenging, and private forest owners are not motivated in regarding this. A lack of knowledge and experience on climate change adaptation as well as a limited capacity and shortage of resources by forest administration and management bodies to implement SFM and to control the legality of forest resources use were reported as obstacles by four European countries. More common and more serious biotic and abiotic forest damaging events due to climate change were reported as obstacles for carbon maximisation by four countries.

Criterion 2

Criterion 2: Maintenance of Forest Ecosystem Health and Vitality

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Reviewer: **Piermaria Corona**

Data sources: **ICP Forests (2.1, 2.3), EC JRC (2.2), National reports on the pan-European indicators for SFM (2.4, 2.5, C.2)**

Criterion 2 considers and quantifies the exposure, risk, and impact on forest health posed by biotic and abiotic stressors. Environmental conditions, such as air and soil quality, influence the health and vitality of forest ecosystem and, subsequently, the provision of forest products and services. Appropriate management practices can improve the condition of forest ecosystems, while inappropriate practices can lead to degradation of forests and forest land.

Key messages

- Generally, the condition of European forests is deteriorating, with increasing mean defoliation of the six most frequent tree species particularly obvious on 18.9% of the plots.
- Pests, diseases, wildlife (especially browsing by large ungulates) and grazing by domestic animals, fires and weather extremes such as storms were reported as important causes of damage. The frequency and intensity of storms is increasing over time. A geographical shift in disturbances is also observed. However, the report does not include the most recent developments in forest damage resulting from drought, storms, and bark-beetle outbreaks indicated by some countries after the reporting year of 2015.
- Forests in Europe are still exposed to excessive levels of nitrogen deposition and tropospheric ozone – the latter being reported for the first time in the SoEF. Trends over recent decades, however, indicate a reduction in both, reflecting efforts in clean-air policies.
- Soil condition revealed distinct North-South gradients in several attributes, most pronounced for soil organic carbon, carbon-to-nitrogen ratio, and soil pH. An apparent increase in total nitrogen was detected between 2009/2012 and 2015 in most of the countries.
- Maintenance of forest health and vitality is of high importance in national forest-related policies, as well as in establishing a system of risk prediction and prevention. The implementation of various forest fire prevention activities are the main achievements. The major challenges comprise the necessity to face the increasing risk of damage by harmful organisms and extreme weather events, mass dying of trees and whole stands, and the unclear adaptive potential of tree species to climate change.

Indicator 2.1 Deposition and concentration of air pollutants

Deposition and concentration of air pollutants on forest and other wooded land

Key findings

- Annual sulphur and nitrogen throughfall deposition were generally higher in central and some southern and eastern parts of Europe. For the first time, tropospheric ozone concentrations in forests were also reported, with higher levels in southern and eastern Europe.
- Mean annual sulphur and nitrogen throughfall deposition decreased by about 60-70% and about 20-40% from 1997 to 2017, respectively. Mean ozone concentrations over the growing season (April-September) decreased by about 10% between 2000 and 2013.
- The thresholds for potential adverse effects on forests – critical loads and levels – are still exceeded at many ICP Forest monitoring plots, mainly in central parts of Europe for nitrogen, and over the majority of countries for ozone.

Introduction

Sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3) are emitted into the atmosphere by human activities such as fuel burning, industrial processes, traffic and agriculture. They can be transported over long distances as gases or particles (aerosols). Together with volatile organic compounds (VOC) and carbon oxide (CO), these emissions have also contributed to the mean global tropospheric ozone (O_3) concentrations having approximately doubled comapared to the pre-industrial age. Ozone levels, trends and related potential risks for forests are reported for the first time after the indicator 2.1 has been revised in 2015.

Atmospheric deposition of sulphur (S) and reactive nitrogen (N) to forests and tropospheric ozone (O_3) can all affect forest ecosystems. Sulphur and N mostly accelerate soil acidification, eutrophication and change nutrient availability in soils. Soil acidification may result in a loss of important nutrients (base cations, particularly calcium (Ca) and magnesium (Mg)) and an increase in aluminium toxicity impairing roots. Eutrophication, due to N in excess, may result in e.g. nutrient imbalances and increased vulnerability. Ozone can affect plants via foliar uptake, with effects ranging from visible foliar damage to reduced growth and carbon sink strength of forest trees.

The risk for negative effects on forests can be evaluated by comparing the actual atmospheric deposition loads and O_3 concentration levels to Critical Loads and Levels. Critical Loads are defined as "a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge". Critical Levels are defined as "concentration, cumulative exposure, or cumulative flux of atmospheric pollutants, above which direct adverse effects on sensitive vegetation may occur according to present knowledge".

The International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) under the UNECE Air Convention has measured the deposition of sulphate (SO_4^{2-}), nitrate (NO_3^-), ammonium (NH_4^+) and base cations (BC) in the open field and under the forest canopy (throughfall) since the mid-1990s, and growing season ozone O_3 concentrations since 2000 at hundreds of its Level II monitoring plots in Europe. Although the plots cannot be considered statistically representative for European forests, they cover the major forest types, and they likely reflect typical deposition and O_3 exposure regimes in each country. All measurements are carried out according to the ICP Forests Manual[1].

Status

For atmospheric deposition, in 2016 sea-salt corrected SO_4^{2-}-S throughfall deposition was below 8 kg S ha^{-1} $year^{-1}$ on most forest plots. However, some forest plots with higher S deposition were scattered across Europe. In general, S deposition in parts of central Europe tended to be slightly higher compared to other regions (Figure 2.1-1). For N, in 2016 the highest throughfall deposition was measured mainly in the central part of Europe (Denmark, southern Sweden, Germany, Belgium, Poland, Switzerland, Austria, northern Italy). High N deposition was also measured on some plots in Spain, Serbia and Romania (Figure 2.1-2, Figure 2.1-3). The throughfall deposition of sea salt-corrected Ca and Mg was highest in southern, central and eastern parts of Europe (Figure 2.1-4, Figure 2.1-5). For all measured compounds, the throughfall deposition was comparably low in northern Europe. For O_3 concentration, harmonised data cover the years between 2000 and 2014. Mean O_3 concentrations over the period April-September

[1] http://icp-forests.net/page/icp-forests-manual

were 36.2 ppb, ranging from 14.5 to 71.1 ppb, varied spatially and showed a slight increasing spatial gradient from northern to southern Europe. The highest concentrations were registered in Italy, southern Switzerland, the Czech Republic, Slovakia, Romania and Greece (Figure 2.1-6). Between 2000 and 2014, accumulated ozone exposure over a threshold value of 40 ppb (referred to as 'AOT40') ranged from 4.3 to 35.5 ppm h. The AOT40 threshold of 5 ppm h – set to protect sensitive tree species from adverse ozone effects – was exceeded in 13 out of 15 countries providing data (approx. 87%) (Figure 2.1-7).

Trends

Within the twenty years from 1997 to 2017, the mean annual SO_4^{2-} throughfall deposition generally decreased by 60-70% and the decrease was statistically significant on most of the plots (Figure 2.1-8). Throughfall deposition of oxidised and reduced N compounds generally decreased by 20-40% between 1997 and 2017 and the decrease was also statistically significant on many of the plots. For the reduced N compound ammonium (NH_4^+), however, the decrease was the highest during the first of the two decades, while its deposition of has been stagnating from 2007 to 2017. For Ca and Mg, concentrations were relatively often below the determination limit and the reported fluctuations and apparent time trends might be partly caused by technical changes. An overall significant decreasing temporal trend of -0.35 ppb per year over the 2000-2013 period was observed for the mean growing season (April-September) O_3 concentrations (Figure 2.1-9). On average, this corresponds to about 10% reduction of the mean concentration levels recorded in 2000.

Exceedance of Critical Loads and Levels

The proportion of Level II plots, on which the critical loads for acidification were exceeded by the S and N deposition, decreased already from 57% in 1980 to 18% in 2000 (see previous SoEF reports). In 2015, it was estimated that about 7% of the EU-28 ecosystem area (including a large proportion of forests) was still at risk of acidification (Slootweg et al. 2015). Regarding the deposition of N as a nutrient, a rough estimate suggests that there is still a rather high share of plots on which critical loads are exceeded, especially in central and parts of southern Europe (Figure 2.1-10).

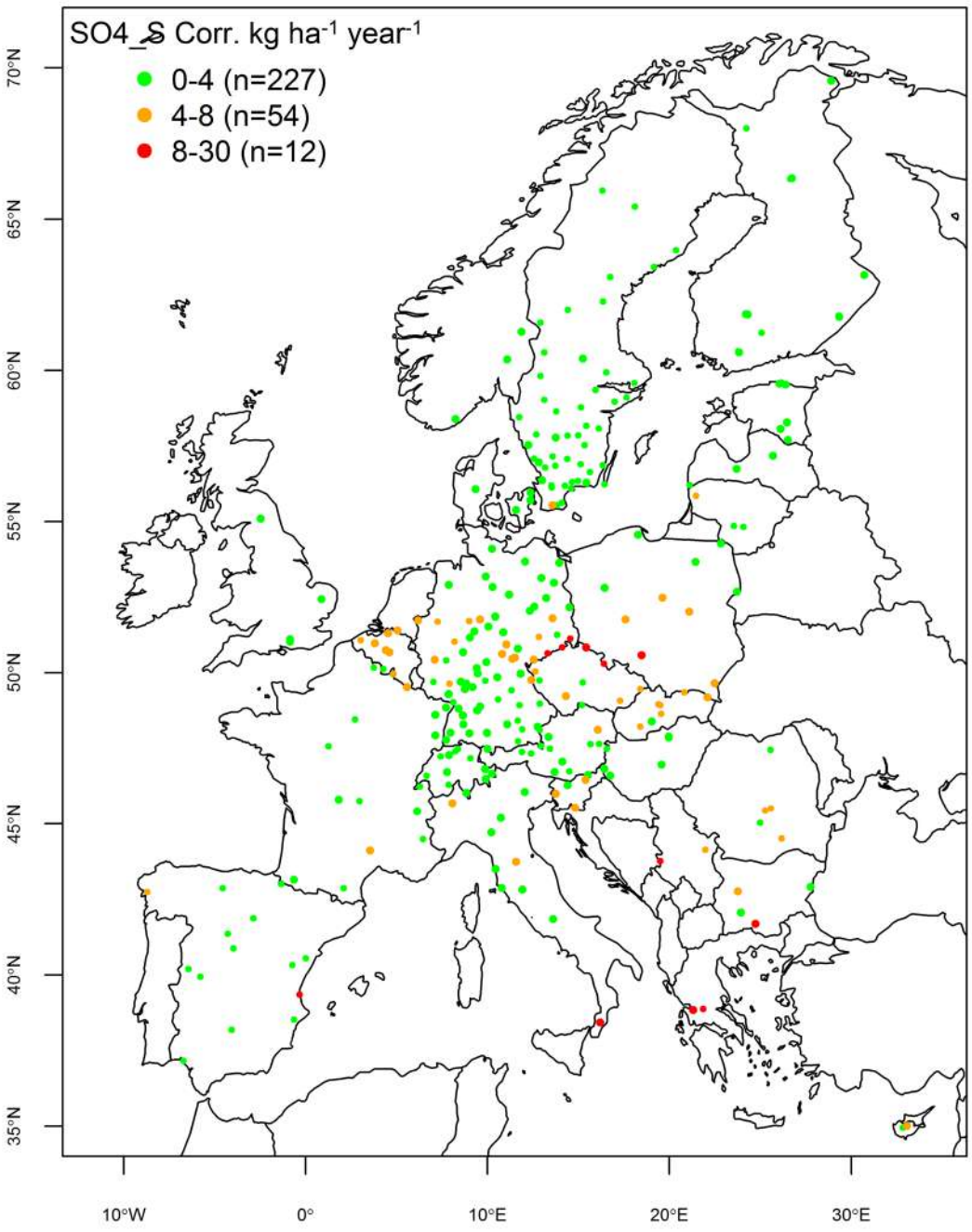

Figure 2.1-1: Sea-salt corrected annual throughfall deposition of sulphate-sulphur (SO_4^{2-}-S; kg S ha^{-1} $year^{-1}$), 2016

Notes: Data source – ICP Forests Level II plots (stemflow not included; larger symbols indicate those where data passed the quality control checks).

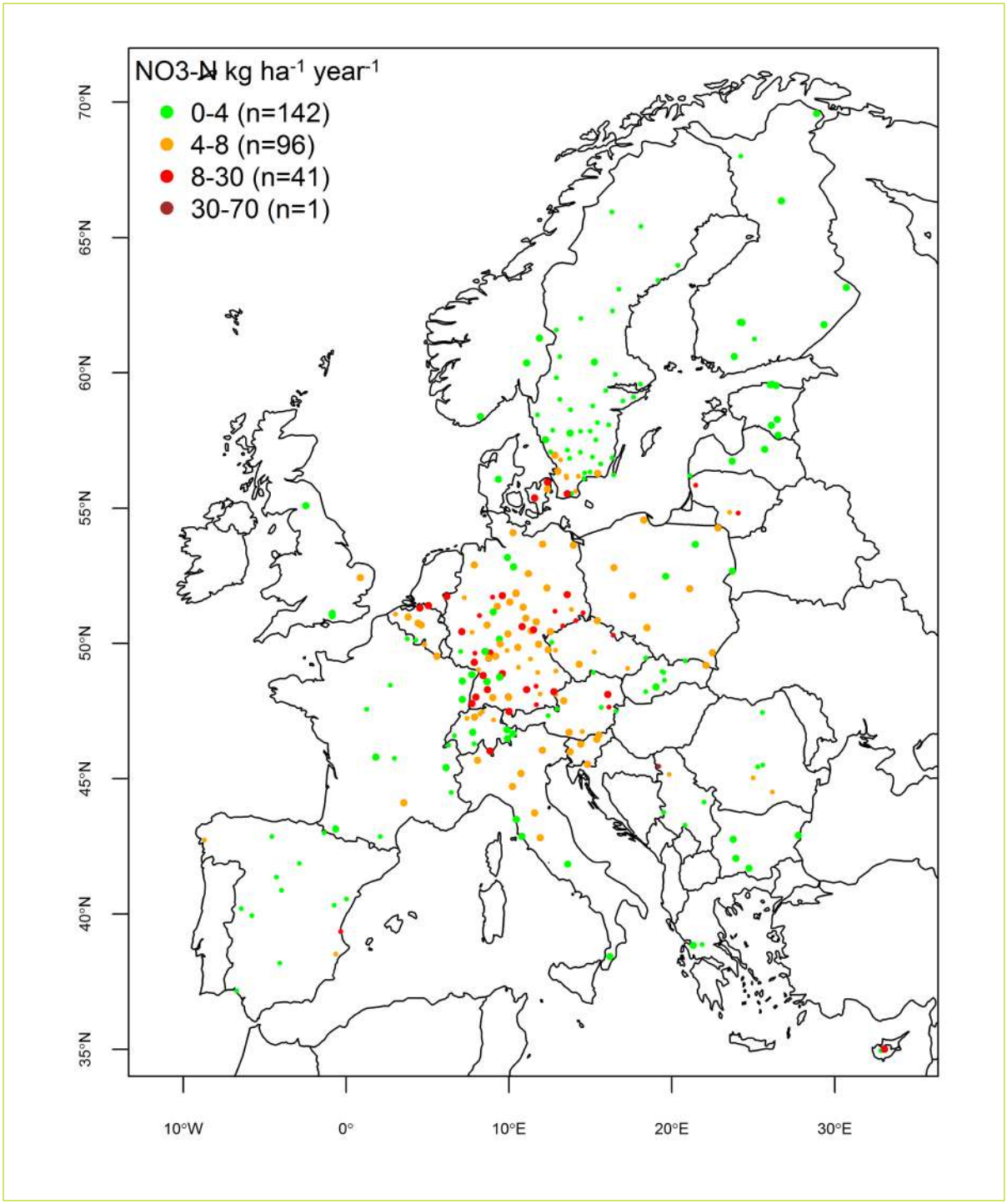

Figure 2.1-2: Annual throughfall deposition of nitrate-nitrogen (NO_3^--N; kg N ha^{-1} $year^{-1}$), 2016

Notes: Data source -ICP Forests Level II plots (stemflow not included; larger symbols indicate those where data passed the quality control checks).

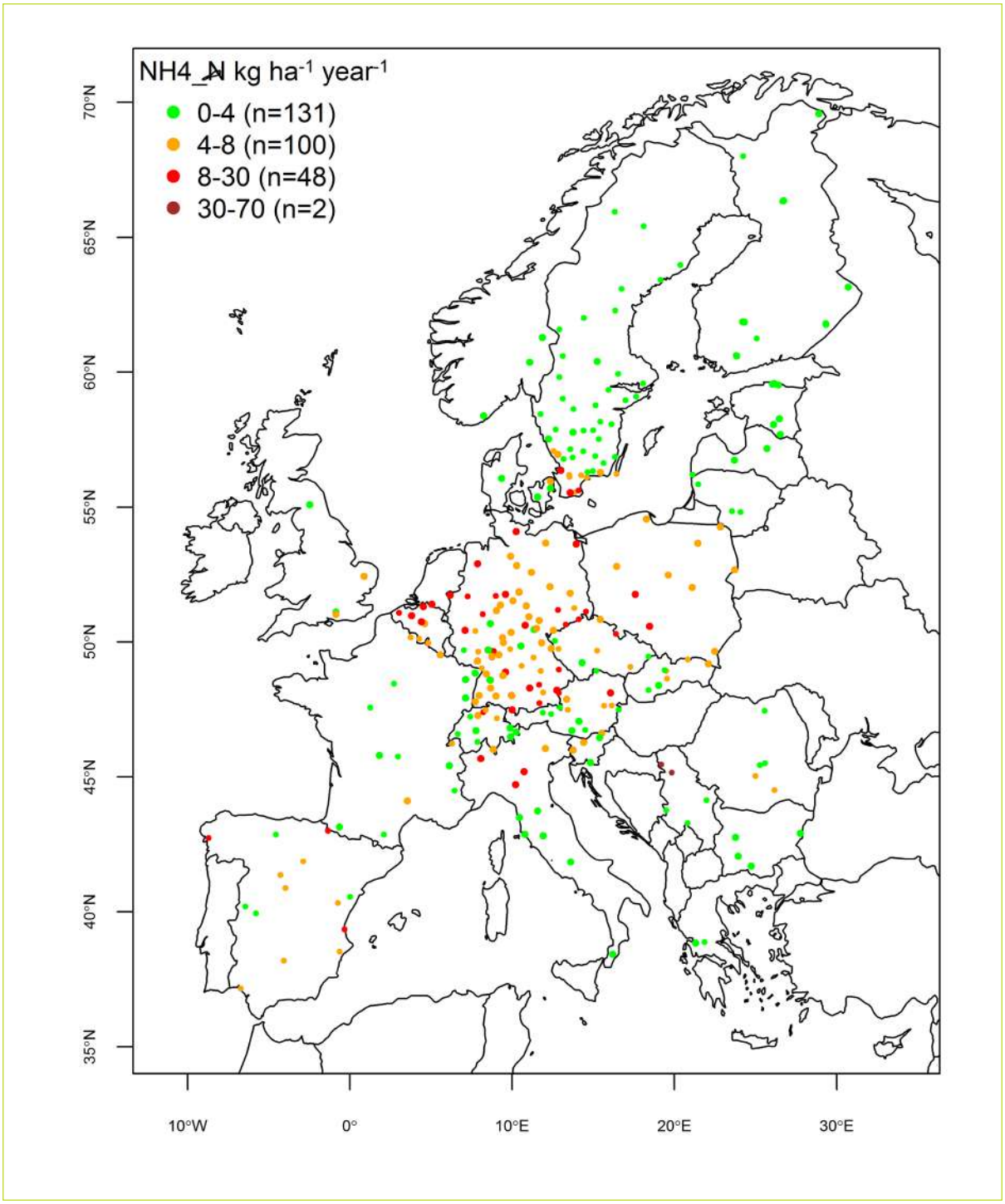

Figure 2.1-3: Annual throughfall deposition of ammonium-nitrogen (NH_4^+-N; kg N ha^{-1} $year^{-1}$), 2016

Notes: Data source - ICP Forests Level II plots (stemflow not included; larger symbols indicate those where data passed the quality control checks).

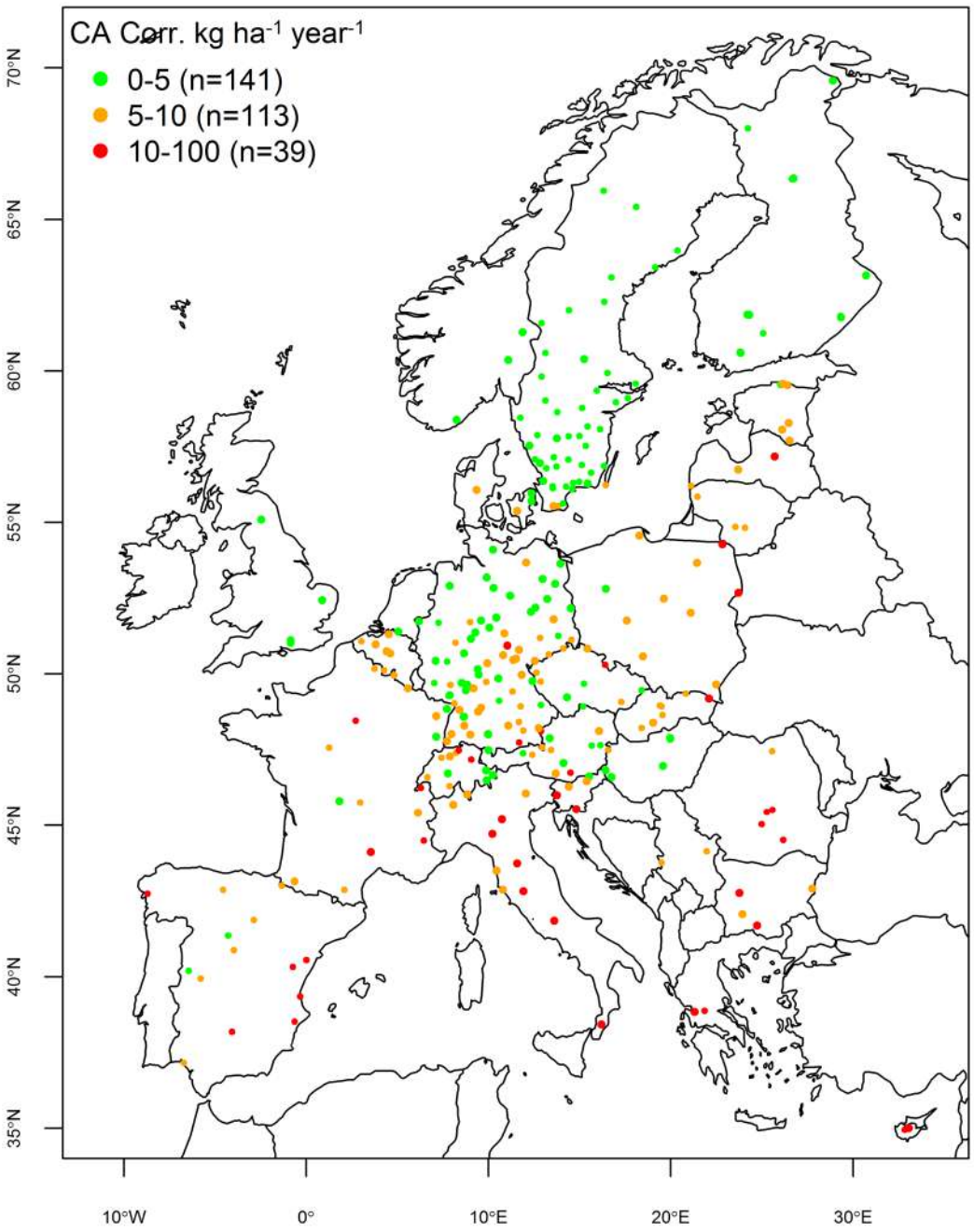

Figure 2.1-4: Sea-salt corrected annual throughfall deposition of calcium (Ca^{2+}; kg ha^{-1} $year^{-1}$), 2016

Notes: Data source - ICP Forests Level II plots (stemflow not included; larger symbols indicate those where data passed the quality control checks).

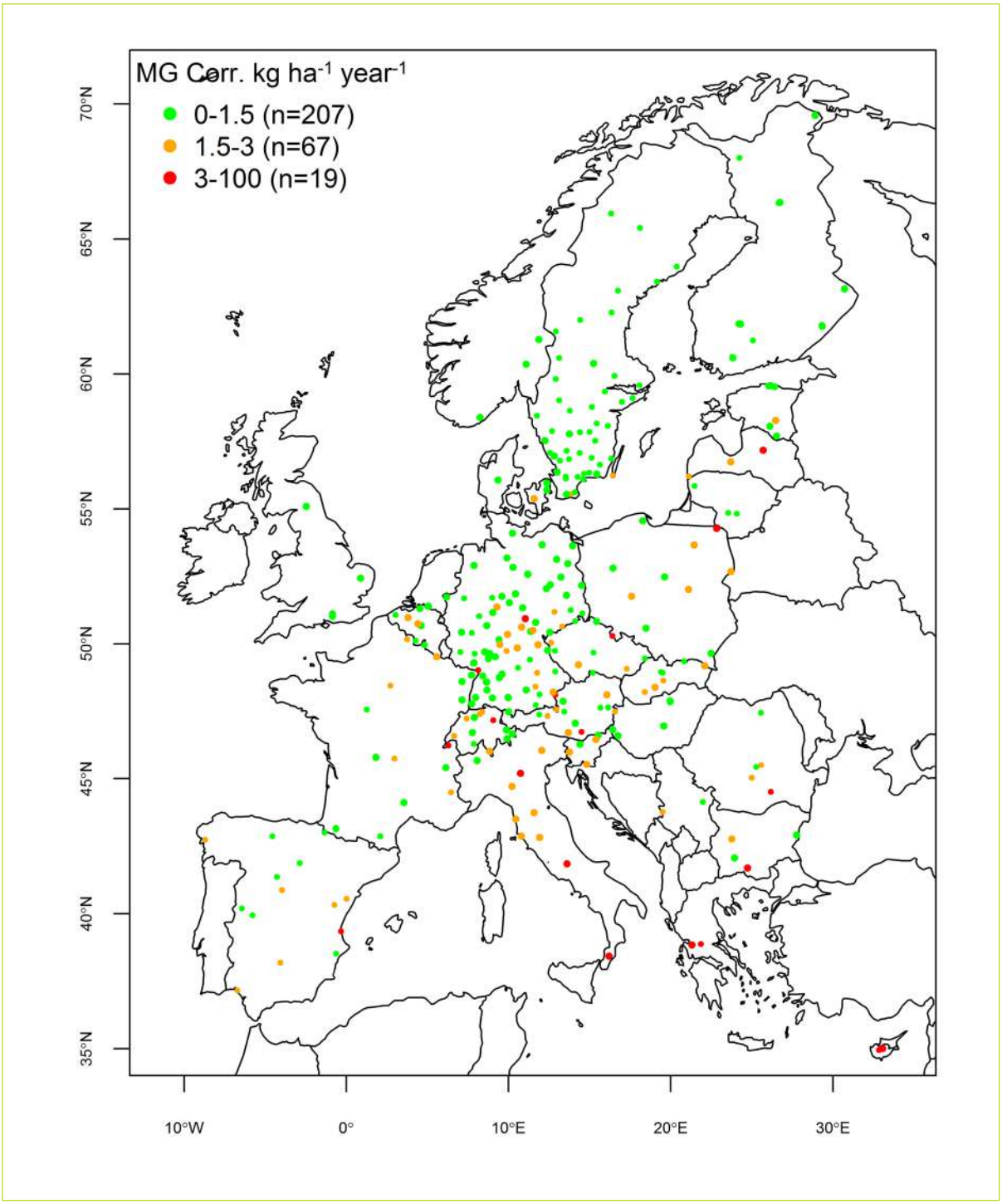

Figure 2.1-5: Sea-salt corrected annual throughfall deposition of magnesium (Mg^{2+}; kg ha^{-1} $year^{-1}$), 2016

Notes: Data source - ICP Forests Level II plots (stemflow not included; larger symbols indicate those where data passed the quality control checks).

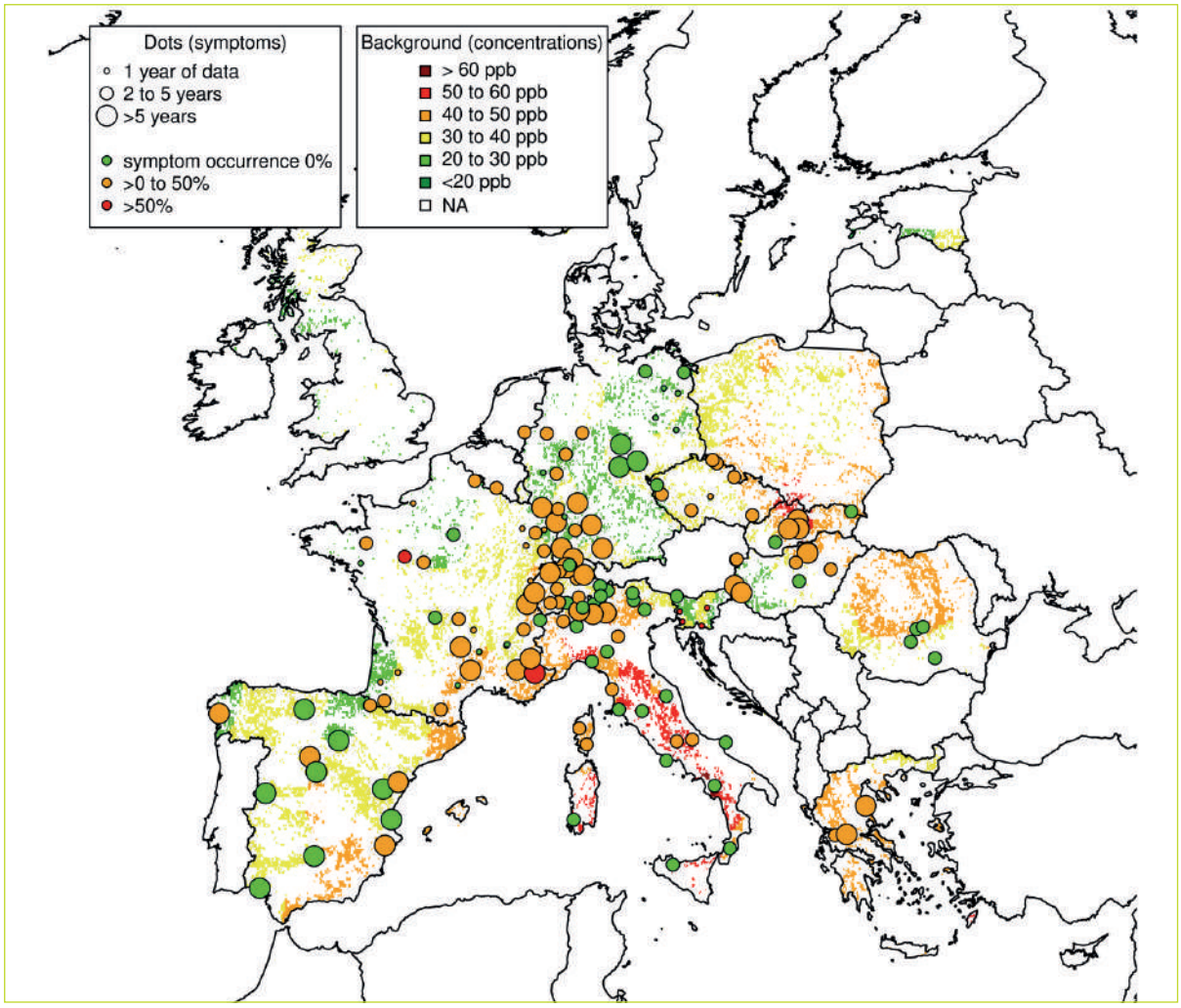

Figure 2.1-6: Spatial distribution of April-September mean ozone concentrations (ppb) 2000–2014 and occurrence of ozone-induced foliar symptoms 2002–2014

Note: Ozone concentrations interpolated from 18 464 passive samplers on 206 plots in 15 countries for the period 2000–2014 (background colour) and occurrence of ozone-induced foliar symptoms on 155 plots in 11 countries for the period 2002–2014 (coloured dots).

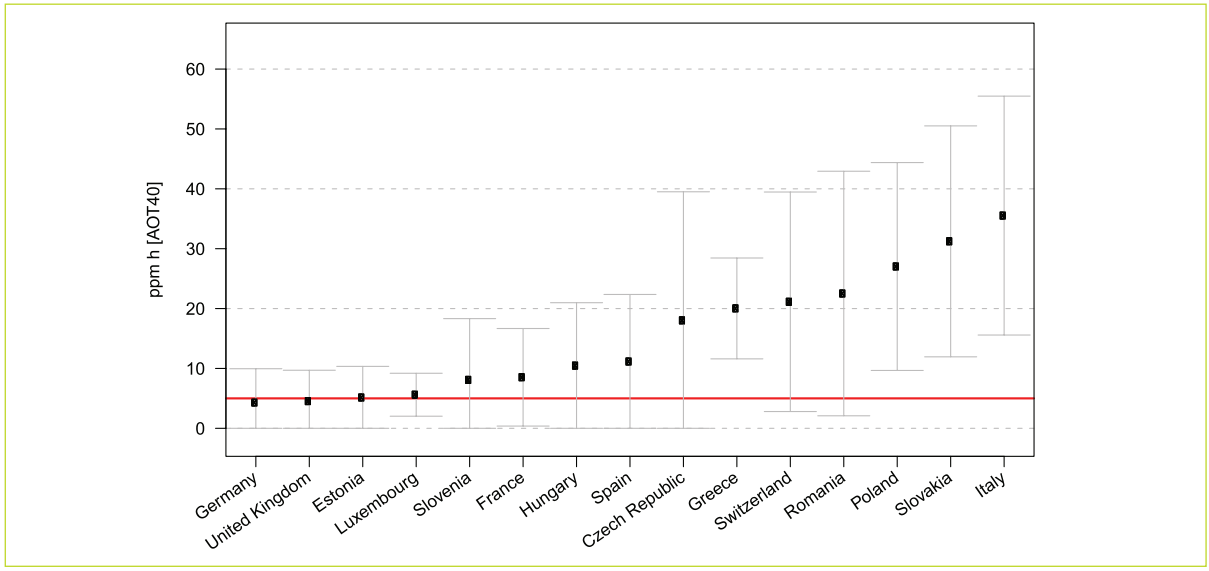

Figure 2.1-7: Mean AOT40 values based on April-September ozone concentrations (ppb), 2000-2014

Note: Data collected from passive samplers on 206 plots during 2000-2014 (Source: Schaub et al. 2018).

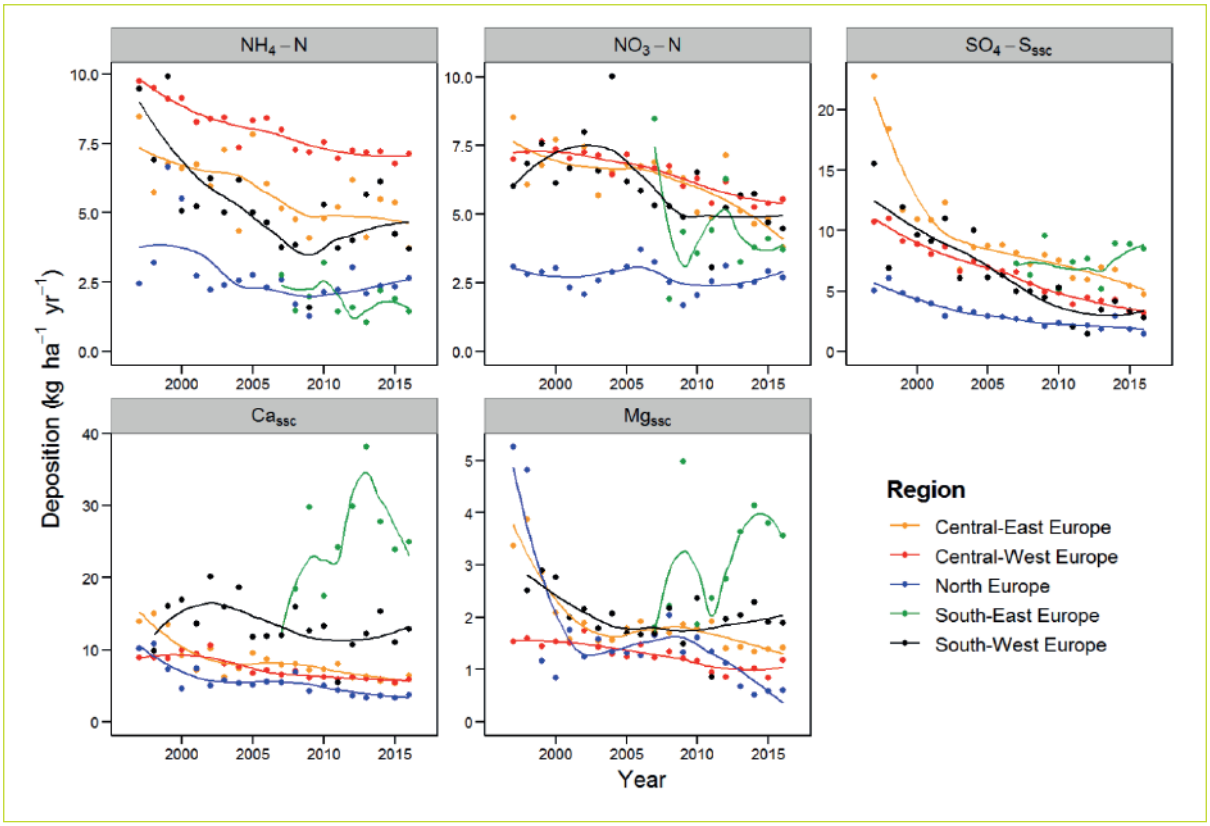

Figure 2.1-8: Means for European regions of annual throughfall deposition of nitrate (NO_3^--N) and ammonium (NH_4^+-N) nitrogen, sea-salt corrected sulphate sulphur (SO_4^{2-}-S), calcium (Ca^{2+}) and magnesium (Mg^{2+}) (kg ha^{-1} $year^{-1}$), 1997-2017

Note: Data collected from the Level II plots with almost complete time series between 1997 and 2017 (stemflow not included.

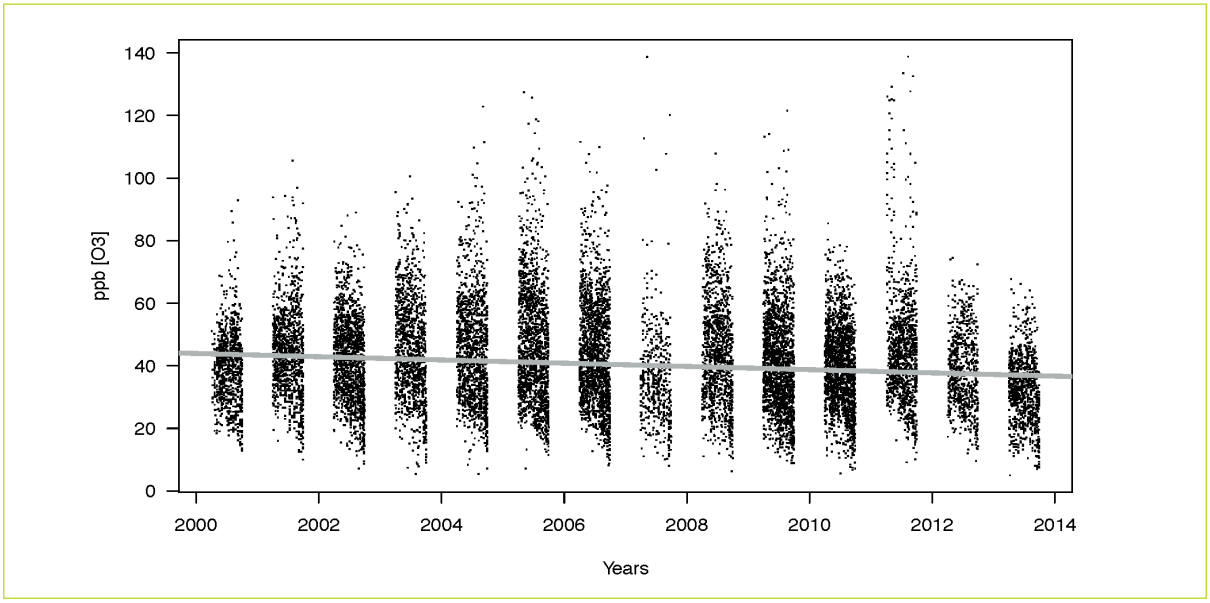

Figure 2.1-9: Scatter plot of April–September ozone concentration values (ppb), 2000-2013

Note: Data collected from passive samplers exposed in 20 countries from 2000 until 2013 with a significant decrease of 0.35 ppb/year (n=29 356; p=0.000) (Source: Schaub et al., 2015).

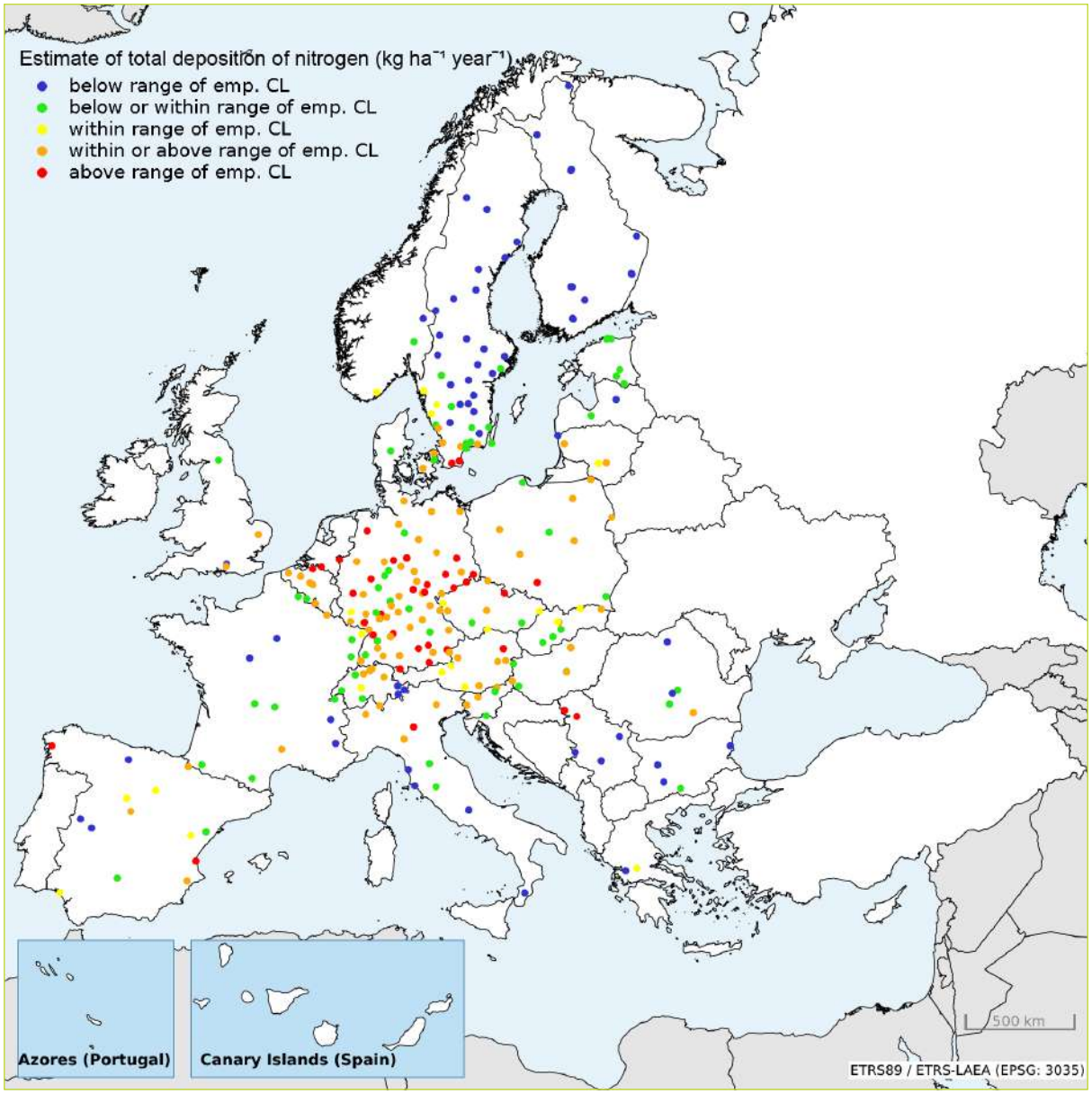

Figure 2.1-10: Tentative classification of ICP Forests Level II plots showing the estimated exceedance of the empirical Critical Loads for nutrient nitrogen (emp. CL) depending on the plot's dominant tree species, 2016

Note: Emp. CL for broadleaved deciduous woodland: 10-20 kg N ha^{-1} year^{-1}, coniferous woodland: 5-15 kg N ha^{-1} year^{-1} (Bobbink R, Hettelingh JP (eds), 2011: Review and revision of empirical critical loads and dose-response relationships, RIVM – CCE, www.rivm.nl/cce). It is assumed that total inorganic N deposition at Level II plots ranges between one and two times the locally measured inorganic N throughfall deposition. Example for a broadleaved deciduous forest plot on the map: Estimated total inorganic N deposition ranges between 12 and 24 kg ha^{-1} year^{-1} on a plot with a measured inorganic N throughfall deposition of 12 kg ha^{-1} year^{-1}. The corresponding emp. CL ranges between 10 and 20 kg N ha^{-1} year^{-1} and results in a classification of 'within or above range of emp. CL'.

Indicator 2.2 Soil condition

Chemical soil properties (pH, CEC, C/N, organic C, base saturation) on forest and other wooded land related to soil acidity and eutrophication, classified by main soil types

Key findings

- The data uphold the distinct North-South gradient in soil organic carbon and carbon-to-nitrogen ratio, with higher values in north European forest soils, accompanied by higher acidity as indicated by soil pH.
- Less pronounced geographic patterns occur also for total nitrogen and extractable phosphorus, that increase from South to North in Europe.
- A comparison of 2015 data with those from 2009-2012 revealed just minor changes, with only total nitrogen showing a generalised increase across Europe, which should be interpreted with caution. The comparison confirmed that to provide meaningful information on changes in forest soil conditions, consistent sampling and laboratory methods are indispensable for repeated surveys.

Introduction

Indicator 2.2 monitors chemical soil properties (organic carbon (OC), acidity (pH), nitrogen (N), phosphorus (P), potassium (K), cation exchange capacity (CEC) and carbon-to-nitrogen ratio (C:N ratio) on forest and other wooded (FOWL) land related to soil acidity and eutrophication. Chemical properties of the topsoil soil play a vital role in providing forest ecosystem services (FES)[2,3]. For example, forest biomass and soil form a cycle with the atmosphere and are key ecosystem compartments for absorbing and storing atmospheric CO_2, thus acting as carbon sinks. Soil nutrients and organic matter governs the nutrient cycle and largely affects forest growth, and soil is an integral part of the forest water cycle, buffering, regulating and filtering water flow.

Among the many soil functions, some are important in view of soil acidification and eutrophication. The relevant soil physical and chemical data are available at European scale from the soil samples collected during the 2015 Land Use/Cover Area frame statistical Survey (LUCAS) Soil Component survey (referred to as LUCAS Soil hereafter). The 2015 LUCAS Soil was the first assessment of this kind that covered all EU-28 Member States at the time (Orgiazzi, et al., 2017). For information on geographic position and land cover data, the LUCAS micro-data of the primary data set was used[4]. For an assessment of changes in forest soil properties, the 2015 LUCAS Soil data were compared to results from the 2009 and 2012 LUCAS Soil surveys, albeit with partial coverage.

The methods for collecting and analysing soil samples under the LUCAS Soil differ from dedicated forest soil surveys, such as those performed under ICP Forests and national soil inventories. In particular, as the method adopted for soil sampling under LUCAS Soil simplifies the in-field procedure, it does not include information of the overlaying litter and partially decomposed organic material. Therefore, the assessment of chemical properties and processes is limited to the underlying soil stratum.

Organic carbon (OC) is the main constituent of organic matter (OM) in the soil (approx. 58%). OM has a wide range of functions, such as improving nutrient-holding capacity and turnover, regulating water storage and climate change mitigation potential through carbon storage in the organic material. Soil OM acts as a source of slow release of nitrogen and phosphorus and thus supports long-term forest productivity. The pivotal role of the organic material in soils to perform ecosystem functions was the reason for adding a Soil Component to the LUCAS survey.

The soil pH can be used as an indicator of the degree of soli acidity. The soil pH was analysed by the laboratory from the suspension of the soil in H_2O ($pH_{(H2O)}$) and in 0.01 mol dm^{-3} solution of calcium chloride ($pH_{(CaCl2)}$), with the latter considered more stable for repeated measurements.

Nitrogen is probably the most single growth-limiting nutrient, not only for forests. A system with a soil-nitrogen deficit fails to fulfill growth potential, while a surplus can lead to nutrient imbalances, growth reduction, nitrogen leaching and groundwater pollution. In nitrogen-limited systems, nitrogen in the soil is almost exclusively held in organic form and bound to organic components. When surplus, nitrogen can be present in inorganic form as ammonium (NH_4^+), which is attached to cation exchange positions and can be trapped by clay particles. Where nitrogen leaching occurs as a result of its surplus, it is mostly present in the form of nitrate (NO_3^-), which is more moveable in the soil. The laboratory method determines total nitrogen content in the soil (ammonium-N, nitrate-N, nitrite-N and organic N). Therefore, the nitrogen available to plants, which is generally the mineral form of nitrogen, represents a very small portion (about 2%) of the total amount determined by the laboratory method.

[2] FOREST EUROPE: https://foresteurope.org/ecosystem-services/
[3] Forest Ecosystem Services: https://forest.jrc.ec.europa.eu/en/activities/forest-ecosystem-services/
[4] Eurostat LUCAS primary data: https://ec.europa.eu/eurostat/web/lucas/data/primary-data/2015

Phosphorus may be considered the second most limiting nutrient to forest production, after nitrogen.

Phosphorus is an essential component for all energy-related processes in living organisms and photosynthesis in plants. Phosphorus has low mobility in soils, which results in a low leaching rate. Phosphorus is associated with oxides and soil OM. Plants take up phosphorus in mineral form of phosphate, which originates from weathered minerals (Fink, et al., 2016) or from mycorrhizal fungi that "mine" the soil for phosphorus and provide the nutrient to their host (Zavišić, et al., 2018). The amount of phosphorus in the samples is measured in the laboratory by a spectrophotometric method.

Potassium represents the third nutrient sustaining forest functions. Potassium is used by plants as a regulator of the osmotic balance in cells and helps to maintain general plant health. It regulates the uptake of CO_2 through controlling the opening and closing of stomata and water in plants. In soil, potassium is generally classified into unavailable, slowly available and readily available potassium, which is absorbed on clay particles or in soil solution. Most of the potassium in soil is in the unavailable form.

The cation exchange capacity (CEC) is the number of negative charges on the surface of soil particles. The CEC is used as an indicator for soils to hold cations, which are many soil nutrients (Ca^{2+}, K^{+}, Mg^{2+}, Na^{+}, less Fe^{2+}, Mn^{2+} and Cu^{2+}) (Mengel, 1993). It is thus a major indicator of soil fertility. Commonly, clay soils and soils rich in OM also have higher CEC than sandy soils or soil with low OM content.

The ratio of the carbon-to-nitrogen concentration (C:N ratio) is a suitable indicator for the decomposition rate of organic matter, the availability of nitrogen and turnover of nutrients. The C:N ratio in mineral topsoil generally ranges from 15-20 and decreases with soil depth. The rate of decay is an indicator of the extent to which nitrate and ammonium are immobilised to the soil OM (Bengtsson, et al., 2003). The C:N ratio presented here was computed from the OC content and total nitrogen in the soil samples. Following the sampling procedure of the LUCAS Soil the C:N ratio refers to the soil stratum of the forest soil profile. The samples should not contain litter or partially decomposed organic material.

Status

Estimating the regional state of forest soils was based on data collected on 5 515 locations under the 2015 LUCAS Soil that are assigned to woodland. A summary of the status of the soil parameters evaluated for the 2015 LUCAS Soil data in forested areas, is presented in Table 2.2-1. The table contains the averages aggregated by regions from sample data with LUCAS coverage. The average valueas of soil properties (OC, pH, N, P, Mg, CEC, and C:N) are presented by countries in Figures 2.2-1 – 2.2-7).

Table 2.2-1: Soil condition parameters on forest land, by region, LUCAS Soil 2015

Region	Organic carbon	pH ($CaCl_2$)	Total nitrogen	Soluble phosphorus	Extractable potassium	CEC	C: N ratio
	g kg^{-1}	pH($CaCl_2$)	g kg^{-1}	mg kg^{-1}	mg kg^{-1}	cmol(+) kg^{-1}	unitless
North Europe	133.8	4.0	6.3	36.0	123.9	15.7	20.2
Central-West Europe	61.8	4.7	4.1	28.7	137.3	19.2	14.8
Central-East Europe	42.6	4.5	2.9	31.0	106.3	18.9	13.6
South-West Europe	43.4	5.6	3.2	12.2	188.6	17.9	14.3
South-East Europe	34.9	5.7	2.6	9.8	164.5	20.0	13.3
EU-28	82.4	4.6	4.5	28.4	137.7	17.4	16.5

Note: The table contains the averages from sample data of LUCAS Soil. Regions are not covered systematically.

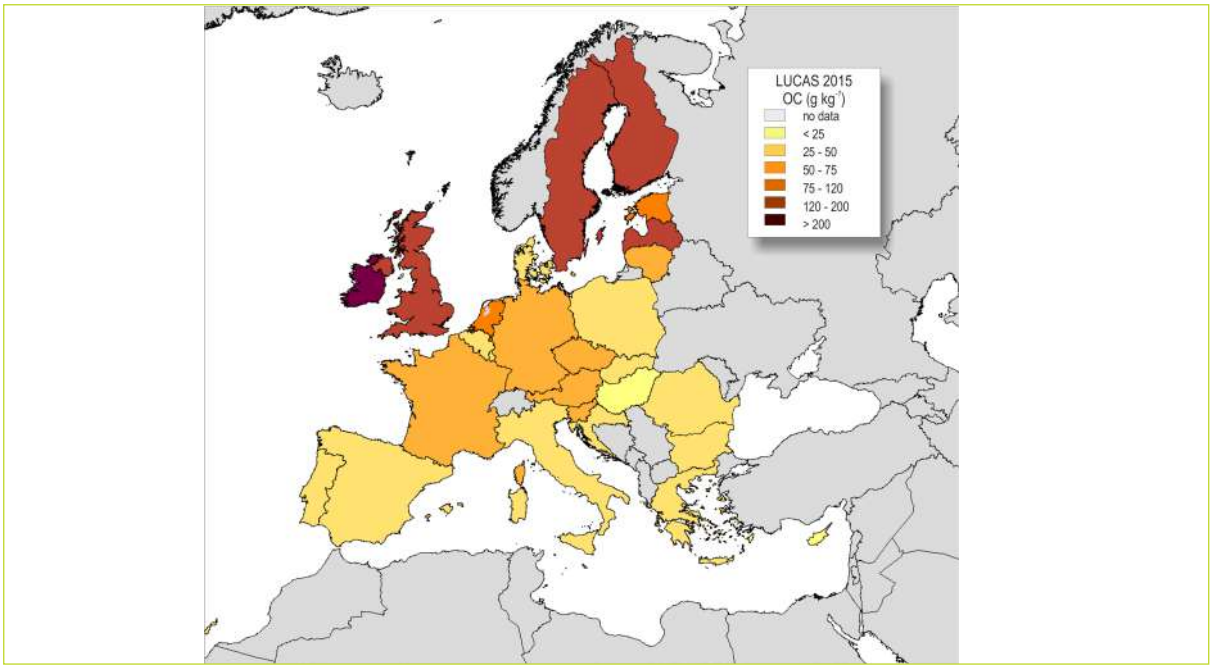

Figure 2.2-1: Organic carbon in forest soils (g kg^{-1}), LUCAS Soil 2015

Note: The map shows the decreasing North-South gradient of soil OC. The largest OC on forest plots was sampled for Ireland (200.8 g C kg^{-1}), while the lowest value is reported for the samples from Hungary (20.9 g C kg^{-1}).

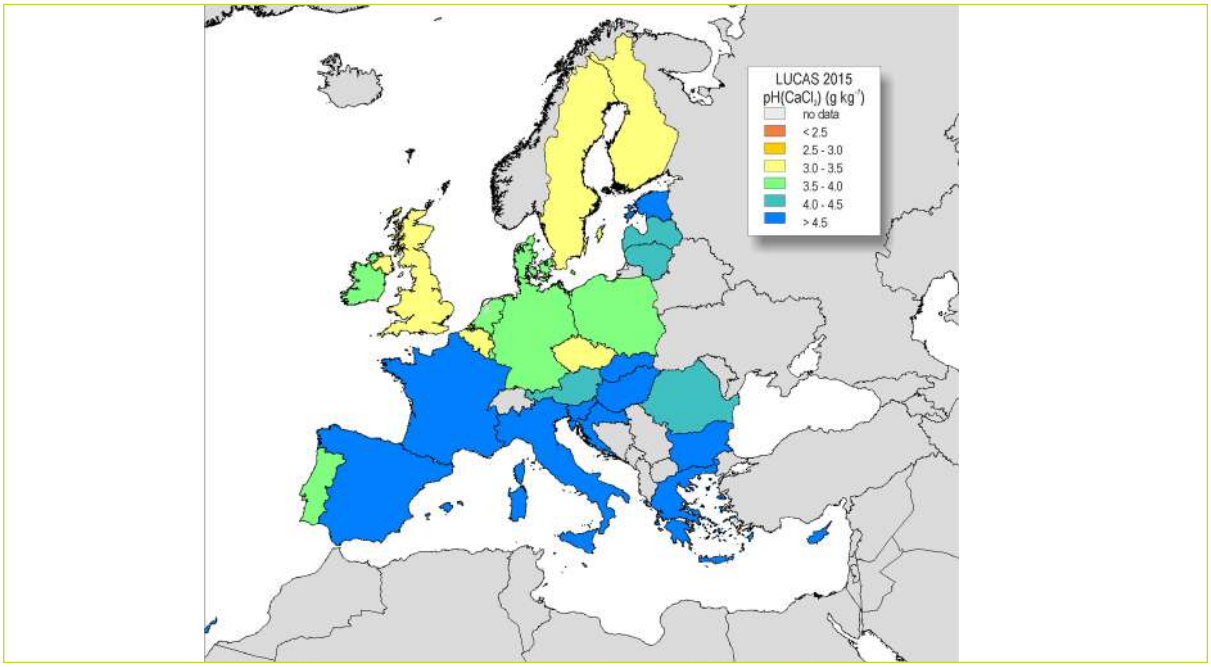

Figure 2.2-2: pH in $CaCl_2$ forest soil suspension, LUCAS Soil 2015

Note: The map shows the gradient in $pH_{(CaCl2)}$ with latitude. This is to a large degree the result of the correlation between pH and OC content and the increase in OC with latitude in Europe. There are exceptions, mainly in southern European countries with forests soils with a relatively high carbonate content, such as Croatia or Greece. Part of this distribution may also be that forest is established or maintained in areas less favourable for agricultural use. The data on $pH_{(CaCl2)}$ confirms to the expectation of generally lower values for soils with higher OC content.

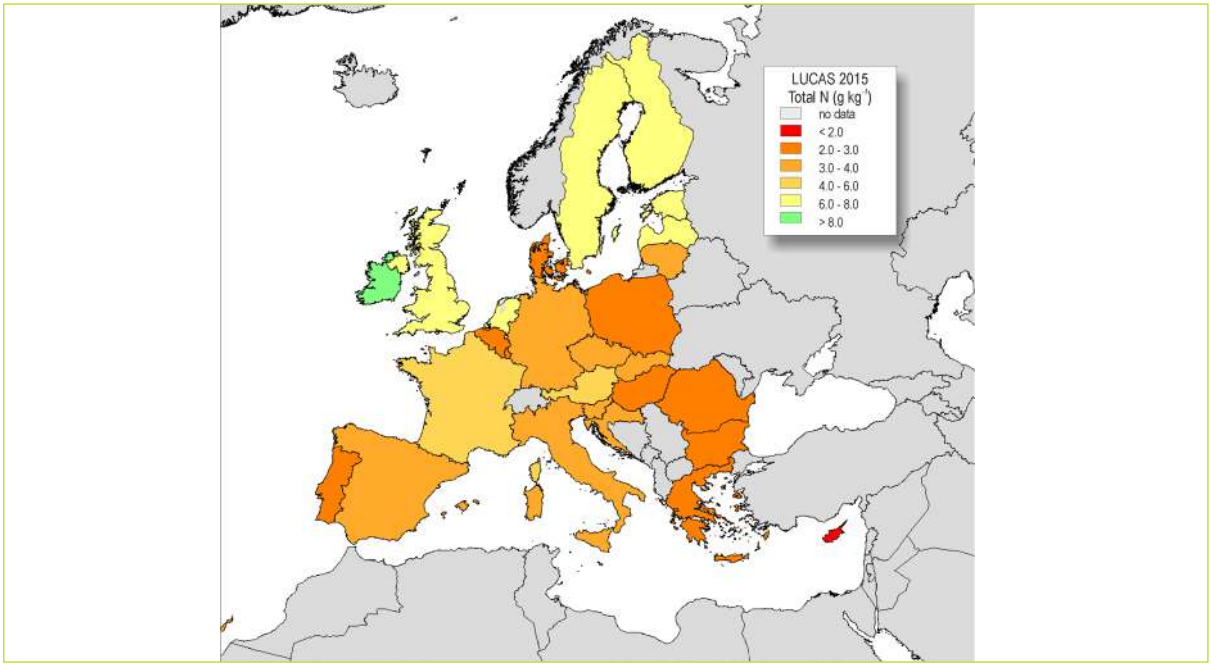

Figure 2.2-3: Total nitrogen in forest soils (g N kg^{-1}), LUCAS Soil 2015

Note: The exceptionally high amount of total nitrogen in the samples from Ireland and uncommonly low amounts in Cyprus are visible in the map. The correlation of total nitrogen with OC content is visible in the general increase in total nitrogen with latitude. Lower amounts of total nitrogen in forest soils are prevalent in Eastern European countries and Belgium, Denmark and Portugal.

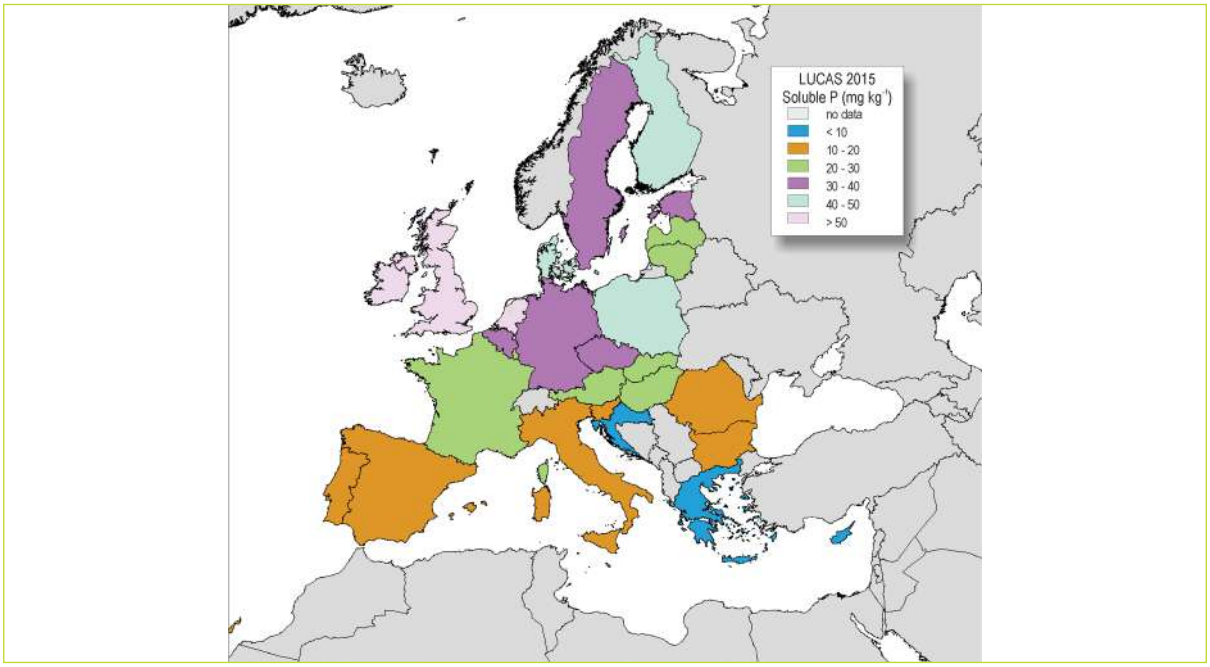

Figure 2.2-4: Phosphorus in forest soils (mg P kg^{-1}), LUCAS Soil 2015

Note: Because phosphorus is correlated with OC content a gradient along latitude is apparent in the map. Comparatively high values (> 50 mg P kg^{-1}) are present in the samples from Ireland, The Netherlands and the United Kingdom. Comparatively low values (< 10 mg P kg^{-1}) are present in the samples from Cyprus, Greece and Croatia.

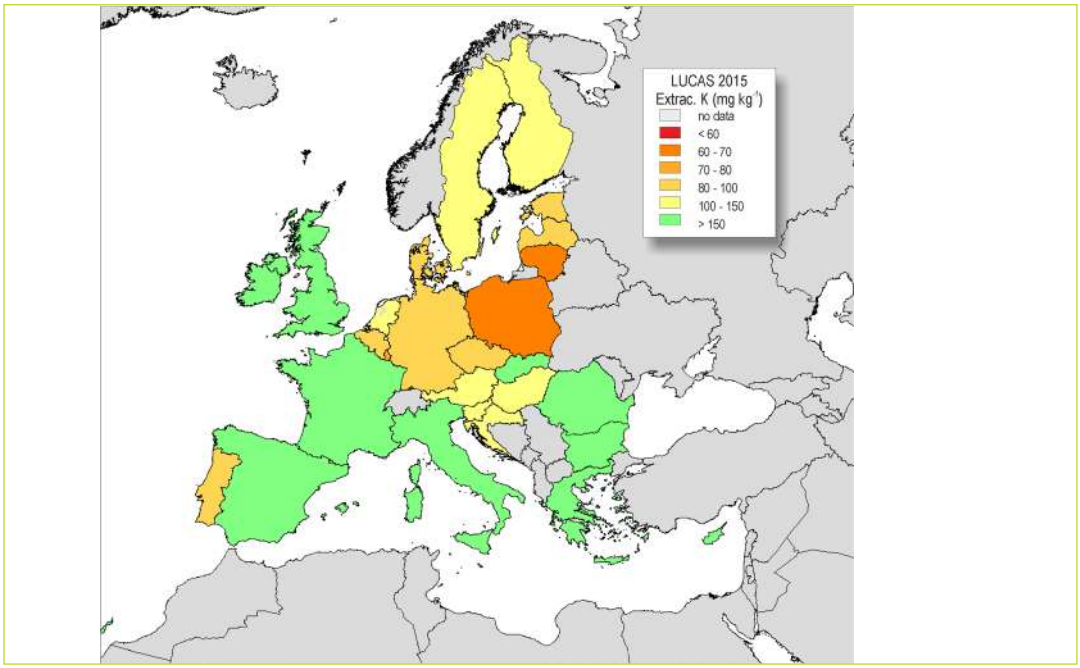

Figure 2.2-5: Extractable potassium in forest soils (mg K kg-1), LUCAS Soil 2015

Note: The map shows relatively low values of extractable potassium in Central and Northern Europe and relatively higher values in other countries. The average value of extractable potassium for the soil samples collected in EU-28 is 137.7 mg K kg^{-1}. The potassium held in the organic material results in a content of 238.1 mg K kg^{-1} in the samples with high OC content, which is twice the content of mineral soils. The lowest average concentration was reported for mineral soil samples from Poland (53.8 mg K kg^{-1}), the highest for soils from Bulgaria (570.1 mg K kg^{-1}). Unusually high are the values reported from Cyprus for mineral soils (531.0 mg K kg^{-1}), which are based just on two samples and the presence of Illite.

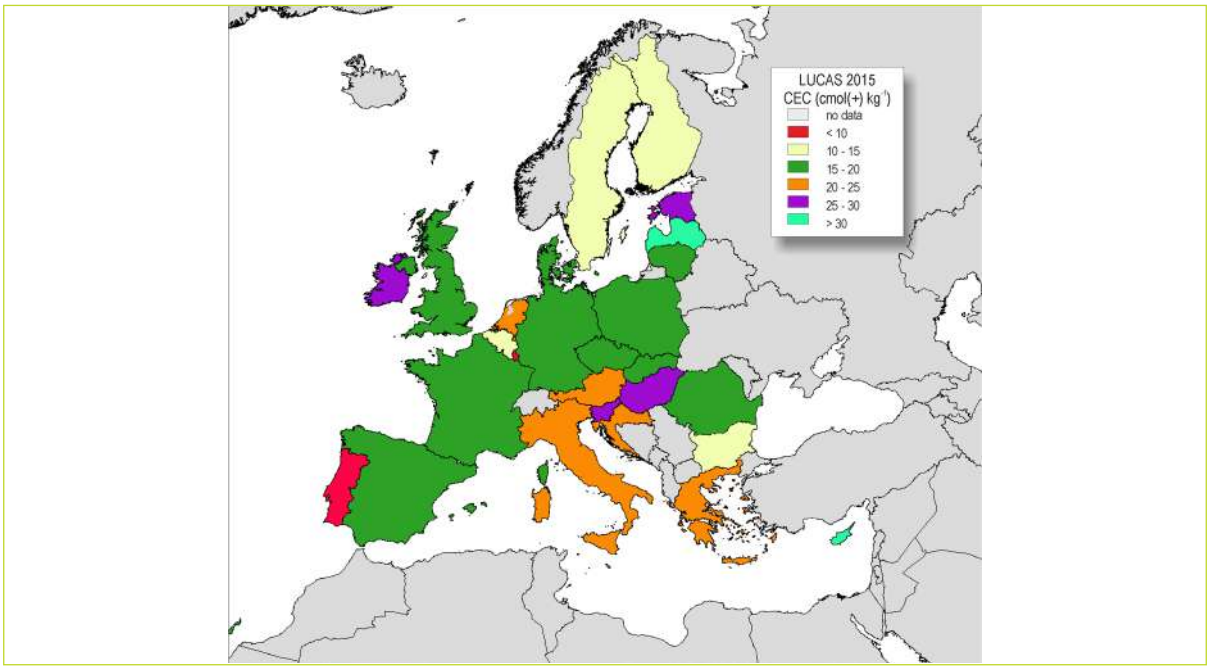

Figure 2.2-6: Cation exchange capacity (CEC, cmol(+) kg^{-1}) in forest soils, LUCAS Soil 2015

Note: There is no obvious spatial pattern in the CEC data, and no correlation to soil OC or extractable potassium. The re-analysis of CEC of 2009 samples during the analysis period of 2015 samples by the same laboratory suggested that possible problems may arise in providing consistent results for this soil property, either from a single survey or for an analysis of change between surveys.

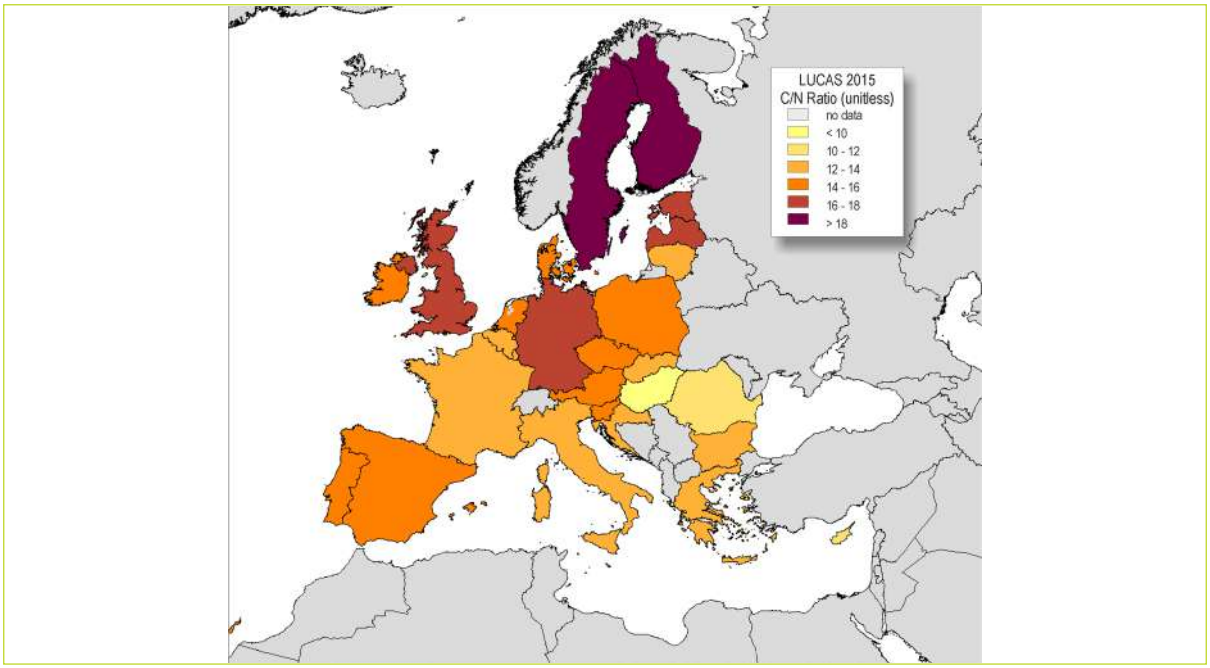

Figure 2.2-7: C:N ratio (unitless) in forest soils, LUCAS Soil 2015

Note: The average EU-28 value for the C:N ratio of mineral soil is 15.2. This is well within the expected range of such soils. For soils high in OC the average for EU-28 is 23.0. The lowest overall C:N ratio of all samples collected in a country was reported for Hungary (10.0), while the highest values were reported for Finland (20.9) and Sweden (20.9).

Changes and trends

Changes in forest soil properties were assessed for 2 417 soil samples from repeatedly visited sites and from the combined results of the 2009/2012 and 2015. The sampling interval is thus six years for 23 countries and three years for Bulgaria and Romania.

The number of samples ranges from three in Luxembourg to 475 in Sweden. Results from countries with less than 30 sample pairs (Luxembourg (3), Ireland (4), Belgium (10), Denmark (12), The Netherlands (13), Portugal (15), United Kingdom (23) and Hungary (25)) should be interpreted with particular care. Results from Croatia, Cyprus and Malta are not included. For these countries, data from previous survey were either not available or could not be paired to samples from the 2015 LUCAS Soil.

A summary of the changes of the soil parameters from 2009/2012 and 2015 LUCAS Soil data in forest land are presented in Table 2.2-2. Changes 2009-2012 to 2015 reported in Table 2.2-2 are compiled from results of re-visited LUCAS Soil locations below 1 000 m in altitude, which remained classified as forest land in all LUCAS surveys (thus excluding the effects of land use change on a soil parameter) and whose soil has been classified consistently between the surveys. The changes of soil properties (OC, pH, N, P, K, CEC, and C:N) are presented by countries in Figures 2.2-8 – 2.2-14).

Table 2.2-2: Average changes of soil condition parameters between LUCAS Soil surveys 2009/2012 and 2015 on forest land, by region

Region	Organic carbon	pH ($CaCl_2$)	Total nitrogen	Soluble phosphorus	Extractable potassium	CEC	C:N ratio
	g kg^{-1}	pH($CaCl_2$)	g kg^{-1}	mg kg^{-1}	mg kg^{-1}	cmol(+) kg^{-1}	unitless
North Europe	-2.3	0.1	0.6	12.8	2.4	-0.2	-3.4
Central-West Europe	4.9	0.0	1.0	11.9	10.6	6.0	-1.8
Central-East Europe	1.8	0.1	0.2	8.4	-4.9	6.5	-1.6
South-West Europe	0.3	-0.0	0.4	5.2	-22.0	2.2	-1.5
South-East Europe	-2.8	0.0	0.2	2.7	-30.7	-4.8	-1.3
EU-25	0.9	0.1	0.6	10.6	-0.6	2.5	-2.4

Note: Average regional values were calculated from repeatedly sampled LUCAS Soil locations, not from country-aggregated data. Change estimates were obtained from the samples classified consistently in both surveys.

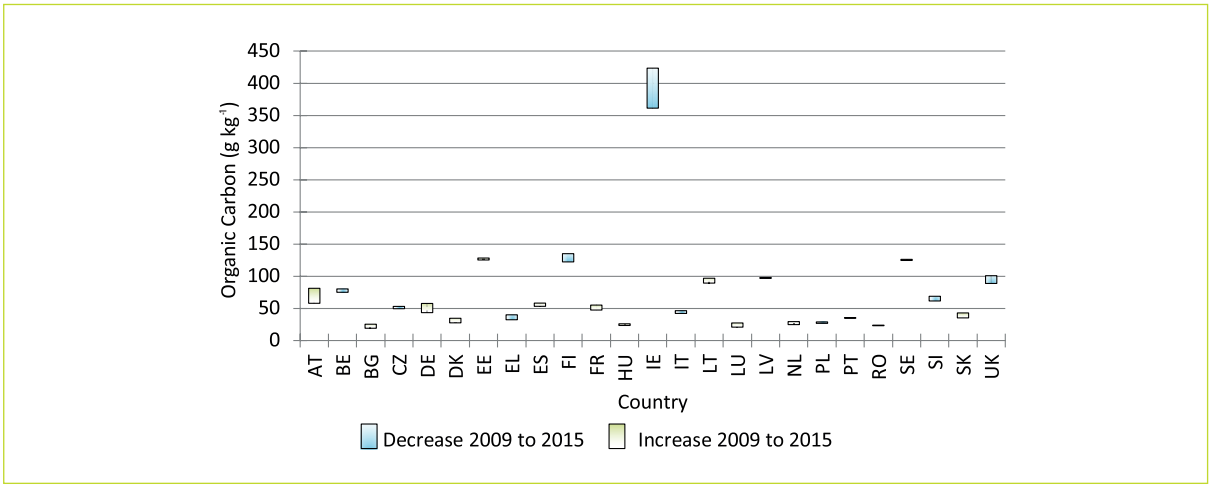

Figure 2.2-8: Changes in organic carbon content in forest soils (g C kg^{-1}) between LUCAS Soil 2009/2012 and 2015, by country

Note: The results from the samples do not indicate a common trend for EU-25. The strong decrease in OC reported for Ireland can be considered coincidental and may reflect possible inconsistency in sampling locations in the 2009 and 2015 surveys (Hiederer, 2019). In general, the country-wide changes in OC content in forest soils remain lower than 10 g C kg^{-1}. The more pronounced change occurred in the Central-West European region and is seemingly due to changes in the share of high OC soils. When the comparison is carried out on the basis of samples classified consistently both in 2009 and 2015, the estimated change in OC is +4.9 g C kg^{-1} in this region (see Table 2.2-2).

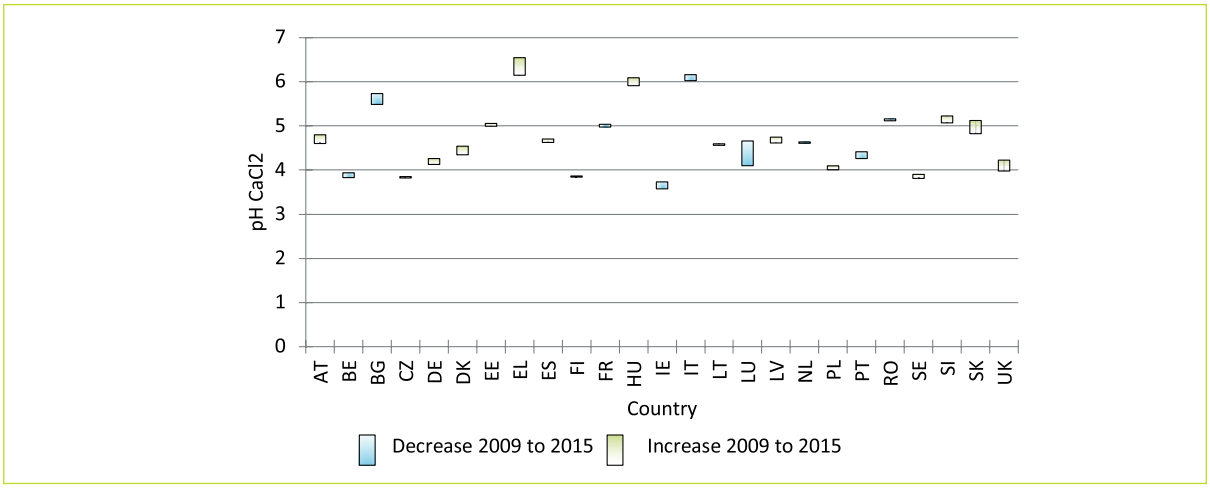

Figure 2.2-9: Change in $pH_{(CaCl2)}$ of forest soils between LUCAS Soil surveys 2009/2012 and 2015, by country

Note: The graph reflects the relatively large changes in some countries, but also the lack of a general trend in changes within countries. Generally, stronger than average decreases in pH for Bulgaria, Italy and Romania are offset by increases in Hungary and Lithuania. The variability in pH for the samples from Bulgaria and Romania is conspicuous. Within three years, the values for pH would not be expected to change notably and certainly not more than in areas that were sampled with an interval of six years. While soil pH is correlated with soil OC in the data, there are no apparent trends between changes in pH and those of OC. There is no difference in changes between $pH_{(CaCl2)}$ and $pH_{(H2O)}$ between surveys. This suggests that the analysis method for pH is solid and, as the re-analysis of data shows, provides consistent results.

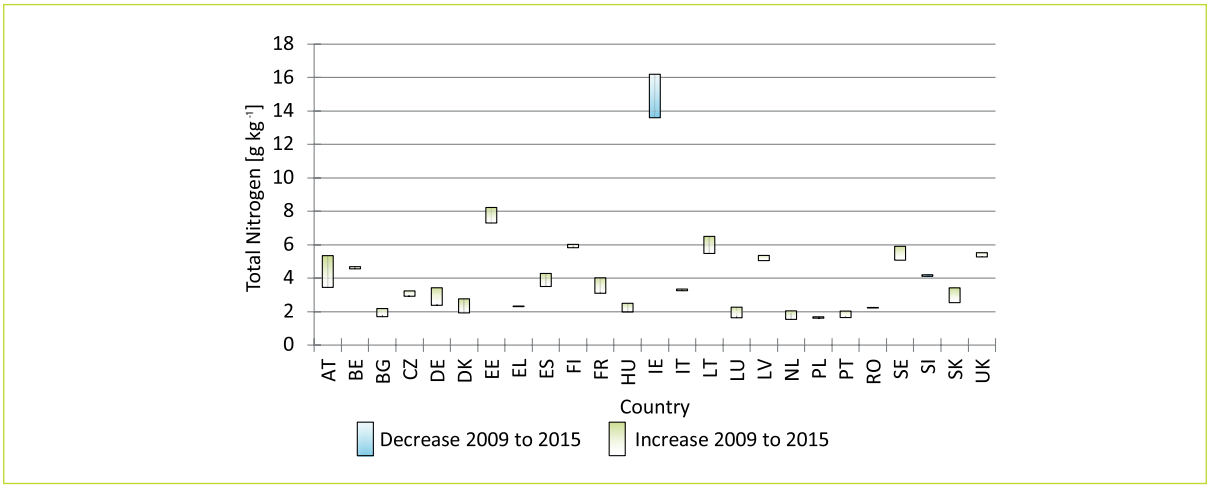

Figure 2.2-10: Change in total nitrogen (g N kg^{-1}) in forest soils from LUCAS Soil 2009/2012 to 2015, by country

Note: The content of total nitrogen in the samples generally increased between the 2009/2012 and 2015 surveys. A negative change in total nitrogen is present only in the samples for Belgium and Spain. The change observed in Ireland may be not representative. In the absence of a systematic factor in the analysis, one may conclude that there has been a general increase in total N in forest soils for analysed countries between 2009 and 2015.

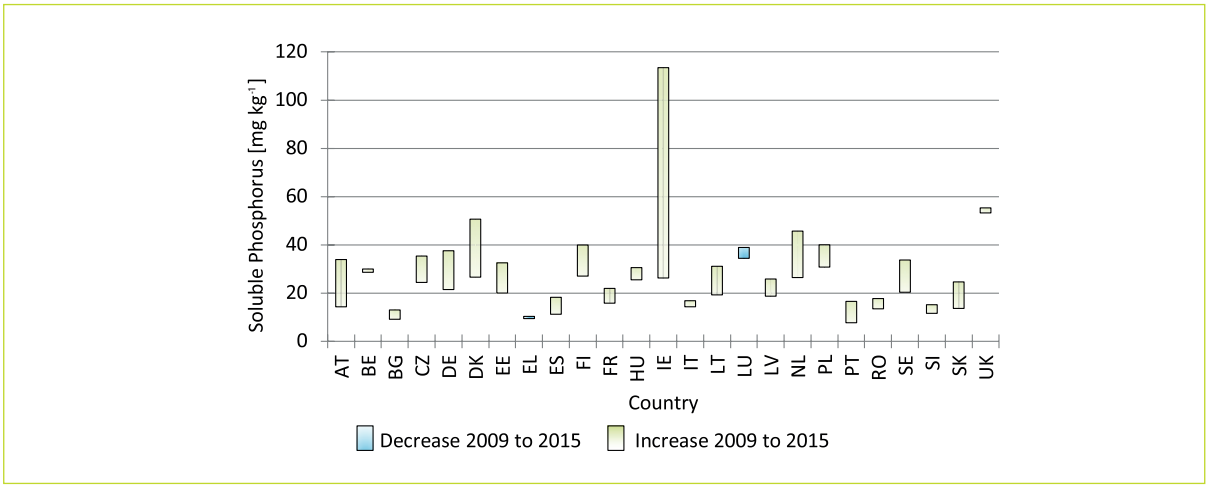

Figure 2.2-11: Change in soluble phosphorus in forest soils (mg P kg^{-1}) between LUCAS Soil 2009/2012 and 2015, by country

Note: There is a very marked and common increase in the amount of soluble phosphorous from 2009/2012 to 2015. A small decrease is only reported for Greece and Luxembourg. From the evaluation of the data for soluble phosphorous, it may be concluded that the findings on changes between the surveys have to be interpreted carefully. The changes in the sample sites in Ireland are caused by a single sample, for which the amount in soluble phosphorus increased from 32.2 mg P kg^{-1} in 2009 to 328.5 mg P kg^{-1} in 2015. The magnitude of the change in phosphorus over the relatively short period of six years is unexpected. The nutrient is quite immobile in the soil and over short periods provides a stable pool. A possible explanation of the observed change is that the laboratory instrument has changed before the analysis of the 2015 soil samples.

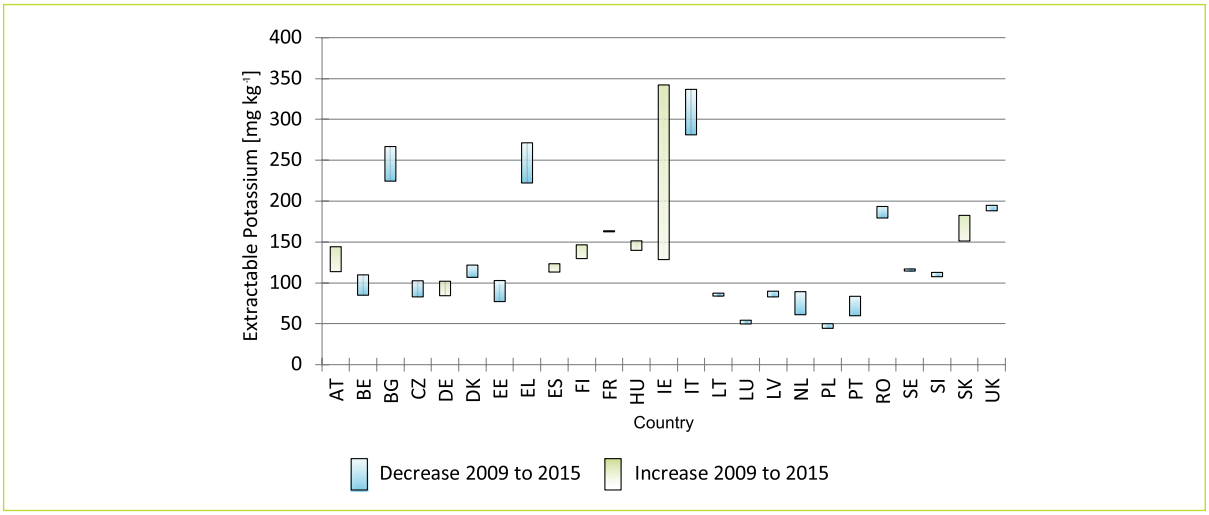

Figure 2.2-12: Change in extractable potassium in forest soils (mg K kg^{-1}) between LUCAS Soil 2009/2012 and 2015, by country

Note: There is no clear tendency for the changes in extractable potassium, the average decreased in 13 countries while it increased in 11. The average extractable potassium in the soil samples of 2009/2012 was 130.2 mg K kg^{-1}, whereas the average for 2015 soil samples is 137.5 mg K kg^{-1}, for repeatedly sampled points it was 130.3 mg K kg^{-1} for 2009/2012 and 129.6 mg K kg^{-1} for 2015. Whatis notble, average extractable potassium decreased in all four countries with averages > 200 mg K kg^{-1} in the samples collected in 2009/2012. Yet, there is no apparent link of the changes in extractable potassium with the changes in the samples of any other soil parameter. The increase in extractable potassium in Ireland is based just on two of the four repeated samples, where there was an increase (75.90 mg K kg^{-1} to 734.40 mg K kg^{-1}; 72.50 mg K kg^{-1} to 537.70 mg K kg^{-1}).

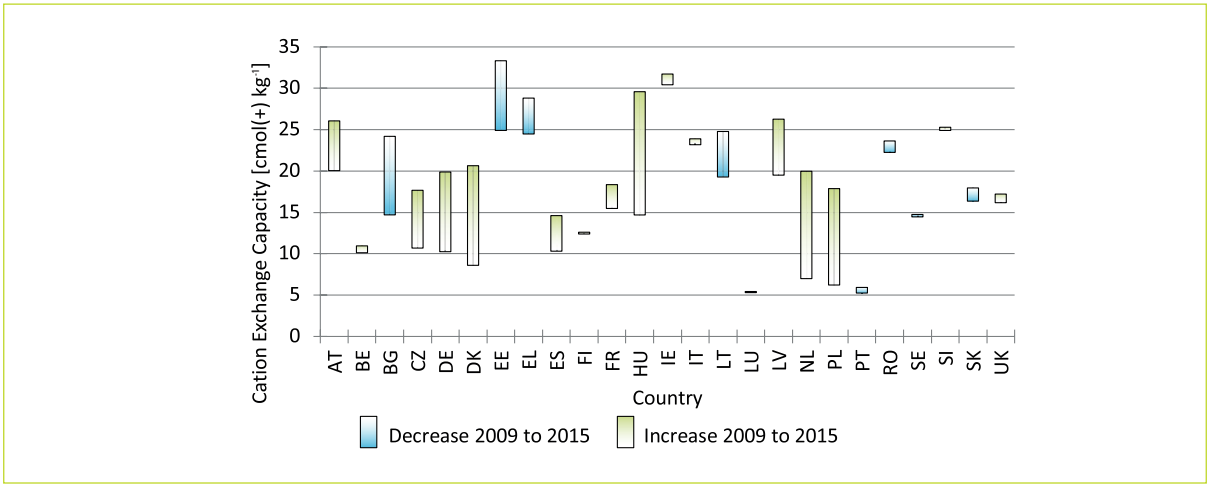

Figure 2.2-13: Change in cation exchange capacity (CEC, cmol(+) kg^{-1}) in forest soils between LUCAS Soil 2009/2012 and 2015, by country

Note: The values of CEC for the samples of the 2009/2012 surveys were within the expected range. However, the changes between the surveys are notable and variable between national averages.An evaluation of re-analysed samples by the laboratory suggests that the data on changes in CEC between surveys may not provide consistent results.

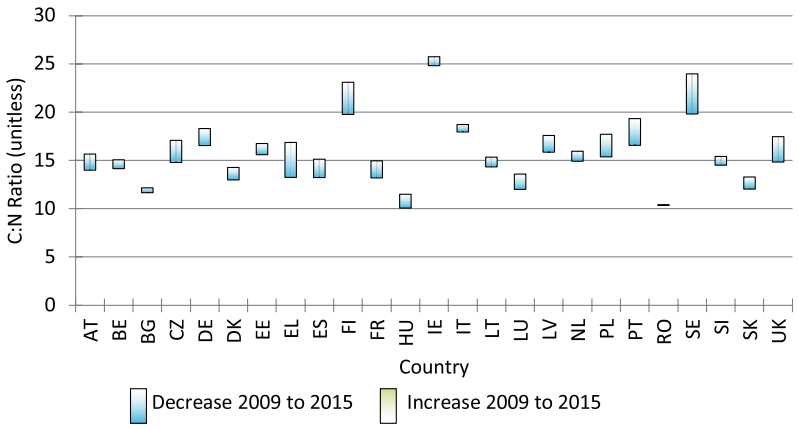

Figure 2.2-14: Change in C:N ratio (unitless) in forest soils between LUCAS Soil 2009/2012 and 2015, by country

Note: The general trend for changes in C:N ratio between 2009/2012 and 2015 is a decrease in mean values (2009/2012: 18.6; 2015: 16.3 for, repeated, paired samples). The C:N ratio increased only for the samples from Romania (+0.1). This is a direct result of the changes in total nitrogen, and not in OC, which remained stable between the surveys. Any reservations about the changes for total nitrogen, therefore, also apply to the C:N ratio. Notable is that the changes between the surveys relate to those of total nitrogen. The lower ratios are not a direct indication of an increase in plant-available mineral nitrogen in the soil, nor for an increase in nitrogen leaching from the soil.

Indicator 2.3 Defoliation

Defoliation of one or more main tree species on forest and other wooded land in each of the defoliation classes

Key findings

- In the period 2010-2018, the health of forest trees, measured by defoliation, remained unchanged on about 72% of the monitoring plots, deteriorated on 19% and improved at 9%.
- In 2018, 26% of more than 100 thousand assessed forest trees were moderately to severely defoliated, and 0.6% were dead.
- Insect attacks, weather extremes and fungal diseases were reported as the most common and widespread factors associated with tree defoliation

Introduction

The health of forest trees in Europe is systematically monitored by annual surveys of tree crown condition of individual trees, including attributes as defoliation and symptoms of biotic and abiotic agents. The crown condition survey is the core activity of the large-scale, Europe-wide monitoring system (Level I) of ICP Forests, based on the harmonised methodologies[5] under the UNECE Convention on Long-range Transboundary Air Pollution (Air Convention).

Tree crown defoliation is defined as leaf or needle loss as compared to a reference optimum and is used as an indicator of tree health and vitality. A decline in tree health, reflected in fine root dieback, reduced growth and ultimately tree mortality, is often associated with increasing defoliation. Based on the degree of defoliation, trees are grouped into five classes: no defoliation (0-10% defoliation), slight defoliation/ warning stage (>10-25%), moderate defoliation (>25-60%), severe defoliation (>60-<100%) and dead (100% defoliation).

The regular monitoring of defoliation represents a valuable early warning system on the responses of forest ecosystems to environmental changes. Defoliation is influenced by many different factors, including climatic conditions and weather extremes as well as insect attacks and fungal infestations, and deposition/uptake of pollutants. Defoliation data for 2018 were submitted from 27 countries, for 5 634 plots. In total, 103 797 trees were assessed comprising more than 130 species, while 15 the most frequent tree species accounted for 75% of the sample.

Status

In 2018, 26.4% of all trees assessed had defoliation above the warning stage (25%), and 0.6% were dead. This represents a slight increase compared to the previous year. Defoliation varies regionally, by species, and by a combination of both. High mean defoliation was observed on plots in Central Europe and in the Mediterranean parts of Italy, France and Spain. Plots with low mean defoliation were found across Europe, mainly in Northern Europe but also in Romania, central Serbia and Turkey (see Figure 2.3-1).

On the trees assessed in 2018, signs of insect attacks, abiotic causes (particularly drought) and fungi were reported as the main factor for crown defoliation (Figure 2.3-2).

Trends

Defoliation increased on 18.9 % of the plots monitored from 2010 to 2018 and decreased on 8.9% of the plots (see Figure 2.3-3). There has been no change in defoliation on 72.2% of the monitored plots. Of the main tree species, *Quercus robur* and *Quercus petraea* (temperate oaks) and *Quercus ilex* have had the highest mean defoliation over the past two decades (see Figure 2.3-4). While there is no clear trend in defoliation of *Pinus sylvestris*, *Picea abies* and *Fagus sylvatica*, the defoliation of *Quercus ilex* and *Pinus pinaster* has deteriorated since 1992 (note: the high mean defoliation values in 2015 for these species were due to temporary discontinuation of assessments on Spanish plots in that year).

Climatic factors, and in particular drought stress, appear to be primary drivers for changes in forest trees defoliation. Droughts and water shortages triggered an extreme increase of *Quercus ilex* defoliation in the mid-1990s. *Picea abies, Fagus sylvatica* and temperate oaks showed clear reactions to the drought in 2003. These reactions are even more pronounced at regional level - as was the case with early beech autumn senescence due to the drought in Central and Northern Europe in 2018. The observed high levels of defoliation may, therefore, indicate that trees have a reduced potential to withstand adverse environmental impacts. This is particularly relevant as climatic extremes are predicted to occur more frequently in the near future. Climate change is also interlinked with other factors affecting forest health such as soil acidification and foliar nutritional imbalances. Furthermore, the spread of non-native, invasive pests and pathogens due to climate change increases the risk to tree health and vitality.

[5] https://www.icp-forests.org/pdf/manual/2016/ICP_Manual_2017_02_part04.pdf

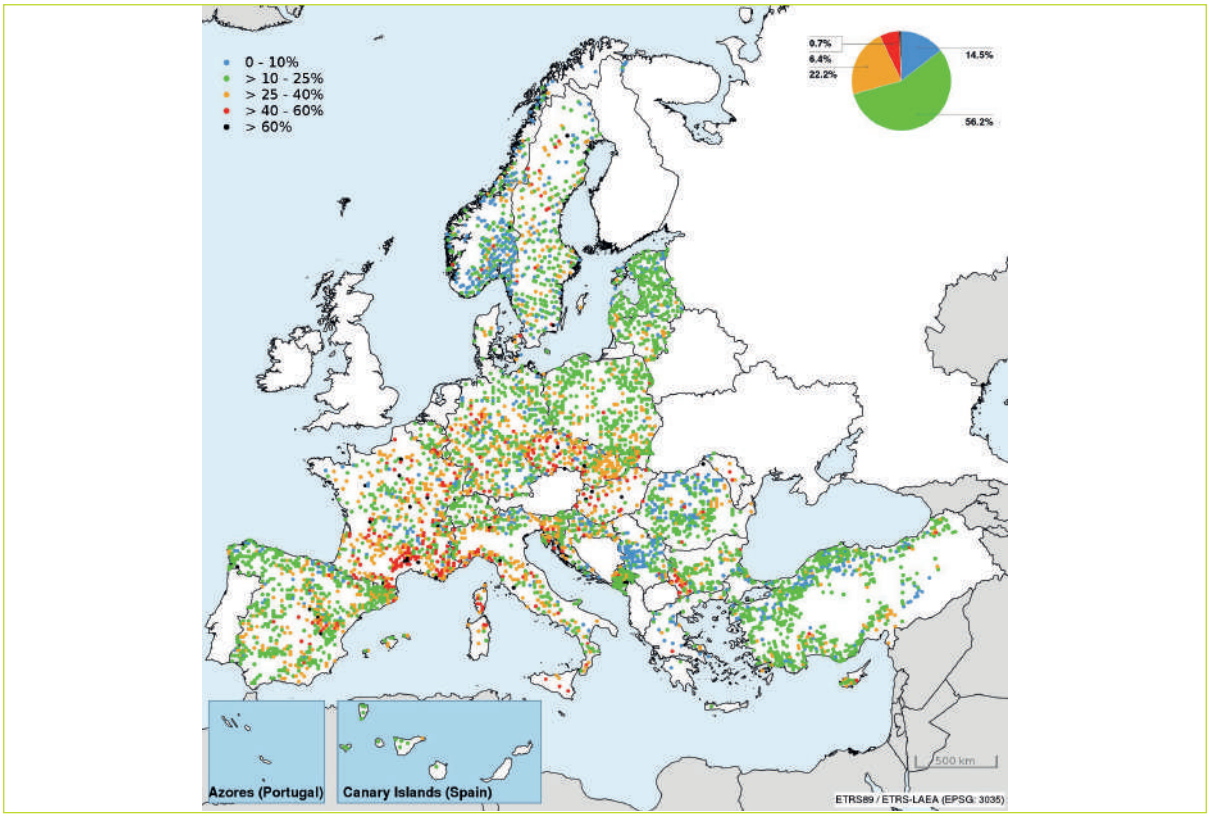

Figure 2.3-1: Mean defoliation of trees at monitoring plots (all tree species), 2018

Note: The percentage of plots in each defoliation class is given in the pie chart in the upper right corner.

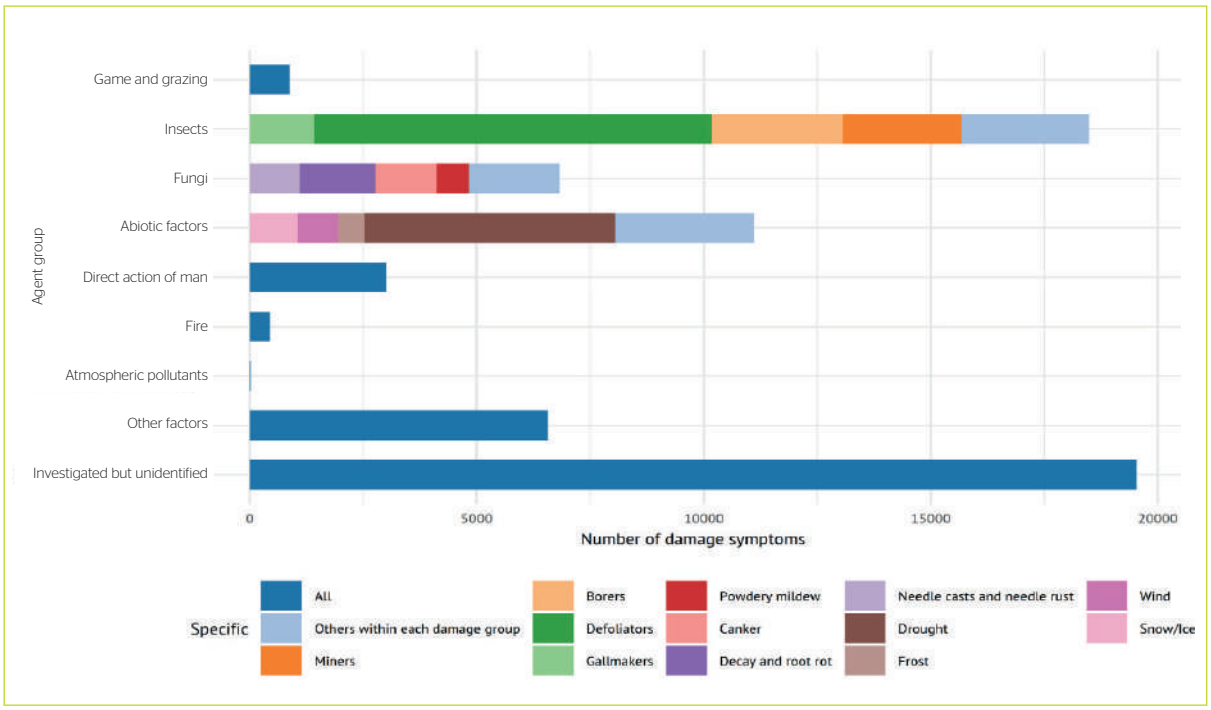

Figure 2.3-2: Number of symptoms other than defoliation recorded on trees at monitoring plots, 2018

Note: Multiple symptoms can be recorded on the same tree. "All" refers to all symptoms in certain agent groups. "Atmospheric Pollutants" refers to visible symptoms of the direct impact of air pollution only. All these symptoms may relate to defoliation.

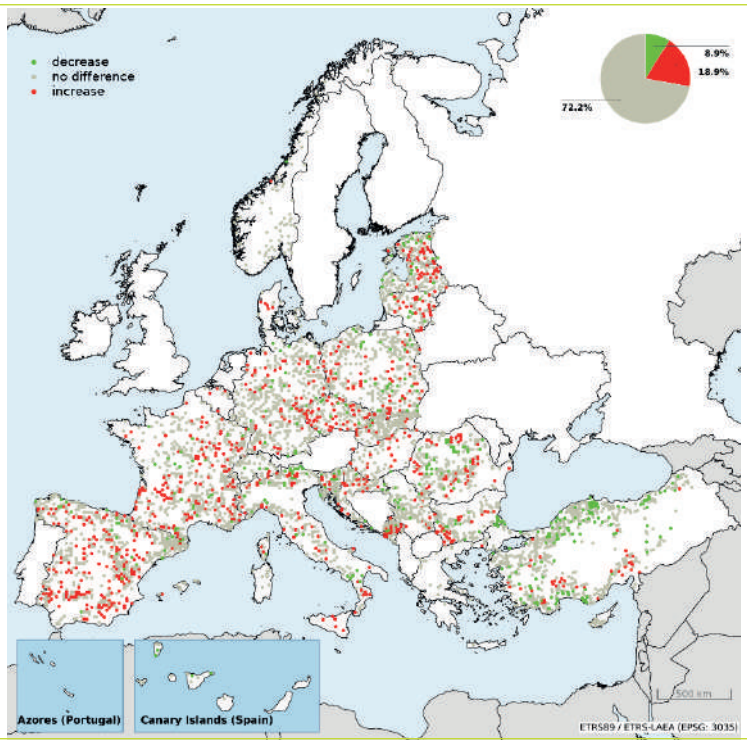

Figure 2.3-3: Trend in mean plot defoliation of all species over the years 2010-2018

Note: Plots were included if assessments were available for at least 80% of the time period. Due to changes in plot location in some countries, this evaluation is not based on the full set of data.

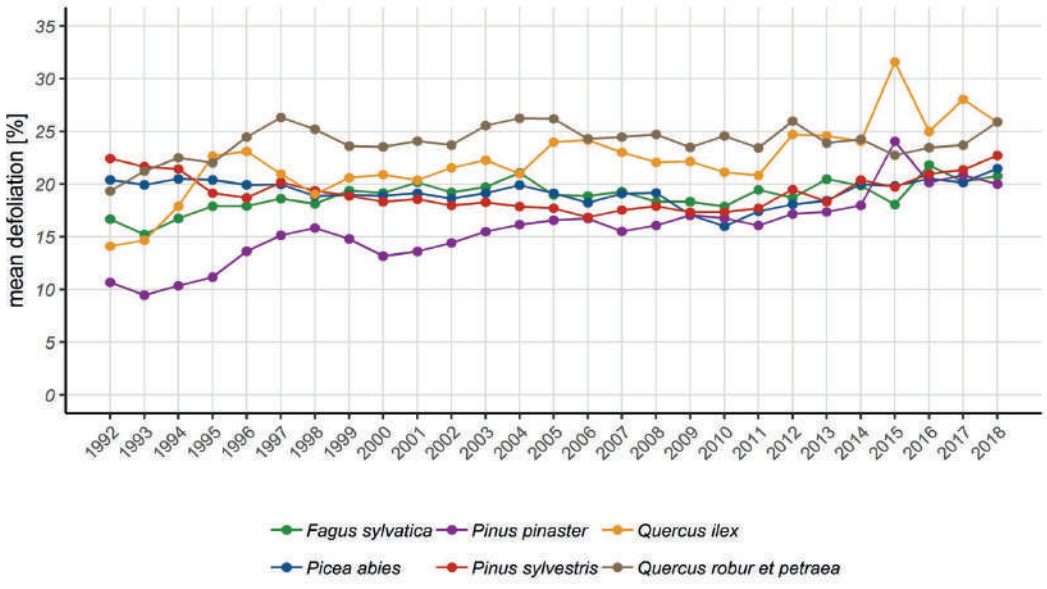

Figure 2.3-4: Mean defoliation of main tree species, 1992–2018

Notes: Minimum and maximum number of trees per species: Fagus sylvatica (8 671 - 13 400), Picea abies (10 028 - 26 818), Pinus pinaster (668 - 3 841), Pinus sylvestris (15 483 - 36 768), Quercus ilex (683 - 3 985), Quercus robur et petraea (6 363 - 9 369). Trees were included if assessments were available for at least 80% of the time period. Due to changes in plot locations in some countries, this evaluation is not based on the full set of data. The peak values in mean defoliation for Pinus pinaster and Quercus ilex in 2015 are due to the missing assessments on Spanish plots that year.

Indicator 2.4 Forest damage

Forest and other wooded land with damage, classified by primary damaging agent (abiotic, biotic and human induced)

Key findings

- The most damage to the European forests has been caused by windstorms and snow, insects and diseases, wildlife (particularly large ungulates) and grazing by domestic animals. The damage caused by forest fires and forest operations was well below 1% in most countries.
- The damage caused by insects, diseases and fire has decreased since 1990 whereas the damage by wind and snow has increased.
- Fires mostly affect the Mediterranean region and storm, wind and snow more the North, South-East and Central-East European regions. The influence of ungulate browsing can be considered European-wide.

Introduction

Several disturbance agents affect forests in Europe. The agents can be biotic or abiotic, natural or human-induced. Biotic agents include insects and diseases, wildlife (especially browsing by large ungulates), and domestic grazing in woodland. Abiotic agents may include fire, wind, snow, drought, air pollutants, mudflows and avalanches. Certain degree of damage is an essential component in natural forest dynamics as it fosters processes such as regeneration, selection, adaptation and evolution. In managed forest ecosystems, however, damage often results in economic losses. It can furthermore hinder the provision of ecosystem services. Human-induced long-range impacts on the environment, such as air pollution and climate change, expose forests to aggravated risks. Reduced health and vitality of forests may promote a cascade of damaging effects and hinder the sustainable management of forests. Future climate change impacts can reinforce damage by droughts, fires, storms and insect outbreaks.

Status

Damaged forest area

A forest can be affected by more than one damaging agent, for example by insects following storm damage, drought or fire. Therefore, in order to avoid double-counting, the reporting countries were requested to specify both the total area of damaged forests, regardless of the damaging agents, and areas subject to individual damaging agents.

Information on the total area of forests with damage (Table 2.4-1) was provided by 22 countries representing 59% of the total forest area in the region. Based on the information available, about 3% of the total forest area of reporting countries is affected by some type of damage. The largest proportions of forest area with damage were reported for Republic of Moldova (19.5%) and Sweden (9.4%), followed by Ireland (7.3%), Belgium (6.4%) and Denmark (5.5%). In the remaining 17 countries, the proportion of damaged forest ranged from 4.3% (Croatia) to less than 0.1% (Latvia).

Table 2.4-1: Forest area with damage, by region, 2015

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	2 716.3	4.6
Central-West Europe	99.4	6.9
Central-East Europe	1 045.2	2.4
South-West Europe	-	0.0
South-East Europe	572.6	2.0
EU-28	3 767.4	4.2
Europe	4 433.5	3.3

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 4%, C-EE 100%, S -E 0%, S -EE 71%, EU-28 56%, Europe 59%.

Insects and diseases

Heavy attacks by insects and phytopathogens (bacteria, viruses, fungi) may cause major impacts on forests, resulting not only in weakening of forest ecosystem health and vitality but also considerable economic losses. Insects and micro-organisms are likely to react to impacts of climate change. Symptoms of a certain damage may usually remain visble for more years. Substantial wind damage and drought can contribute to the mass propagation of bark beetles. Such effects have not been so visible in the reporting year 2015 but show very prominent in recent years (2018 and 2019) and will most likely impact forests in the years to come.

Information on the area of forests damaged by insects and diseases (Table 2.4-2) was provided by 29 countries (74% of the forest area of Europe). 1% of the forest area of reporting countries in Europe and the EU-28 respectively is damaged by insects and diseases. In European regions, it ranges from 13.2% in South-West Europe (only Portugal has reported damage from this region) to 0.3% in South-East Europe. The highest proportions of forest area damaged by insects and diseases were reported by Republic of Moldova (19.5%) where all forests are reported to be in protected areas, Liechtenstein (15.8%) and Portugal (13.2%).

Table 2.4-2: Area of forests damaged by insects and diseases, by region, 2015

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	609.8	1.0
Central-West Europe	146.6	0.5
Central-East Europe	399.5	0.9
South-West Europe	436.0	13.2
South-East Europe	92.4	0.3
EU-28	1 366.4	1.1
Europe	1 684.3	1.0

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 81%, C-EE 100%, S-WE 11%, S-EE 73%, EU-28 76%, Europe 74%.

Wildlife and grazing

Forests are the natural habitat for a wide range of wildlife. In the case of unnaturally high populations, some herbivore species can pose a threat to the regeneration of forests, reduce the number of tree species and call for often costly protection measures. With the exception of rather local occurrences, grazing by domestic animals is not considered a problem.

19 countries reported information on damage by wildlife and grazing. These countries cover about 47% of the European forest area (Table 2.4-3). The forest area damaged by wildlife was highest in North Europe (1.3%) and lowest in South-East Europe (0.1%), while no information was provided for South-West Europe.

In summary, 1% of forest area of reporting countries in Europe and EU-28 respectively suffer from damage caused by wildlife. Ireland (4.5%), Belgium (3.9%) and Sweden (2.8%) had the most considerable damage by wildlife in terms of affected forest area. For the rest of the reporting countries, proportions ranged from 1.5% to less than 0.1%.

Table 2.4-3: Area of forests damaged by wildlife and grazing, by region, 2015

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	790.2	1.3
Central-West Europe	71.5	0.5
Central-East Europe	81.2	0.3
South-West Europe	-	-
South-East Europe	5.5	0.1
EU-28	948.4	1.0
Europe	948.4	0.9

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 37%, C-EE 56%, S-WE 0%, S-EE 17%, EU-28 59%, Europe 47%.

Forest fires

Fires increasingly occur in most European countries, but particularly affect forests in the Mediterranean region. While controlled burning can support forest resilience against fires and may have positive effects on ecosystem biodiversity, uncontrolled forest fires, especially mega-fires, which some European countries have experienced during the recent years, can have major negative consequences for forest ecosystems (e.g. desertification, soil erosion, impact on water supply), result in the tragic loss of life and property and cause major economic losses for forest owners.

In 2015, data were available for 31 countries covering about 87% of the total European forest area. Fires were reported on less than 0.1% (161 540 ha) of the forest area of reporting countries in Europe and on 92 120 ha in EU-28 (0.1%) (Table 2.4-4). The largest areas damaged by forest fires are reported in South-West Europe (54 670 ha) and South-East Europe (52 630 ha). Those two regions account for more than 66.4% of the fire-affected area in Europe.

In recent years, southern European regions were severely impacted by forest fires. Fires have also become more frequent in European regions, which have so far been only little affected. Due to the exceptionally hot and dry summers 2018 and 2019, these regions are now also being confronted with more severe forest fires and their impacts.

Table 2.4-4: Area of forests damaged by forest fires, by region, 2015

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	0.5	0.0
Central-West Europe	25.8	0.1
Central-East Europe	28.0	0.1
South-West Europe	54.7	0.2
South-East Europe	52.6	0.2
EU-28	92.1	0.1
Europe	161.5	0.1

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 81%, C-EE 100%, S-WE 89%, S-EE 81%, EU-28 91%, Europe 87%.

Storm, wind and snow

Windstorms and heavy snowfalls represent a serious threat to forests. They may have considerable financial impacts, negatively affect landscape quality and wildlife habitats. More than 130 such events have caused notable damage to forests in Europe since the 1950s, with two such destructive storms, on average, each year (Gardiner et al., 2013). Some windstorms (e.g. Lothar, Gudrun, Kyrill, Klaus) were very severe. They resulted not only in high economic losses but also deprived many forest owners of their livelihoods. They disrupted timber markets and were often followed by bark beetle infestations. More recently, Slovenia faced an unprecedented ice storm in 2014, in 2015 storm Niklas caused considerable damage in Germany, while in 2016 Belarus was hit by a powerful windstorm, and devastating storms continue to occur.

In October 2018 in the north-eastern Italy, the windstorm Vaia affected 2.3 million ha of land area and with it nearly 500 municipalities. It destroyed at least 42 500 ha of forest including some of the most beautiful and productive forests in Italy located in the Dolomites. It downed more than 8.5 million m³ of timber causing timber prices to collapse and forest owners to lose their livelihoods. In the cases of poorly adapted forest stands, such storm events, despite all their negative impacts, may also provide an opportunity to establish new, site-adapted and resilient forest stands for the future.

In Europe, 1.8 million ha (1.1% of the forest area of reporting countries) of forests were damaged by wind and snow (Table 2.4-5). 25 countries reported on this damaging factor, representing 73% of the forest area of reporting countries in Europe. The most affected regions were North and South-East Europe. The most affected country was Sweden (3.4% of the forest area), followed by Romania (2.9%), Bulgaria (2.8%) and Croatia (2.6%). In the majority of countries, the affected area was smaller than 1% of the total forest area.

Table 2.4-5: Area of forests damaged by storm, wind and snow, by region, 2015

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	970.9	1.6
Central-West Europe	35.6	0.1
Central-East Europe	291.1	0.7
South-West Europe	-	-
South-East Europe	464.6	1.6
EU-28	1 435.5	1.2
Europe	1 762.2	1.1

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 81%, C-EE 99%, S-WE 0%, S-EE 73%, EU-28 74%, Europe 73%.

Human-induced damage

Direct human-induced factors include damage by harvesting and forest operations. They can cause economic losses, the reduction in tree health and vitality, and other negative effects to forest ecosystems.

Tourism and recreational activities are an important ecosystem service that forests provide and it continues to grow. However, this can result in a variety of negative impacts to forest ecosystems ranging from massive disturbances of forest wildlife, erosion, extensive networks of trails to littering and vandalism.

Human-induced damage by unidentifiable causes may include impacts e.g. of air pollution (see Indicator 2.1) or traffic.

Damage by forest operations and other human-induced factors is presented in Table 2.4-6. Approximately 0.2% or 184 480 ha of the forest area of reporting countries were damaged by forest operations. For the majority of regions, the area affected was very minor (0.1% of the forest area), with the value slightly higher for North Europe (0.2%).

Table 2.4-6: Area of forest damaged by forest operations, by region, 2015

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	137.4	0.2
Central-West Europe	12.7	0.1
Central-East Europe	29.4	0.1
South-West Europe	-	-
South-East Europe	5.0	0.1
EU-28	179.6	0.2
Europe	184.5	0.2

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 51%, C-EE 45%, S-WE 0%, S-EE 15%, EU-28 58%, Europe 46%.

Unspecified and mixed damage

Unspecified and/or mixed damage was reported by 16 countries, representing 60% of the total European forest area. The affected areas ranged in size from 40 ha (Latvia) to 210 000 ha in (Poland).

Comparison of damage sources

Figure 2.4-1 presents a holistic view of the different reported damaging agents. Among the individual agents, the most prominent are windstorms, insects and diseases, wildlife and grazing by domestic animals. Damage by forest fires, forest operations and unspecified mixed damage follow at a considerable lag. The higher abundance and severity of some damaging agents may have resulted from changed climate conditions in the past decade. They may be influenced by human intervention to a certain degree and are thus linked to policy measures and forest management practices.

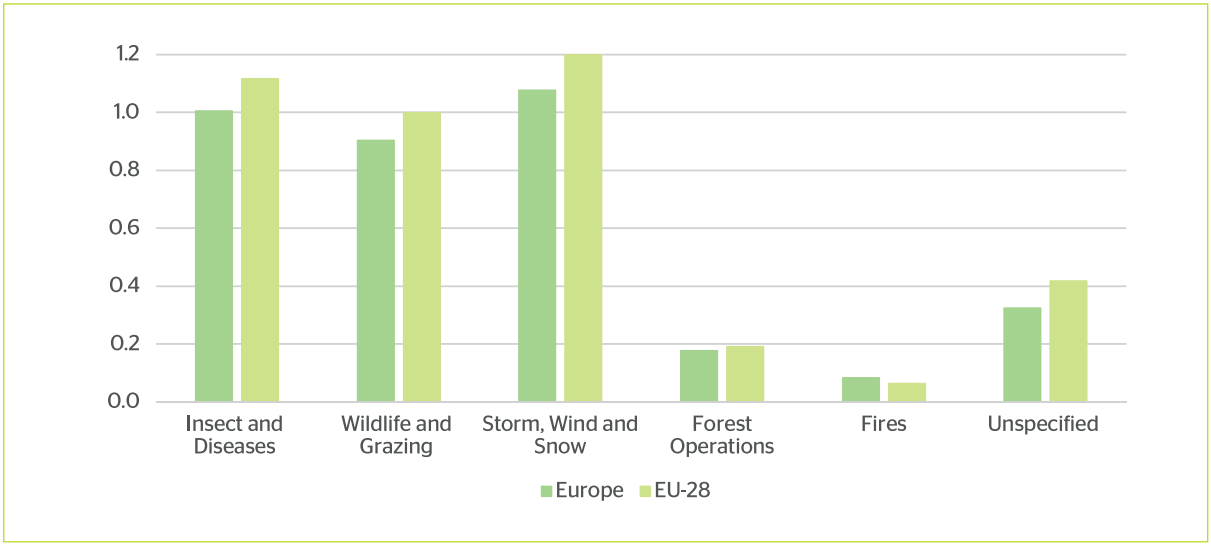

Figure 2.4-1: Percentage of forest area damaged by different agents, 2015

Note: For data coverage see tables 2.4-1 to 2.4-6.

Trends

The year 1990 was omitted here due to lower number of the reporting countries for the trend analysis. No consistent trends could be identified in the extent of forest areas affected by the different damaging agents between 2000 and 2015. This may be due to the limited number of countries that provided data for each of the considered points in time (Table 2.4-7).

Table 2.4-7: Data available for assessment of the trends on forest damage between 2000-2015

Damages	Number of countries reporting	Forest area in reporting countries 1 000 ha	Share of European forest area covered by data %
Insect and diseases	20	85 588.5	38.0
Wildlife and grazing	14	43 695.3	19.4
Storm, wind and snow	18	82 508.3	36.6
Forest operations	9	23 703.4	10.5
Human-induced	10	34 592.8	15.3
Fires	26	145 195.0	64.4
Fires human induced	7	71 500.9	31.7
Unspecified	10	56 048.3	24.9

The number of countries reporting observations diverge between survey intervals. This makes it difficult to analyse results in a time series. Therefore, trends are presented only for damage types, for which continuous time series are available for at least 20% of the European forest area (i.e. insects and diseases, storm, wind and snow, and fires; Figure 2.4-2). Note that the presented results only reflect a part of the actual situation and can be highly influenced by the figures of individual countries. Therefore, it is recommended not to use them as a basis for generating trends for the entire European forest area.

Figure 2.4-2 presents the development of forest area affected by damaging agents for countries that have made available trend data for the years 2000 to 2015. Forest areas affected by fire decreased slightly between 2000 and 2010. From 2010 to 2015, a minimal increase can be observed.

The areas damaged by insects and diseases, for which 20 countries provided a complete time series, has decreased since 2005. The damaged areas more than halved between 2000 and 2015 with a strong decline between 2005 and 2010. This development can be mainly assigned to data reported by Romania, where the area of forests affected by insects and diseases decreased from 1.3 million ha in 2000 to 37 680 ha in 2015. In contrast, the respective areas increased for Portugal, Republic of Moldova and Ukraine.

The area damaged by, wind and snow showed a slight increase in 2005 and then a more visible one in 2015. Out of the 18 countries providing a complete data set, this development can be explained by data provided from Turkey, Romania and Bulgaria for the year 2015.

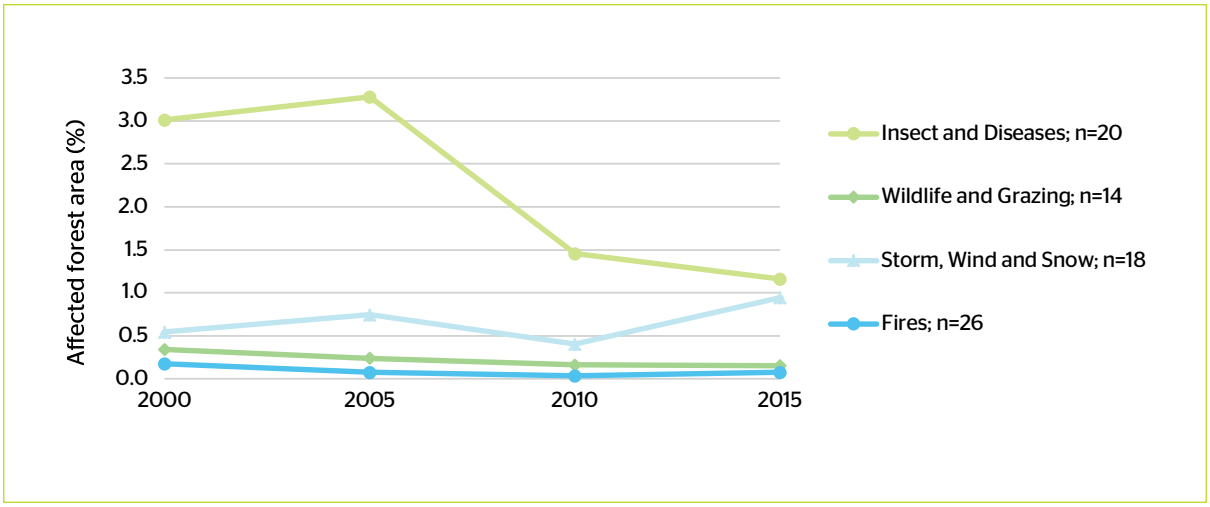

Figure 2.4-2: Trends in damaged forest area by agents, 2000-2015

Notes: n - number of countries which provided information on all years.
Data coverage as % of total regional forest area: Insect and diseases: 38%, Wildlife and grazing 19%, Storm, wind and snow 37%, Fires 64%.

Indicator 2.5 Forest land degradation

Trends in forest land degradation

Key findings

- Forest land degradation can be assessed as the number and intensity of relevant land degradation processes, or as the extension of the degraded land area resulting from these processes.
- On the other hand, forestry activities can restore formerly degraded forest and other land and reduce the area affected by forest land degradation.
- Missing data in actual pan-European reporting render the quantitative analysis and presentation of the indicator in this report impossible.

Forest land degradation can be understood as reduction or loss of the biological or economic productivity and complexity of forest resulting from land use or from a process or combination of processes, including processes arising directly or indirectly from human activities and habitation patterns such as:

- soil erosion caused by wind and/or water,
- deterioration of the physical, chemical and biological properties of soil and
- long term loss of natural vegetation or permanent modification towards regressive stages.

The degradation of forest resources can have serious environmental, social and economic impacts and reflects a reduction of provided goods and services, such as productivity, biomass, or biological diversity. The term refers to a process of change that negatively affects forest functions. The process of change is caused by disturbances, which can vary in type, extent, effect, severity, cause and frequency. The disturbances can be natural (e.g. fire, wind, drought, massive erosion), human-induced (overexploitation, forest pasture exceeding carrying capacity, mining, inappropriate land-use change) or a combination of these two causes. Also, indirect causes as chemical or nuclear contamination, long-range trans-boundary air pollution, exposure to ammunition or changes of site conditions can contribute to degradation. The perception of forest land degradation depends on the drivers of degradation and the goods and services of most interest. A pilot study was conducted to develop and implement this indicator (FOREST EUROPE, 2019c), which is also reflected in the formulation of the indicator definition.

Definition of degraded forest land used for the pan-European reporting 2020:

Forest land severely damaged, e.g. by the desertification, fires, grazing, air pollution, erosion, unsustainable management, etc., that lost tree cover and with soil damaged to such a degree, that severely hampers or delays the re-establishment of the stocking.

Note: After stocking is re-established, the area can still be considered as a degraded forest, but not degraded forest land.

The full text of indicator 2.5 (trends in land degradation) can be interpreted as either (1) processes contributing to forest land degradation or (2) the change of land areas that meet degradation criteria. The two approaches require different assessment concepts. The first approach requires the assessment of a defined number and intensity of processes and allows the early detection of progressive degradation long before a final and possibly irretrievable state is reached. However, there are operational problems with implementation. Since many of the processes concerned are present on practically every piece of land, reasonable threshold values must be defined for each process. The acceptable intensity of any process could be set differently depending on the perspectives and interests involved and must be seen in the field of tension between degradation and (positive) development. The majority of degradation processes are difficult to record, and therefore data for larger areas are usually incomplete. In contrast to the monitoring of processes, the assessment of degraded areas is much easier and could be integrated into national forest inventories, for example. This makes an irretrievable final state the subject of the assessment, which may not permit the introduction of early measures to prevent degradation. In addition, degradation processes generally proceed slowly, so that five-year changes in the area of degraded land may be small and therefore be difficult to monitor with sufficient accuracy. The definition of degraded forest land proposed by FOREST EUROPE expert group is area-based and not process-based.

Forest land degradation has been added as a new indicator to the updated pan-European indicators for sustainable forest management. Its definition was developed just before data collection and limited information were available at the country level. Therefore, no quantitative information on the status and trends of forest land degradation or forest land restoration can be presented.

Indicator C.2: Policies, institutions and instruments to maintain forest ecosystem health and vitality

Key findings

Most countries have **policy objectives** on the maintenance of forest health and vitality but also funding of damage prognosis and respective prevention is of high importance. Various **quantitative targets** related to the policy objectives were indicated by about one-fifth of the reporting countries focusing mainly on forest fires, ungulate browsing and insect outbreaks. The **institutional measures** implemented to achieve these objectives relate to policies and strategies for the prevention and control of hazards, crisis management, distinctive services for damage monitoring and reporting, forest-fire prevention and protection as well as reduction of soil degradation. **Policy tools** put in place to achieve these objectives include financial support mainly through the Rural Development Programme, amendments of related laws and information programmes on forest health and vitality issues. Systematic restoration of forests affected by abiotic and biotic damage and the implementation of various forest-fire-prevention activities are the main **achievements** over the past five years. The major **challenges** and **obstacles** to maintain forest health and vitality comprise the increasing threat of damage to forests by harmful organisms and extreme weather events, mass dying of trees and whole stands and an unclear adaptive potential of tree species.

The majority of countries have policy objectives on the maintenance of forest health and vitality; funding of damage prognosis and respective prevention is also of high importance.

Almost all reporting countries (27 of 30) reported on national policy objectives to maintain forest health and vitality. They focus on the following topics in their national reports:

- reducing the susceptibility of forest ecosystems to threats and adapting management towards healthy and resistant forests was mentioned by 19 countries due to their raising concern about increasing climate change-induced damaging events,
- monitoring and reporting of forest health and condition to obtain precise information on forest damage, pests, diseases and invasive species was stated by eight countries from all over Europe,
- funding the development and modernisation of systems for prognosis and respective prevention of damaging agents and damaging events, distinctively forest fires, was reported by 13 countries from all European regions,
- securing regeneration after disturbances and damaging events was mentioned by three countries,
- guaranteeing the necessary forest-wildlife balance was stated by three Central-West European countries,
- developing and applying the latest science and evidence of the full range of threats to tree health and strengthening resilience as well as communicate this also to forest owners was reported by three countries,
- achieving biosecurity was reported by two countries which are islands,
- forest demining and related restoration of degraded forest areas is a prerequisite for sustainable forest management in former war zones and was reported as policy objective by two countries from Central-East and South-East Europe,
- creating legal and economic preconditions to face calamities in protected forest areas was highlighted by one Central-East European country.

Quantitative targets related to these policy objectives were indicated by about one-fifth of the reporting countries, focusing mainly on forest fires, ungulate browsing and insect outbreaks.

Although most countries have policy objectives related to Criterion 2, only six countries reported on related quantitative targets (see Table C.2-1).

Table C.2-1: Country-specific targets on forest ecosystem health and vitality

Country	Target
Austria	10% reduction in the number of stems affected by bark peeling in forests available for wood supply (FAWS) by the year 2025 (reference year 2000/2002).
Austria	Reduction of peeled stems in protective forests (less than 5%)
Croatia	To clean up 404 km² of mine suspected areas until 2025
Estonia	100% of spring and summer fellings treated with antagonists of root rot
Poland	Construction or modernisation of 150 forest fire observation stands
Poland	10% reduction of forest areas (State Forests Holding) affected by forest fires compared to the period 2012-2014
Slovakia	Support of about EUR 20 million in 2015-2020 for forest regeneration after wind and insect calamities as well as tending of subsequent stands in line of adaptation measures
Slovenia	Protective measures against browsing on 800 ha
Slovenia	2 700 working days per year to be spent on prevention and control of insect outbreaks

The institutional measures implemented to achieve these objectives relate to policies and strategies for the prevention and control of hazards, crisis management, particular services for damage monitoring and reporting, forest-fire prevention and protection as well as reduction of soil degradation.

Six countries, mainly in Central-West Europe, developed or strengthened measures, policies and strategies for the prevention and control of abiotic and biotic hazards including the development of crisis management within their existing institutional framework. Eight countries, mainly in Central-West and Central-East Europe, established State forest departments or services which monitor damaging agents including negative effects of climate change on forests. Another eleven countries from all European regions informed on damage monitoring and reporting including conducting tree pathogen surveys and the participation in the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests). Four countries developed or updated programmes for forest fire prevention focusing on e.g. the improvement of forest fire protection systems, automated forest fire detection systems, establishment of forest fire observation stands and the procurement of specialised fire-fighting vehicles. Six Central European countries have implemented various measures to improve the soil quality and nutrient balance in the forest and to reduce soil degradation. One South-West European country developed a National Action Plan Against Desertification. Further institutional measures of single countries comprise the establishment of a working group on holm oak decline and a reconstitution scheme to address the Ash dieback. Specific education for forest owners and employees for the identification and management of abiotic and biotic hazards and damaging agents in the forest were reported by three countries. Three countries from North and Central-West Europe reported on an implemented control of timber and other woody imports as well as the inspection of imported living plants.

Policy tools put in place to achieve these objectives include financial support, mainly through the Rural Development Programme, amendments to related laws and information programmes on forest health and vitality issues.

Various **financial tools** were reported by 13 countries from all over Europe. This comprises financial support mainly through the Rural Development Programme in eleven European countries provided for adaptation, prevention e.g. against browsing, insects, pests, diseases, landslides, avalanches, floods and restoration measures e.g. for airborne liming in areas affected by air pollution to improve the soil. In two countries public investments for forest fire protection systems were provided. Funding of research related to Criterion 2 was granted in two countries. In a South-East European country, the payments for forest ecosystem services are being used for afforestation, reforestation, protection, prevention and demining.

Legal tools applied for the protection of forests against diseases, pests and other damage were mentioned by nine countries from all over Europe. In three of these countries, the National Forest Acts were amended on forest protection issues. In one Nordic country, large-scale forest damage prevention was amended in the Forest Damages Prevention Act. A new plant health act, as well as the implementation and assessment of a Tree Health Strategy and the establishment of a plant health risk register, was reported by a Central-West European country. Statutory plant health notices and legal tools to ensure that diseased trees are removed as soon as possible to restrict spread were reported by two countries.

Information tools applied have been reported by ten, mainly Central European countries. Communication programmes on forest health and vitality issues were elaborated in five of those countries resulting in public information campaigns and awareness-raising for foresters and forest owners. Single countries reported on: maintaining close cooperation with the meteorological service and with local authorities for fire warning and for winter storms; a publication on forest protection modules; a biosecurity plan "keep it clean", an electronic atlas of harmful agents and strengthened communication methods which are obligatory in high fire risks periods.

Systematic restoration of forests damaged by abiotic and biotic agents and the implementation of various forest-fire-prevention activities are the main achievements in the area of Criterion 2 over the past five years.

20 European countries reported on achievements to maintain forest health and vitality over the past five years. It was reported that the staff responsible for plant health across Europe and further afield liaise to keep abreast of the latest threats, monitor their progress and act to prevent their spread. In this regard, it was also reported that pest and disease control of wood imports was effectively implemented.

The successful implementation and improvement of forest fire prevention and suppression activities were highlighted by six countries comprising, *inter alia*, fire observation towers, forest fire-prevention belts, IT-based automated forest fire detection systems, a geo-information system for forecasting and monitoring forest fires, modern fire-fighting equipment or maps for finding water resources. The average forest fire area was being kept small in those countries. Eight mainly Central European countries reported on ensured financial support for prevention or reconstitution schemes introduced for forests affected by abiotic and biotic damaging agents and related systematic forest restoration or recovery activities.

Three countries reported general public awareness-raising and targeted reporting for decision-makers. Good cross-administrative sector cooperation and coordination on the maintenance of forest health and vitality was also mentioned as an achievement by six Central-West European countries. Two of them reported in detail on dialogues between the highest-ranking hunting and forestry representatives and authorities to develop solutions for game induced damage. Two South-West European countries informed about recent improvements to fulfil forest health and vitality related national and international reporting requirements.

The major challenges and obstacles to maintain forest health and vitality comprise the increasing threat of damage caused to forests by harmful organisms and extreme weather events, intensive mass dying of trees and whole stands and an unclear adaptive potential of tree species.

The spread of new pests, diseases or invasive species due to imports from abroad and other biotic and abiotic hazards are on the increase. The main causes of this development include climate change and the rise in global trade. These developments might become even more pronounced in future. Hence, 15 European countries from all regions see it as a major challenge to increase the stability and the reduction of vulnerability of forest ecosystems and to secure continuously all forest functions and services.

Six countries pointed that more extreme climatic events (e.g. storm, ice break, droughts, insect calamities) require significant financial investments for early detection and identification as well as rapid and efficient sanitary cutting, timber processing and restoration of the forest areas. In this regard, the low predictability of climate change-based natural phenomena in terms of type, amplitude and duration as well as their economic and ecological (social) impacts were mentioned by one Central-West European country. Five Central European countries highlighted that further knowledge and experience will be needed to conduct the most effective climate change-related adaptive forest management. The size of game populations adapted to the habitat and optimised hunting methods to ensure an ecologically viable game impact require increased efforts in four Central-West European countries.

Reaching a generally good quality of the site

conditions (quality of air, water, soil) in combination with increased quality conditions for specific sites with high conservation values were reported challenging by two Central-West European countries. Further on, particularly challenging for a few countries are seen: forest-related biosecurity; to organise a feasible early warning system for invasive species; to combat the progress of desertification and soil erosion. The challenge for transformation at all levels and the urgent and comprehensive need to respectively act and to operate also in other sectors like transport, industry, energy, etc. to mitigate climate change and thus to avoid climate change-induced damage was highlighted by three Central-West European countries.

Obstacles to maintaining forest health and vitality have been reported by ten countries and focus on intensive mass dying of forest tree species (e.g. ash) and unclear adaptive potential of tree species. Together with biotic and abiotic forest damage, this is leading to worsening sanitary conditions in forests. Emissions from other sectors are leading to pollutant accumulation (e.g. nitrogen, lead, nuclear contamination).

Human-induced forest fires and increasing impact on and disturbance of the wildlife habitats caused by recreational use and tourism was also reported as respective obstacles. Further, the diffusion of invasive plant species was considered difficult to halt. One South-Eastern non-EU country reported as an obstacle the lack of disease and pest control mechanisms for traded wood-based products.

Criterion 3

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

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Reviewer: **Risto Päivinen**

Data sources: **National reports on the pan-European indicators for SFM (3.1, 3.2, 3.3, 3.4, C.3), UNECE/FAO Timber database, 2019 (3.3)**

Balancing net annual increment and annual fellings is important for the sustainability of the production of wood as a renewable raw material. This balance maintains an adequate growing stock and forest environment necessary for the provision of a range of ecosystem services and non-wood products.

Key messages

- More wood grows in European forests than is harvested. Therefore, Europe's forests continuously accumulate growing stock and provide a sustainable supply of wood.
- In some countries, the proportion of salvage cuttings to total fellings has increased.
- With over EUR 20 000 million (reference year 2015), roundwood represents substantial market value.
- The quantity and market value of non-wood goods is constantly increasing but remains far below the market value of wood production.
- The market value of plant non-wood products (e.g. Christmas trees) is about twice as high as that of animal products (e.g. wild meat and honey)
- The value of ecosystem services provided by European forests is underestimated. Only part of them is marketed, although their value could be significant if markets are developed on a larger scale.
- Policy achievements comprise increased motivation of forest owners to make more effective use of their forests and ensuring timber supply for the bioeconomy, as well as increased recognition of non-wood forest products and services. Innovations in wood-based products are contributing to increased use of timber. Three quarters of forests are under forest management plans, with over half the forest area certified by a third party certification scheme. Low economic performance of the forestry sector is seen as one of the challenges, next to a lack of entrepreneurial and innovative thinking, increasing competition for forest resources and their services, and untapped potential for the valuation of ecosystem services.

Indicator 3.1 Increment and fellings

Balance between net annual increment and annual fellings of wood on forest available for wood supply

Key findings

- In European forests, every year more wood grows than is harvested. About 73% of the net annual increment is utilised by fellings.
- The wood increment is higher than in earlier periods. Since 1990 it has increased by approximately 25%. Similarly, the volume of timber harvested has increased steadily since 1990. As timber stocks grow despite the higher volumes harvested, European forests provide a sustainable supply of wood as a renewable resource.

Introduction

The balance between the volume of annual increment and annual fellings has long been used to assess the sustainability of wood extraction from forests and is decisive for the current and future availability of wood. Fellings should not exceed increment in the long term. From a mid-term perspective, forest management may still be sustainable even if felling exceeds increment. As timber markets are volatile, growing stock surplus aggregated in periods of weak markets, can be utilised under prospering market conditions without harming the principle of sustainability.

Concerns about the emission of greenhouse gases and shortage of natural resources have led to increasing demand for woody biomass as renewable material and energy source. The transition to a market economy in Eastern Europe fostered wood utilization and timber processing. These developments have impacted on the amount of fellings; while felling was and still is smaller than increment, the proportion of increments that are utilised is likely to increase in the future. The assessment of increment and felling is, therefore, an important activity to monitor that fellings do not exceed the aggregated, not utilised increments from past decades and that increments and fellings are in a balance on the long run.

In order not to adulterate the proportion of increment extracted through fellings by forests that are not utilised for timber production, the following information refers to forests available for wood supply (FAWS) only. The increment is presented here as a net annual increment (NAI), which is defined as the average annual volume over the given reference period of the gross increment (i.e. the total increase of growing stock during a given time period) minus natural losses on all trees. The increment, natural losses and fellings are reported over bark, as well as the growing stock in indicator 1.2. If felling is lower than the net increment, the growing stock is increasing (Figure 3.1-1). A part of the fellings remains in the forest as logging losses (e.g. stem sections with defects) and is not utilised for energy or wood products.

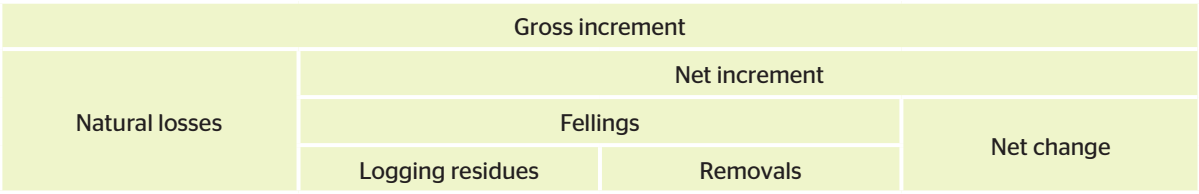

Figure 3.1-1: Components of gross increment

Status

23 countries reported data on both NAI and fellings for 2015, covering approximately 67% of FAWS area in EU-28 and 65% in Europe. The percentage of FAWS covered by reporting countries differs among regions from 34% (Central-East Europe) to almost 100% (Central-West Europe). None of the South-West European countries reported data for 2015.

In 2015, NAI of 652.3 million m^3 was reported for Europe and ranged from 57.5 million m^3 in South-East Europe to more than 259 million m^3 in Central-West Europe (Table 3.1-1). At the country level, the highest NAI was observed in Germany (more than 100 million m^3). NAI per hectare was the highest in Central-East Europe (8.1 m^3/ha) and lowest in North and South-East Europe (4.8 m^3/ha).

Fellings reported for 2015 amount to 477.5 million m^3 in Europe. The largest volume of fellings was reported in North Europe (205.8 million m^3), followed by Central-West Europe (184.7 million m^3).

A comparison of NAI and fellings provides Figure 3.1-2, where information is presented for those 23 countries that reported data for both, NAI and fellings.

Table 3.1-1 presents the utilisation rates in terms of fellings as a percent of NAI.

Table 3.1-1: Net annual increment and fellings, by region, 2015

Region	NAI		Fellings		Utilisation rate
	million m³	m³/ha	million m³	m³/ha	%
North Europe	249.1	4.8	205.8	3.9	82.6
Central-West Europe	259.1	7.3	184.7	5.2	71.3
Central-East Europe	86.6	8.1	53.6	5.0	61.9
South-West Europe	-	-	-	-	-
South-East Europe	57.5	4.8	33.3	2.8	58.0
EU-28	576.4	6.3	432.2	4.7	75.0
Europe	652.3	5.9	477.5	4.3	73.2

Note: Data coverage as % of total regional FAWS area: NE 94%, C-WE 100%, C-EE 34%, S-WE 0%, S-EE 61%, EU-28 67%, Europe 65% (23 countries).

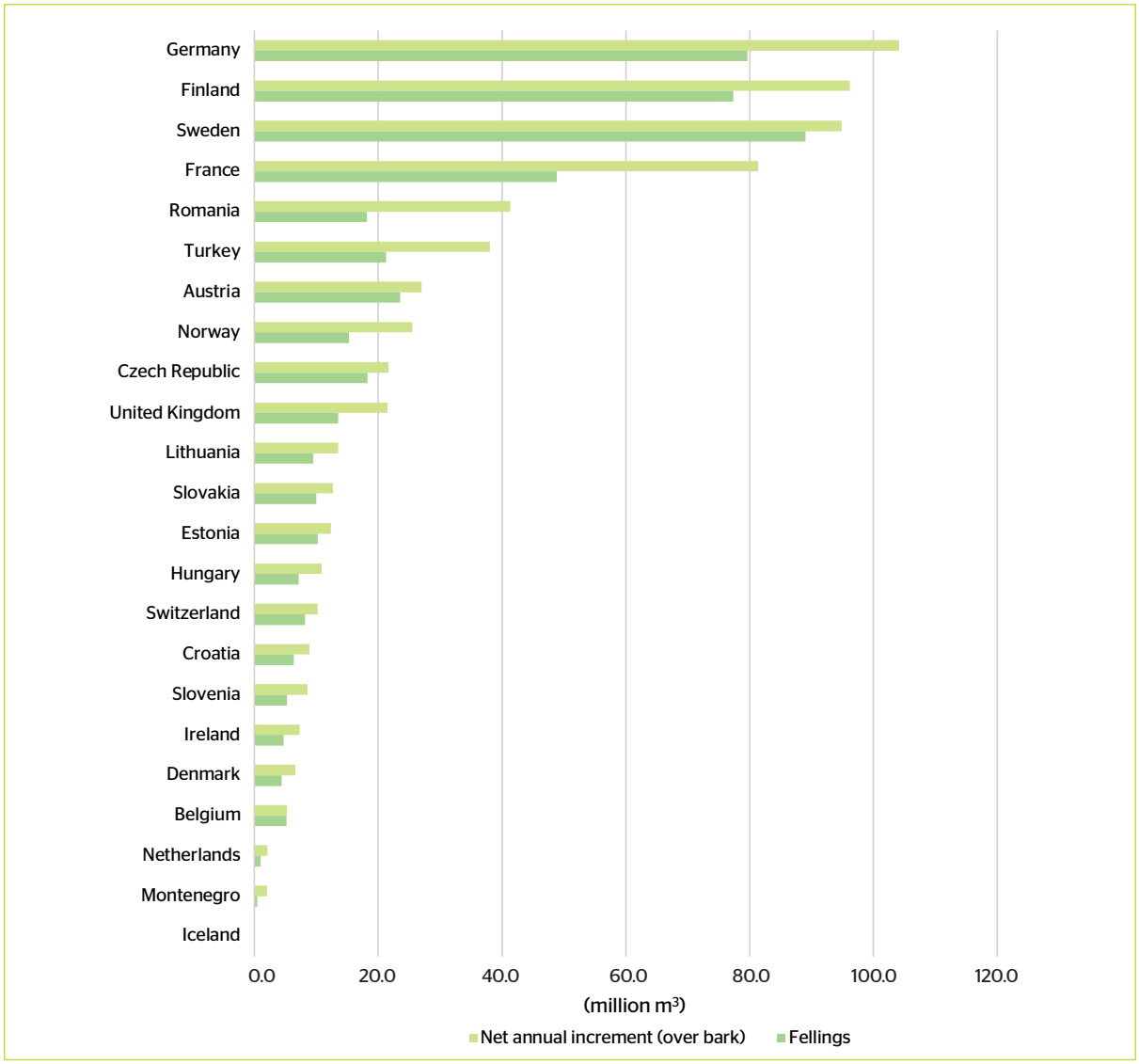

Figure 3.1-2: Annual fellings and net annual increment, by countries, 2015

Based on the reported data, approximately 73% of the NAI is utilised by fellings in Europe. The highest utilisation rates are reported for Belgium (98.7%) and Sweden (93.9%). In all other countries, utilisation rates were below 90%. Lowest utilisation rates were reported for Iceland (12.8%), Montenegro (24.9%), Romania (43.9%) and the Netherlands (47.6%). Sweden and Central European countries have faced catastrophic storms in the past decade, often followed by bark beetle infestation, which resulted in high natural losses and consequently the increased removals of downed timber as well as in reductions in NAI. In addition, in several countries increment was not utilised over decades due to restrictions of cutting which led to aging of overmature stands with high growing stocks. Under these conditions, utilisation rates larger than 100% could still be sustainable. Even the high utilisation rates observed in some countries maintain the countries' outstanding high growing stocks.

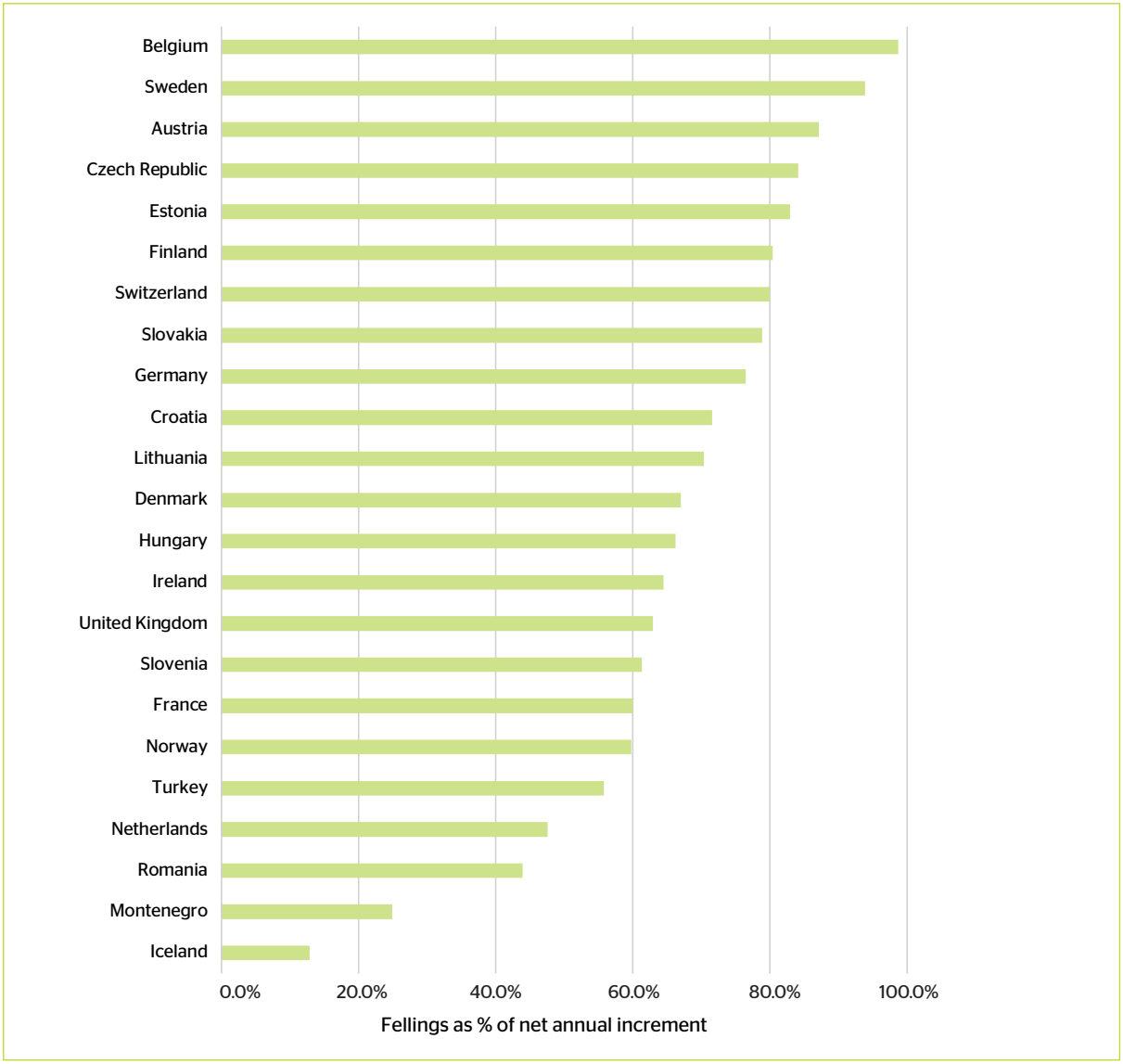

Figure 3.1-3: Fellings as a percentage of net annual increment, by countries, 2015

Trends

The analysis of the trend of NAI is based on the data from countries that reported a complete series for all reporting years (1990-2015). The information on NAI was provided by 19 countries and on fellings by 16 countries. Complete series provided no country in South-West Europe region. In the reporting countries, NAI increased during the reporting period in all regions (Table 3.1-2). In Europe, the NAI increased by 0.89% annually between 1990 and 2015, i.e. by more than three million m³ per year. South-East Europe

experienced the strongest increase (by 1.23% annually), with Turkey contributing the most. Great variability was found among the countries, in absolute figures the largest increase in total NAI was reported by Finland.

Table 3.1-2: Trend in net annual increment, by region, 1990-2015

Region	NAI								
	NAI (million m³)					Annual change (million m³/year)			
	1990	2000	2005	2010	2015	1990-2000	2000-2005	2005-2010	2010-2015
North Europe	111.5	121.5	135.1	138.1	140.7	+1.00	+2.72	+0.60	+0.53
Central-West Europe	51.9	57.4	57.2	57.6	56.7	+0.54	-0.04	+0.08	-0.17
Central-East Europe	105.9	115.4	116.8	120.5	134.1	+0.95	+0.28	+0.74	+2.72
South-West Europe	-	-	-	-	-	-	-	-	-
South-East Europe	40.8	47.9	54.2	55.1	55.5	+0.71	+1.26	+0.18	+0.08
EU-28	222.1	236.1	252.1	260.7	275.9	+1.40	+3.22	+1.71	+3.04
Europe	310.2	342.1	363.3	371.2	387.1	+3.20	+4.23	+1.59	+3.17

Note: Data coverage as % of total regional FAWS area: NE 55%, C-WE 21%, C-EE 71%, S-WE 0%, S-EE 57% EU-28 32%, Europe 42%.

Change in fellings (Table 3.1-3) closely followed the trend in NAI when both NAI and fellings increased. The utilisation rate (fellings as a percent of NAI) increased from 62.4% in 1990 to 70% in 2015 (Table 3.1-4). In North Europe, utilisation rates increased from 65.9% in 1990 to around 76.2% in 2015. The increase in utilisation rates was even more pronounced in Central-West Europe, reaching as much as 77.4% in 2015 compared to 59.6% in 1990 or 55.1% in 2000. The lowest utilisation rates were reported in South-East Europe.

Table 3.1-3:Trend in annual fellings, by region, 1990-2015

Region	Fellings								
	Subtotals (million m³)					Annual change (1 000 m³/year)			
	1990	2000	2005	2010	2015	1990-2000	2000-2005	2005-2010	2010-2015
North Europe	73.4	93.1	89.4	90.4	107.3	+1.97	-0.73	+0.19	+3.38
Central-West Europe	30.6	31.3	38.8	40.1	43.3	+0.07	+1.51	+0.25	+0.64
Central-East Europe	43.0	43.3	50.5	52.3	53.6	+0.03	+1.44	+0.36	+0.25
South-West Europe	-	-	-	-	-	-	-	-	-
South-East Europe	23.7	20.3	22.8	25.8	33.3	-0.34	+0.51	+0.59	+1.51
EU-28	138.3	161.2	173.5	177.6	200.5	+2.28	+2.48	+0.82	+4.57
Europe	170.7	188.0	201.6	208.6	237.5	+1.72	+2.73	+1.39	+5.78

Note: Data coverage as % of total regional FAWS area: NE 55%, C-WE 21%, C-EE 34%, S-WE 0%, S-EE 61% EU-28 32%, Europe 36% (16 countries).

Table 3.1-4: Trend in the net annual increment utilisation rates, by region, 1990-2015

Region	Fellings				
	1990	2000	2005	2010	2015
North Europe	73.4	93.1	89.4	90.4	107.3
Central-West Europe	30.6	31.3	38.8	40.1	43.3
Central-East Europe	43.0	43.3	50.5	52.3	53.6
South-West Europe	-	-	-	-	-
South-East Europe	23.7	20.3	22.8	25.8	33.3
EU-28	138.3	161.2	173.5	177.6	200.5
Europe	170.7	188.0	201.6	208.6	237.5

Note: Data coverage as % of total regional FAWS area: NE 55%, C-WE 21%, C-EE 34%, S-WE 0%, S-EE 57% EU-28 32%, Europe 35% (15 countries).

Indicator 3.2 Roundwood

Quantity and market value of roundwood

Key findings

- In 2015, roundwood production in Europe has reached a maximum of almost 550 million m^3. North and Central Europe's forests are still the main producers; Sweden, Finland, Germany, France and Poland account for above 51% of the whole roundwood removals in Europe in terms of volume with a total of 279 million m^3.
- The reported value of marketed roundwood is continuously increasing. In 2015, it reached EUR 20 533 million, corresponding to 416 million m^3 in 2015. The reported roundwood volumes and values by the unit are highly variable between reporting countries.

Introduction

Roundwood comprises all wood obtained from removals from forests in its natural state (wood in the rough). It includes wood from planned harvesting operations and wood recovered from incidental fellings and does not include the felled wood left in forests in the form of logging residues. Roundwood can be sub-divided into industrial roudwood (used for further processing) and wood fuel (a source of renewable energy). Roundwood production acts as an interface between the forestry and the wood processing sector: it provides income for forest owners, serves as a resource for the wood processing sector and its added value, and contributes to the economy, especially in rural areas.

Only a few countries record the removal of wood fuel on a representative scale. It is widely accepted that a considerable amount of wood fuel is utilised for self-consumption and enters neither markets nor statistical records. Thus, the figures presented below might underestimate the total removals of wood fuel from forests.

Status

The figures relate to total removals (marketed and non-marketed). 41 countries provided data on roundwood removals while only 20 countries provided data on roundwood value. The total volume of roundwood excludes roundwood harvested for self-consumption (subsistence) and other forms of uses without a market transaction. Figures were reported for individual years and here are presented for reference years as five years averages, i.e. for the year 2015 the average 2013-2017 is used.

For 2015, 542.5 million m^3 production of roundwood has been reported, 177.1 million m^3 of which is in North Europe, 147.6 million m^3 in Central-West Europe and 129.6 million m^3 in Central-East Europe (Table 3.2-1). The highest production of roundwood at the country level have been realised in Sweden (73 million m^3), Finland (60 million m^3), Germany (54 million m^3), France (51 million m^3) and Poland (42 million m^3). Removals per hectare of forest available for wood supply (FAWS) ranged from 4.2 m^3/ha in Central-West Europe to 1.3 m^3/ha in South-West Europe.

20 countries reported data on the market value of removals in 2015 (see Table 3.2-1), representing 72% of FAWS in Europe. The value of roundwood removals amounts to EUR 20 533 million. The highest value was reported by Germany (EUR 4 114 million), Sweden (EUR 2 826 million) and France (EUR 2 788 million).

The value of wood removals per ha of FAWS varied between EUR/ha 43.1 (South-West Europe) and EUR/ha 268.0 (Central-West Europe).

Table 3.2-1: Volume and market value of roundwood, by region, 2015

Region	Roundwood volume		Market value	
	1 000 m^3	m^3/ha FAWS	EUR million	EUR/ha FAWS
North Europe	177 083	3.2	5 860	116.6
Central-West Europe	147 574	4.2	8 820	268.0
Central-East Europe	129 616	4.1	4 054	214.5
South-West Europe	34 897	1.3	354	43.1
South-East Europe	53 328	2.1	1 446	129.8
EU-28	449 251	3.3	19 107	182.3
Europe	542 498	3.1	20 533	169.1

Note: Averages of yeas 2013-2017; Data coverage as % of total regional FAWS area:
Roundwood volume: 100% for all regions;
Market value: NE 90%, C-WE 93%, C-EE 60%, S-WE 30%, S-EE 57%, EU-28 77%, Europe 72%.

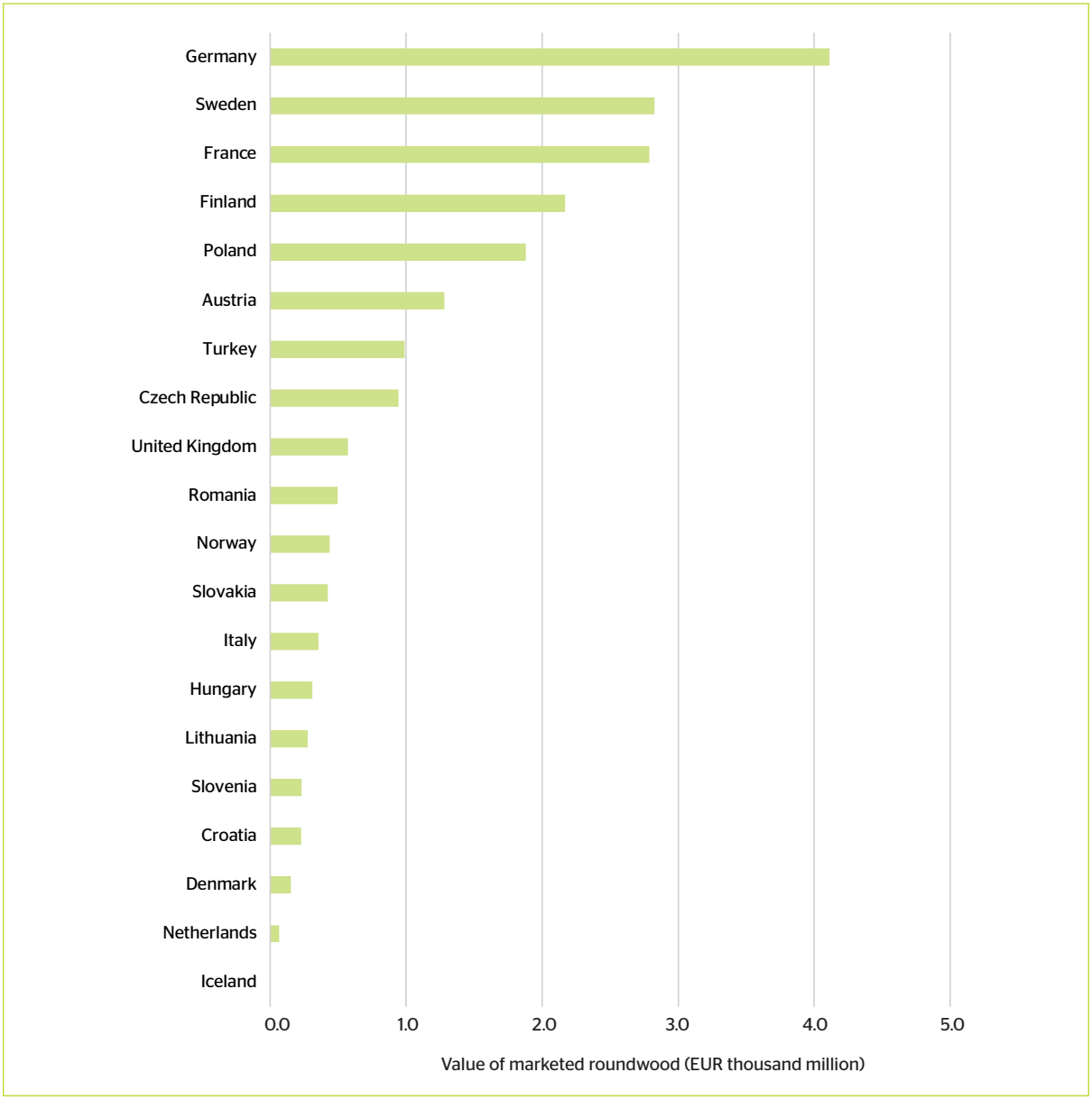

Figure 3.2-1: Market value of roundwood, by countries, 2015 (averages 2013-2017)

Table 3.2-2: Proportion of reported roundwood and fellings, by region, 2015

Region	Roundwood (under bark)	Fellings (over bark)	Proportion
	1000 m³		%
North Europe	164 460	205 836	79.9
Central-West Europe	147 204	184 676	79.7
Central-East Europe	46 674	53 612	87.1
South-West Europe	-	-	-
South-East Europe	36 888	39 940	92.4
EU-28	351 948	432 240	81.4
Europe	395 226	484 064	81.6

Notes: Averages of yeas 2013-2017; fellings in FAWS;
Data coverage as % of total regional FAWS area: NE 94%, C-WE 100%, C-EE 34%, S-WE 0%, S-EE 69%, EU-28 67%, Europe 66%.

Figure 3.2-2: Volume of marketed roundwood, by countries, 2015 (averages 2013-2017)

Differences between roundwood and fellings volumes are mainly attributable to the fact that fellings are reported in the volume over bark, while roundwood removals are reported under bark and exclude logging residues.

When interpreting figures, it should be noted that the share of marketed roundwood in the total roundwood removals cannot be clearly determined and that the removals of wood fuel are underestimated because they are not monitored consistently in the countries.

Trends

The trend of roundwood volume is based on 32 countries, representing approximately 95% of the whole European FAWS area (see Table 3.2-3).

In Europe, roundwood production increased between 1990 and 2015 by approximately 114 million m^3, reflecting an increase in the net annual increment (Indicator 3.1).

Between 1990 and 2015 the level of roundwood production per ha was maintained or increased almost in all European regions. North and Central-East Europe reported a consistent increase from 2.0 m^3/ha and 2.6 m^3/ha in 1990 to 3.2 m^3/ha and 4.2 m^3/ha in 2015, respectively. In the same period, the roundwood production per ha decreased from 2.1 m^3/ha to 1.8 m^3/ha in South-West Europe.

The value of marketed roundwood increased steadily in almost all regions with a resulting increase for the Europe of more than EUR 5 628 million or 53.1% between 1990 and 2015. Also, the value of marketed roundwood per ha of FAWS increased steadily in Europe from EUR/ha 106.0 to EUR/ha 161.5.

Table 3.2-3: Trend in roundwood volume, by region, 1990-2015

Region	Roundwood									
	1 000 m^3					m^3/ha FAWS				
	1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
North Europe	117 706	155 480	167 211	157 163	177 078	2.0	2.7	3.0	2.8	3.2
Central-West Europe	141 948	136 524	153 891	148 441	147 218	4.3	4.0	4.4	4.2	4.1
Central-East Europe	68 592	77 274	93 280	97 821	109 435	2.6	2.9	3.5	3.7	4.2
South-West Europe	34 333	33 329	34 687	33 837	34 897	2.1	1.9	1.9	1.8	1.8
South-East Europe	30 187	27 899	30 583	34 009	38 335	2.0	1.6	1.7	1.9	2.1
EU-28	343 457	382 116	427 318	414 126	443 440	2.8	3.1	3.5	3.4	3.6
Europe	392 765	430 506	479 651	471 270	506 964	2.6	2.9	3.2	3.2	3.4

Note: Five years averages are presented; Data coverage as % of total regional FAWS area:
Roundwood volume: NE 100%, C-WE 100%, C-EE 82%, S-WE 100%, S-EE 85%, EU-28 99%, Europe 95%;
Roundwood volume per hectare of FAWS: NE 100%, C-WE 98%, C-EE 82%, S-WE 38%, S-EE 83%, EU-28 86%, Europe 84%.

Table 3.2-4: Trend of the value of marketed roundwood, by region, 1990-2015

Region	Total roundwood									
	EUR million					EUR/ha FAWS				
	1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
North Europe	4 610	4 691	4 890	5 215	5 584	88.2	93.6	99.4	107.9	115.6
Central-West Europe	4 543	5 712	6 400	7 318	8 755	148.8	181.7	199.7	226.5	268.4
Central-East Europe	169	149	223	289	311	96.9	81.0	118.9	150.3	163.1
South-West Europe	454	444	437	594	354	67.7	60.0	56.5	74.4	43.1
South-East Europe	818	556	706	1 112	1 217	94.1	62.7	78.9	123.4	129.5
EU-28	9 353	10 651	11 622	13 096	14 797	111.5	127.6	138.9	157.0	176.4
Europe	10 594	11 552	12 656	14 529	16 222	106.0	116.0	126.8	145.9	161.5

Note: five years averages are presented;
Data coverage as % of total regional FAWS area: NE 87%, C-WE 92%, C-EE 6%, S-WE 30%, S-EE 48%, EU-28 61%, Europe 59%.

Indicator 3.3 Non-wood goods

Quantity and market value of non-wood goods from forest and other wooded land

Key findings

- Non-wood goods from forests and other wooded land represent an essential source of food and materials such as cork, Christmas trees, chestnuts, fruits, mushrooms, wild meat and honey. In financial terms these goods represent a source of additional income from forests.
- The value of marketed non-wood goods in Europe is more than twice as high for plant products as for animal products.

Introduction

Non-wood goods (NWGs) are defined as goods of biological origin other than wood derived from forests and other wooded land (FOWL). They may be produced in natural or planted forests, agroforestry systems or trees outside forests. These products can be used as food and food additives (edible nuts, mushrooms, fruits, herbs, spices and condiments, aromatic plants, game, roots, seeds, honey), fibres (used in construction, furniture, clothing or utensils), resins, gums, and plant and animal products used for medicinal, cosmetic or cultural purposes.

In recent years, NWGs have attracted considerable global interest due to the increasing recognition of their contribution to meeting environmental objectives, including the conservation of biological diversity. NWGs are produced in a wide range of land-use types and habitats from forests to urban greenspace. Furthermore, they are derived from a wide range of production systems from wild to domesticated and intensively cultivated. This means NWGs provide a myriad of opportunities to enhance the personal well-being of citizens and entrepreneurial culture.

Even if there is a strong NWGs collecting culture in Europe, the associated knowledge is vanishing as uses related to traditional, subsistence lifestyles are not passed on to younger generations. At the same time, there is increasing interest in natural foods, artisanal crafts and back-to-nature lifestyles. Besides, Europe has the second largest area of land under organic certification, but it produces a relatively small amount of certified wild products.

The NWGs sector has many products and services that are not accounted for in the present and could significantly increase the whole value of the forestry sector regarding the overall bioeconomy outlook. The inclusion of NWGs values and volumes into strategic national planning would be crucial as follow up action for wider expansion of the forest-based sector bioeconomy.

Though information on NWGs is available, it usually is not harmonised, so it is difficult to compare. On the other hand, the collection of NWGs data is expensive, the number of products is very large and no commonly accepted classification and a priority list of NWGs are used by national statistical offices. These reasons pose difficulties to obtain an overview and comparable data for all types of NWGs across Europe.

This indicator covers the value and quantity of marketed NWGs from FOWL. For reasons of consistency, even if they could represent a substantial part of the total, NWGs harvested for self-consumption and informal use at the local level are excluded from the analysis (only some EU research projects have surveyed this component).

Status

Plant products

Quantities and/or values of marketed plant NWGs were provided by 34 countries.

Figure 3.3-1 shows the share of total marketed values accounted for by marketed plant products. Table 3.3-1 presents the quantity and value of different types of marketed plant products by region. The highest reported values of marketed plant products were for ornamental plants and food, which amounts to 49.6% and 38.7% respectively, followed by other plants products (9.1%). The reported values for these NWGs represented 97.4% of the total value of NWGs as the reported values for all other categories of NWGs are far smaller.

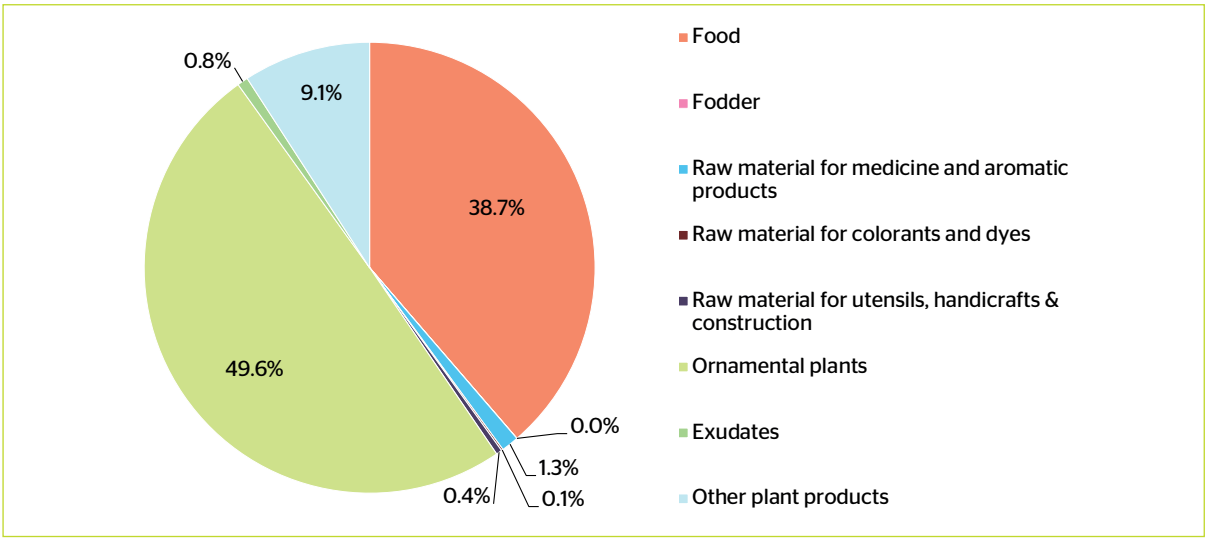

Figure 3.3-1: Shares (%) of the total reported value of plant-related marketed non-wood goods, 2015

Note: Data coverage as % of total regional forest area: Food 79%, Fodder 5%, Raw material for medicine and aromatic products 22%, Raw material for colourants and dyes 4%, Raw material for utensils, handicrafts and construction 12%, Ornamental plants 60%, Exudates 10%, Other plants products 43%.

Table 3.3-1: Quantity and value of different types of marketed plant products, by region, 2015

Region	Food	Fodder	The raw material for medicine and aromatic products	The raw material for colourants and dyes	The raw material for utensils, handicrafts & construction	Ornamental plants		Exudates	Other products
	Market value EUR 1 000					Market value	Quantity	Market value EUR 1 000	Market value EUR 1 000
	Quantity tonnes					EUR 1 000	1 000 pcs	Quantity tonnes	
						EUR 1 000	tonnes		
North Europe	332 080	-	-	-	-	188 908	7 229	-	-
	254 666	-	-	-	-	2 483	853	-	
Central-West Europe	19 041	-	5 582	-	550	1 192 127	39 470	-	145 124
	5 763	-	5 041	-	1 610	2 350	1 410	-	
Central-East Europe	239 489	-	14 677	3 579	-	2 539	15 329	-	977
	72 272	-	3 817	3 010	-	1 192	30	-	
South-West Europe	381 323	-	-	-	-	-	-	21 724	105 536
	93 978	-	-	-	-	-	-	20 211	
South-East Europe	9 309	0.1	10 853	-	-	369	48	-	4 453
	39 787	1.8	5 368	-	-	-	-	-	
EU-28	925 980	0.1	20 277	-	550	1 363 193	60 186	21 724	251 774
	394 987	1.8	10 179	-	1 610	3 682	1 633	20 211	
Europe	981 241	0.1	31 112	3 579	550	1 383 944	62 076	21 724	256 091
	466 466	1.8	14 226	3 010	1 610	6 025	2 293	20 211	

Note: Data coverage as % of total regional forest area:
Food: NE 93%, C-WE 57%, C-EE 63%, S-WE 70%, S-EE 73%, EU-28 76%, Europe 74%;
Fodder: NE 0%, C-WE 0%, C-EE 0%, S-WE 0%, S-EE 5%, EU-28 1%, Europe 1%;
The raw material for medicine and aromatic products: NE 0%, C-WE 54%, C-EE 42%, S-WE 0%, S-EE 17%, EU-28 22%, Europe 20%;
The raw material for colourants and dyes: NE 0%, C-WE 0%, C-EE 19%, S-WE 0%, S-EE 0%, EU-28 0%, Europe 4%;
Raw material for utensils, handicrafts & construction: NE 0%, C-WE 44%, C-EE 0%, S-WE 0%, S-EE 0%, EU-28 10%, Europe 7%;
Ornamental plants: NE 100%, C-WE 95%, C-EE 42%, S-WE 0%, S-EE 17%, EU-28 67%, Europe 59%;
Exudates: NE 0%, C-WE 0%, C-EE 0%, S-WE 70%, S-EE 0%, EU-28 14%, Europe 10%;
Other products: NE 0%, C-WE 85%, C-EE 26%, S-WE 70%, S-EE 75%, EU-28 43%, Europe 43%;
Only data provided on both quantity and volume of products are presented, except for Other products expressed in value.

Data on "ornamental plants" were provided by 22 countries. The total value of this category was almost EUR 1 400 million. Among the reporting countries, the highest values were generated in Germany (EUR 700 million), the United Kingdom (EUR 386 million) and Denmark (EUR 117 million). The main product in this category is Christmas trees.

Information on the quantity of food category was reported by 21 countries. In the overall NWGs reporting, food accounted for a total of 473 thousand tonnes in weight and EUR 1 084 million in value in these countries. The main producers in quantitative terms were Finland (156 thousand tonnes), Latvia (51 thousand tonnes), Portugal (50 thousand tonnes) and Spain (44 thousand tonnes). In terms of value, the main producers were Finland (EUR 214 million), Czech Republic (EUR 202 million), Portugal (EUR 197 million), Spain (EUR 184 million), Italy (EUR 88 million) and Latvia (EUR 64 million).

The total value that was reported for plant-product NWGs is about EUR 2 802 million. The highest shares in the value were reported by the Central-West Europe (EUR 1 365 million), South-West Europe (EUR 608 million) and North Europe (EUR 523 million) regions. The lowest shares are reported for the South-East (EUR 43 million) and Central-East (EUR 263 million) Europe regions (Table 3.3-3).

Animal products

Quantities and/or values for marketed animal NWGs were reported by 24 countries.

Figure 3.3-2 shows the share of total marketed values accounted for by marketed animal products. Table 3.3-2 presents the quantity and value of different types of marketed animal products by region. The highest reported values were for wild meat (73.9%) and wild honey and bee-wax (24.4%).

Wild meat comprises all hunted birds and mammals, such as partridge, pheasant, hare, deer, wild boar and chamois. The data include main game species whose habitats of which are forest-related. The game that roams on farms is excluded. 16 countries in relation to the quantity and 20 countries in relation to the value reported data on wild meat. Among the reporting countries, France (EUR 294 million), Germany (EUR 190 million) and Spain (EUR 89 million) were by far the highest producers of wild meat in terms of total value. Wild meat accounted for EUR 888 million (73.9% of NWGs related to animal products) for all responding countries (Figure 3.3-2).

Honey and bee-wax production were mentioned by 12 countries in relation to value and ten countries in relation to quantity. The total value of marketed honey and bee-wax (which includes farmlands) amounted to EUR 293 million, being the highest producers Germany (EUR 71 million), France (EUR 55 million) and Switzerland (EUR 49 million). The other categories of marketed animal products contributed less than 2% of the total value generated by NWGs related to animal products.

The highest share of the total value of marketed NWGs accounted for by animal products is reported by Central-West Europe (EUR 749 million) and North Europe (EUR 213 million), with a total value of EUR 1 201 million in the animal product market. The lowest shares are reported for the South-East (EUR 48 million) and Central-East (EUR 51 million) Europe regions (Table 3.3-3). However, data coverage in these regions is exceptionally low.

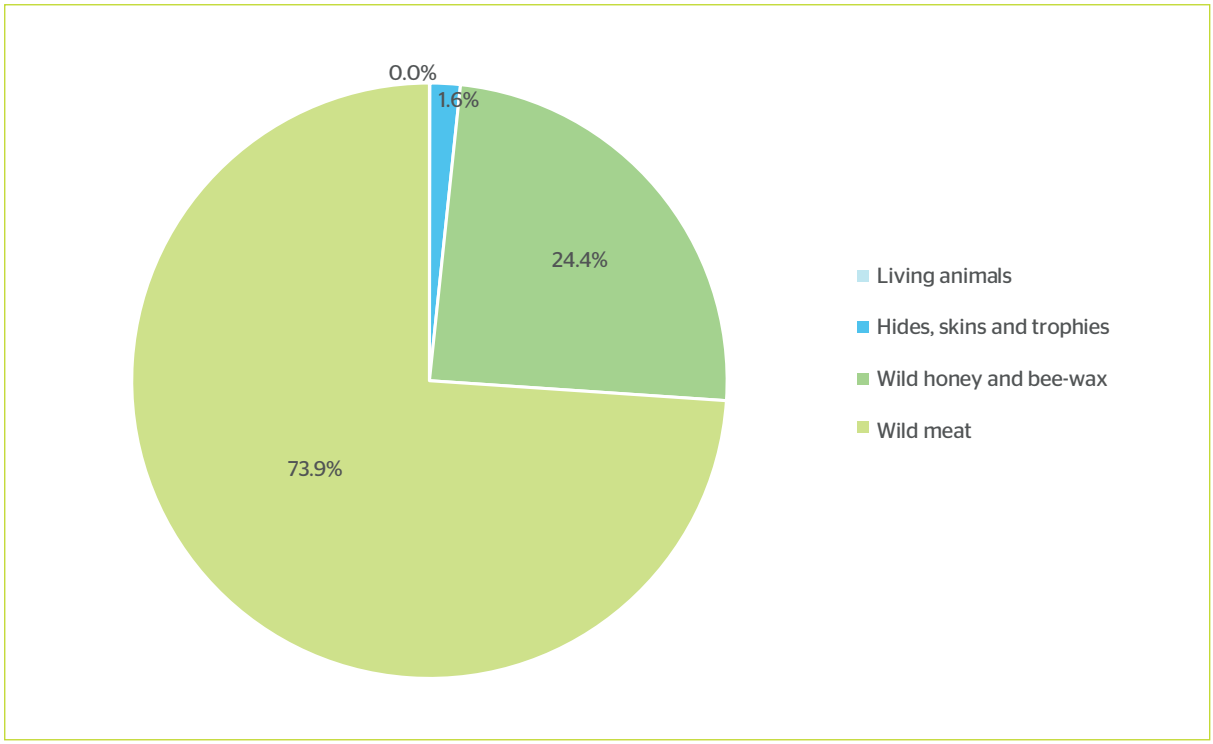

Figure 3.3-2: Shares (%) of the total reported value of animal-related marketed non-wood goods, 2015

Note: Data coverage as % of total regional forest area: Living animals 1%, Hides, skins and trophies 16%, Wild honey and bee-wax 31%, Wild meat 65%.

Table 3.3-2: Quantity and value of different types of marketed animal products, by region, 2015

Region	Living animals		Hides, skins and trophies		Wild honey and bee-wax		Wild meat	
	EUR 1 000	Quantity 1 000 pcs	EUR 1 000	Quantity 1 000 pcs	EUR 1 000	Quantity tonnes	EUR 1 000	Quantity tonnes
North Europe	-	-	3 187	67	554	141	208 929	22 708
Central-West Europe	-	-	7 248	276	202 385	19 858	348 814	48 006
Central-East Europe	287	18	-	-	10	5	26 431	13 922
South-West Europe	-	-	-	-	51 020	47 866	89 932	47 930
South-East Europe	-	-	43	1	3 324	554	148	42
EU-28	287	18	10 359	340	205 241	65 654	599 459	124 267
Europe	287	18	10 478	344	257 293	68 423	674 253	132 609

Notes: Data coverage as % of total regional forest area:
Living animals: NE 0%, C-WE 0%, C-EE 4%, S-WE 0%, S-EE 0%, EU-28 1%, Europe 1%;
Hides, skins and trophies: NE-25%, C-WE 10%, C-EE 0%, S-WE 0%, S-EE 2%, EU-28 6%, Europe 10%;
Wild honey and bee-wax: NE 5%, C-WE 87%, C-EE 16%, S-WE 70%, S-EE 2%, EU-28 40%, Europe 30%;
Wild meat: NE 99%, C-WE 68%, C-EE 26%, S-WE 60%, S-EE 2%, EU-28 70%, Europe 57%;
Raw material for medicine: NE 0%, C-WE 0%, C-EE 0%, S-WE 0%, S-EE 0%, EU-28 0%, Europe 0%;
Raw material for colorants: NE 0%, C-WE 0%, C-EE 0%, S-WE 0%, S-EE 0%, EU-28 0%, Europe 0%;
Other edible and non-edible animal products: NE 0%, C-WE 0%, C-EE 0%, S-WE 0%, S-EE 0%, EU-28 0%, Europe 0%;
Only data provided on both quantity and volume of products are presented.

Table 3.3-3: Value of marketed non-wood products, by region, 2015

Region	Plant	Animal
	EUR 1 000	
North Europe	523 471	212 670
Central-West Europe	1 365 137	748 891
Central-East Europe	262 465	50 646
South-West Europe	607 919	140 952
South-East Europe	43 383	48 003
EU-28	2 686 891	1 031 042
Europe	2 802 375	1 201 160

Notes: Data coverage as % of total regional forest area:
Plant: NE 100%, C-WE 98%, C-EE 95%, S-WE 100%, S-EE 82%, EU-28 96%, Europe 96%;
Animal: NE 99%, C-WE 98%, C-EE 48%, S-WE 70%, S-EE 14%, EU-28 86%, Europe 70%.

Trends

Based on the collected data, there is a clear upward trend in NWGs production and value from data provided for previous SoEF report. The reported value of marketed NWGs in Europe (Table 3.3-3) is more than twice higher for plant products (EUR 2 802 million) than for animal products (EUR 1 201 million) when e.g. payments for hunting licenses are reported in Indicator 3.4 – Services.

There has been an improvement on the reporting and response rates compared to previous reports, but still, the presented figures cannot be considered as representative for the entire Europe or for the particular categories of products and users and must be interpreted as minimum values for the financial benefits generated from NWGs.

The wide variety of NWGs, the diversity in the final uses with the relevant role of self-consumption, and the non-homogeneous market organisation have prevented the sector from being clearly defined and also prevented the development of a European statistical information service related to production, trade and consumption of NWGs.

Apart from some mass products like cork, Christmas trees, chestnuts and a few other NWGs, for many non-wood forest products there is a lack of data on stocks, harvesting, prices, operators, and even detailed trade flows. By comparing statistics published in different years by FAO, FOREST EUROPE and the UN Economic Commission for Europe there is a clear problem regarding the availability of data. This is not related to the economic, social and environmental importance of NWGs, but rather to a problem of data collection and coordination by national statistical agencies.

Indicator 3.4 Services

Value of marketed services on forest and other wooded land

Key findings

- Social and biospheric services dominate in marketed services of the forest ecosystems.
- The total reported value for marketed services was around EUR 495 million, only 14 countries reported the value of market realisation of ecosystems services. Large variations persist in the monitoring and reporting value of marketed forest services.

Introduction

Europe's forests provide numerous ecosystem services for benefit of the public. Besides provisioning of wood and other products, in fact, soil protection, water and air purification and climate regulation are crucial forest ecosystem services, to some extent representing the basis for marketed products and services. They could generate financial revenues but still not reflected in market transactions. Forests have clear market effects in surface-water purification, tourism, landscape amelioration (as water and land prices can show), but these effects are usually not associated with any payment for the providers.

In this section, we address the marketed ecosystem services that are forest-dependent or mainly forest-related and were marketed by forest owners, public agencies or others entities, to the extent to which they have been reported on by European countries, related to the year of 2015.

There are five categories linked to this indicator in the FOREST EUROPE framework. Marketed **ecological services** include those related to Indicator 5.1 (protective forests in terms of environmental functions related to soil and water as well as infrastructures and other assets).

Marketed **biospheric services** include services related to Indicator 4.6 (*in-situ* or *ex-situ* gene conservation of genetic resources) and Indicator 4.9 (protected forests), e.g. nature protection on a voluntary contractual basis with compensation or other payments from private or public bodies, that may include some payments in NATURA 2000 sites. Nature protection contract schemes are increasingly discussed and applied as a measure for the promotion of ecological/biospheric services of forests.

Marketed **social services** include hunting and fishing licenses, the renting of huts and houses, forest-based recreation, sports, and outdoor activities, and educational activities that are not free of charge to the users. The value of recreational services that are not exchanged via market transactions is not reported, however, it represents a very significant amount. A recent remarkable development has been seen in initiatives related to forest therapy and forest bathing (known also as Shinrin-Yoku, that could also be seen as social services, like recreation is).

Several **cultural services** (sometimes called amenity services) include those related to spiritual, cultural and historical functions, e.g. sacred spaces, religious or other forms of spiritual inspiration, sites of worship, landscape features (mountains and waterfalls), 'memories' in the landscape from past cultural ties, aesthetic enjoyment and inspiration, forests used for nature art museum, concerts, theatre and historical artefacts; burial forest is also recognised in many European countries.

Other marketed services include payments to woodland owners for licenses that regulate land use for gravel extraction, telecommunication masts, wind farms and electricity distribution, among others. Depending on countries national laws, these marketed services of the forest may add directly to the income of owners and thus contribute to the economic viability of sustainable forest management.

Status and trends

Information regarding the values of marketed services in the five categories is still scarce in country reports. Data for 2015 were reported only by 14 countries, which represents 53% of the European forest area. Although the marketed forest-related services are well identified, the volume of income derived from these services is not known or registered, thus covering only part of the forest sector (e.g. private versus public ownership). In most cases, countries reported values of marketed services for only some of the categories, mostly for social services, or reported the value without describing the amount of the service and the respective units. Figure 3.4-1 presents the proportion of marketed forest services provided in the reporting countries. The values of social and biospheric services dominate the reported data, representing about 86% of the marketed services in all categories.

The higher values were reported on social services with around EUR 289 million, Austria, Norway and France being the countries with the highest values

(about 68.9% of the total). The large contribution (that comes from various land uses embedded with forests) for the total value was done by hunting licenses and other hunting-related incomes like rights of shooting and buying ancillary products like hides and meat. Even if hunting-related services constitute one of the most important traditional income-generating services for private and public landowners, data are missing from several countries. The rates and demand vary considerably across Europe and may depend, among other factors, on the location and attractiveness of the hunting grounds and on local food consumption traditions.

After social services, the biospheric services represent the second second-highest reported value accounting around EUR 139 million. These services are mainly connected to the provision of payments for nature protection and forest habitat protection through conservation agreements. Sweden, Austria and Slovakia are the countries that contribute more to the final value on these services with around 98.4% of the reported total value for Europe (moreover, the provision of compensation - the public incentive for Natura 2000 - are available for all the EU countries on the Rural Network web site).

Amenity services like preservation of historical and biological cultural heritage were only reported by Sweden with a value of EUR 275 thousand.

The total reported value for all five marketed services, considering the relatively few responding countries, was around EUR 495 million. Many countries did not report marketed services related to forest ecosystems, indicating gaps in national monitoring and reporting systems for these services.

Due to the incompleteness of the data, all the figures presented for this indicator are very conservative and likely to underestimate the true gross values considerably – perhaps by an order of magnitude. The total sum of EUR 495 million per year reported by countries suggests that the average income from all of these services is around EUR 4 per hectare and year across Europe. By focusing on the countries that reported information on different marketed services, Table 3.4-1 provides the average marketed value of the recorded services per hectare and year by regions.

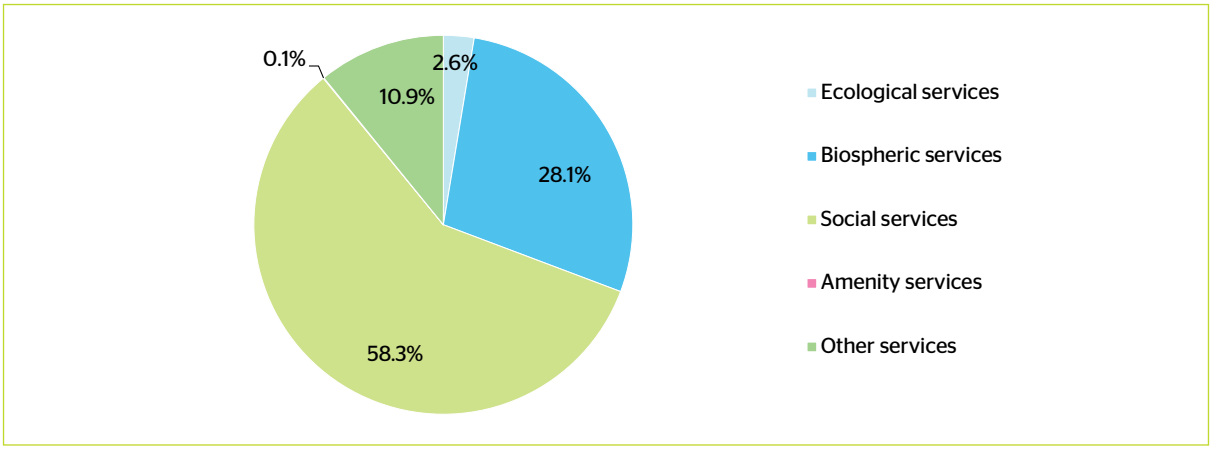

Figure 3.4-1: Proportion of values of marketed services, 2015

Notes: Data coverage as % of total regional forest area: Ecological services 12%, Biospheric services 27%, Social services 52%, Amenity Services 12%, Other services 20%.

Table 3.4-1: Value of reported marketed forest services, by region, 2015

Region	Total reported value	
	EUR 1 000	EUR/ha per year
North Europe	206 598	3
Central-West Europe	232 239	11
Central-East Europe	14 988	8
South-West Europe	10 246	3
South-East Europe	30 579	1
EU-28	403 654	5
Europe	494 650	4

Note: Data coverage as % of total regional forest area: NE 96%, C-WE 56%, C-EE 4%, S-WE 11%, S-EE 57%, EU-28 52%, Europe 52%.

Indicator C.3: Policies, institutions and instruments to maintain and encourage the productive functions of forests

Key findings

Nearly all countries have specific **policy objectives** for the productive functions of forests. About one-quarter of the reporting countries have **quantitative targets** for the maintenance and encouragement of the productive forest functions mainly focusing on additional timber supply through better utilisation of the increment and on accumulated timber volumes. **Institutional measures** taken to achieve the objectives focus on marketing and promotion of sustainable forest resources mobilisation. Efforts in the valuation of forest ecosystem services were also mentioned. Legal, financial and communication **policy tools** include amendments to forest law and new regulations, Rural Development Programmes and public financial support for forest owners for harvesting, management plans and certification as well as the promotion of preferences for forest products. **Achievements** over the past five years comprise an increased motivation of forest owners to make more effective use of their forests and seeking to meet the timber supply for the bioeconomy as well as increased recognition of non-wood forest products and services. Wood-based innovations contributed to increased use of timber. Forest areas under management plans and certified forest areas increased. Three-quarters of forests are under a forest management plan, which is often, but by no means always, obligatory. Over half the forest area is certified by a third-party certification scheme, FSC, PEFC or both. The major **challenges** and **obstacles** to achieve the policy objectives are occasionally seen in low economic efficiency and performance of the forestry sector, a lack of entrepreneurial, innovative thinking, increasing competition for forest resources and their services within the bioeconomy sectors and untapped potential for the valuation of ecosystem services.

Nearly all countries have specific policy objectives for the productive functions of forests.

The national policy objectives related to the maintenance and encouragement of the productive functions of forests (as reported by 26 countries) focus on the following topics ranked according to the occurrence in national reports:

- ensuring and increasing the sustainable timber supply,
- maintaining and enhancing non-wood forest products supply,
- enhancing the valuation and marketing of timber, non-wood products and ecosystem services and being a major guarantor of rural development,
- provision of ecosystem goods and services and developing innovative financial support mechanisms for the valuation of forest ecosystem services to increase the economic viability of forest management,
- enhancing the long-term competitiveness of the forest sector on an international scale,
- diversifying the products and services and finding markets for new wood and non-timber products as well as services particularly with regard to innovations for the bioeconomy,
- increasing the forest area under forest management plans,
- encouraging a certification process and support the use of wood from certified sources,
- supporting the development of the biomass-based industry while ensuring a continued supply of raw material.

About one-quarter of the reporting countries have quantitative targets for the maintenance and encouragement of the productive forest functions, mainly focusing on additional timber supply through better utilisation of the increment and on accumulated timber volumes.

Although most countries have policy objectives related to Criterion 3, only seven countries reported on a variety of related quantitative targets (see Table C.3-1).

Table C.3-1: Country specific targets on the productive functions of forests

Country	Target	Specification
Estonia	Increase of the annual increment	From 12.1 mil m³ in 2015 up to 12.6 mil m³ in 2020
Finland		In commercial forests from 100 mil m³ in 2013 to 110 mil m³ in 2025 and 120-130 mil m³ in 2050
Finland		In all forests from 105 mil m³ in 2013 to 115 mil m³ in 2025
Estonia	Increase volume of fellings	From 5.58 mil m³ in 2015 up to 10.1 mil m³ in 2020
France		12 mil m³ in 2026
Slovenia		6.8 mil m³ per year
Austria		18.5 mil m³ per year
Lithuania		+15% for 2019-2023
Austria	Increase of timber utilisation	85% of the increment
Lithuania	The utilisation of cutting residues for biofuel production	0.25 mil m³ in 2018 up to 0.5 mil m³ in 2020
Slovenia	Increase the market value of game and hunting	2 mil EUR annually
Austria	Increase of marketed non-timber products and services	20% by 2020, (the reference year 2005)
Estonia	Increase of forest area under management plan or equivalent	From 70% in 2015 up to 90% in 2020
Austria		General increase
Austria	Increase of certified forest area	General increase
Slovakia	Increase the area of certified forests and number of chain of custody certificates	General increase

Institutional measures focus on marketing and promotion of forest resources mobilisation. Valorisation of forest ecosystem services was also highlighted.

To maintain and encourage the productive function of forests, measures were taken in 19 reporting countries. These comprise additional institutional support for enhancement of valuation, marketing and promotion of wood and non-wood forest products in two Central European countries. Five European countries coordinated with related sectors and made strategic alignments with future growth or economy strategies and action programmes for mobilisation of forest resources. The exploitation of sustainable wood utilisation potential was reported by four countries from Central and South-East Europe. Promoting the social acceptance for the economic use of the forests and encouraging the use of wood was undertaken by five countries. One Central-West European country developed and established instruments to increase the resilience of the forest and wood-based sector in case of ecological and economic crises. The development of a system for the valorisation of forest ecosystem services (e.g. for recreation, drinking water, CO_2 sink services) was reported by three countries.

Legal, financial and communication policy tools were applied by 22 countries to reach the objectives. They include amendments to forest law and new regulations, Rural Development Programmes and public financial support for forest owners for harvesting, management plans and certification as well as the promotion of increased consumption of forest products.

Legal: Forest and related law (e.g. tax law) are the main legal instrument for regulating the utilisation of timber, non-wood forest products and ecosystem services. The majority of the countries reported on updates and amendments of respective laws to better facilitate the productive functions. New regulations on the collection and marketing of non-wood forest products were reported by one South-West European country. The elaboration and adoption of national C&I for SFM were reported by a Central-East European country. The implementation of the EU Timber Regulation was also mentioned.

Financial: Public financial support for forest management planning and for investments that will enhance the forestry potential or relate to the mobilising wood use, transport, processing and adding value to wood products was reported by nine countries. To facilitate the mobilisation of timber as a renewable resource, financial support for forest owners through Rural Development Programme (RDP) Funds (e.g. for equipment, forest roads, saplings) was reported by five European countries. Financial support was provided by two countries for certification activities.

Communication: Nine countries reported on communication tools (flyers, publications, information campaigns) put in place mainly for the promotion of wood utilisation by private forest owners and to stimulate wood and non-wood products consumption. NFI based forest reports to inform domestic forest policy about sustainable forest management, to support forest research and fulfil national and international reporting commitments were mentioned by two countries.

Achievements over the past five years comprise an increased motivation of forest owners to make more effective use of their forests and seeking to meet the timber supply demands of the bioeconomy as well as increased recognition of non-wood forest products and services. Wood-based innovations contributed to increased use of timber. Forest areas under management plans and certified forest areas increased.

20 countries reported on achievements in the area of Criterion 3. This comprises: Six countries from all over Europe reported that the share of fellings as a percent of net annual increment has been increased considerably but remains below the sustainable harvesting maximum in reflecting an increased motivation of forest owners to make better use of their forests and seeking to meet the timber supply demands of the bioeconomy.

Five countries reported that wood-based innovations have contributed to increasing the use of wood, particularly in construction. In four countries increased promotion and marketing activities were conducted. Six countries reported that particularly through the RDP measure "Marketing of Wood and Non-Wood Forest Products" the potential of non-wood forest products and services in rural areas was increasingly recognised and that volumes collected and related revenues for forest owners increased, reflected in recently available forest inventory data. New possibilities to financially sustain the equipment and infrastructure for forest management including timber harvesting and transport were reported by four countries. An increase in forest area under management plans was reported by three countries. Two countries reported on achieving their internal goals related to forest certification.

The major challenges and obstacles to achieve the policy objectives are occasionally seen in low economic efficiency and performance of the forestry sector, a lack of entrepreneurial, innovative thinking, increasing competition for forest resources within the bioeconomy sectors and untapped potential for the valuation of ecosystem services.

15 countries reported on major challenges in the area of Criterion 3 and major obstacles in achieving the policy objectives. The improvement of the economic efficiency and performance of the forestry sector is seen challenging by four, mainly Central-West European countries. The price pressure arising from increasing costs for the forest management, increasingly scarce public funding and the problem of volatile wood prices render significant organisational adaptations necessary in five mainly Central-West European countries. The short-term nature of current economic and political considerations and actions and the lack of entrepreneurial, innovative thinking and action have made it more difficult to make the necessary changes in five Central-West and Central-East European countries. Efficient forest management was mentioned by seven countries a precondition for the provision of numerous forest services desired by the economy (e.g. wood production) and society (e.g. protective forest service, biodiversity, recreation) and for success on wood markets. However, production potential is usually not being fully exploited due to diverse reasons and the volume of wood being harvested is lower than increment, particularly in private and mountain forests. Hence, three countries have reported high standing volumes. The valuation of ecosystem services is not utilised in any country in

the region. To create favourable conditions and opportunities for establishing markets for non-wood forest products is seen challenging in three countries. Ensuring that biomass and mainstream forest industries can co-exist around timber supply is also seen challenging in three countries. A best possible compromise for conflicts between rising demand for renewable raw materials and the requirements of nature conservation was mentioned challenging by four countries.

Forest management plans[6]

Nearly 150 million ha of forest are under management plans and their equivalents as reported by 21 countries, accounting between them for 85% of Europe's forest area. Between 7.5% and 100% of the forest area are under management plans, nearly 100% in South-East Europe. In general, the percentage is rather high and 76% of the forest area in reporting countries is under a management plans.

In 18 countries, these plans are obligatory, in thirteen not obligatory or only partially so. In 26 countries, the plans are reported to an official body. The differences between the country groups, which reflect political choices and administrative traditions, are briefly summarised below (percentages apply to reporting countries only):

- in North Europe, 88% of forests are under management plans, but in most countries of this region (six out of seven reporting), these plans are not obligatory,
- in Central-West Europe, 53% of forests are under management plans, which are obligatory in only two countries,
- in Central-East Europe, 86% of forests are under management plans, which are, with specific exceptions, obligatory in all countries,
- in South-West Europe, data were only available for the Iberian Peninsula, where 36% of forest area is under a management plan, although such plans are obligatory in both countries. However, small holdings and many private forests are exempt from this obligation,
- in South-East Europe, nearly all the forest in the reporting countries is under a management plan.

The measures of forest management plans are compulsory in 12 countries and partially compulsory in 15 countries. They are not compulsory in 3 North European countries. Issues as the volume of harvest, regeneration systems, reforestation species composition, tending and other silvicultural operations and deadwood volume do not have the same focus of regulation in the forest management plans of the 29 or 30 responding countries (see Table C.3-2). The main focus is on the measures of harvest and regeneration.

Table C.3-2: Issues regulated in forest management plans

Issues	Regulated in the forest management plan		
	Yes	Partially	No
Regeneration systems	23	5	2
Volume of harvest	21	8	1
Tending and other silvicultural operations	20	8	1
Reforestation species composition	17	10	2
Deadwood volume	7	10	13

[6] For this section, data reported though the qualitative indicators enquiry were reviewed and supplemented with information supplied during the preparation of the country profiles in chapter 4. National information is summarised in Annex Table 57.

Certification [7]

Certification is an important tool to communicate and demonstrate to stakeholders and final wood-product consumers the sustainability of forest management and its products, and for this reason is included as one subcomponent in SDG indicator 15.2.1. For this report, data on certified area were available for 33 countries, accounting for nearly 90% of the forest area in Europe.

Nearly 105 mil ha, 52% of the forest area in reporting countries, is certified. About 80 mil ha is certified by PEFC and 52 mil ha by FSC. Over 28 mil ha is certified by both schemes. Four countries reported that no certification scheme was active in their country.

The differences between and within the subregions reflect many factors, but, above all, the the increasing wood-product-consumers' awareness of the importance of sustainable forest management. The situation in the country groups is briefly summarised below (percentages apply to reporting countries only):

- in North Europe, 69% of forests are certified, with about a fifth of the certified area under dual certification,
- in Central-West Europe, 58% of forests are certified, with 12% of this area certified to both schemes,
- in Central-East Europe, 72% of forests are certified. In two countries, Belarus and Poland, nearly all certified forests are under dual certification,
- in South-West Europe, 12% of forests are certified,
- in South-East Europe, 20% of forests are certified, although one country, Croatia, has 93%, the highest share among countries.

[7] For this section, data reported though the qualitative indicators enquiry have been supplemented with information supplied during the preparation of the country profiles in chapter 4. National information is summarised in Annex Table 58.

Criterion 4

Criterion 4: Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems

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Reviewer: **Tomasz Zawila-Niedzwiecki**

Data sources: **National reports on the pan-European indicators for SFM (4.1, 4.2, 4.3, 4.4, 4.5, 4.8, 4.9, C.4), EUFORGEN, EUFGIS 2019 (4.6), EEA, EC JRC (4.7), Pan-European Common Bird Monitoring Scheme 2019 (4.10)**

The maintenance, conservation, and appropriate enhancement of biodiversity remains an important goal for forest management in Europe. Biodiversity is generally considered valuable per se as well as being important for the adaptability and stability of forests. Forest management can support biodiversity through a range of practices – such as supporting natural regeneration and expansion, leaving part of the wood for decomposition, designating valuable habitats as protected areas or genetic conservation units, actively systematically protecting genetic resources of tree species, and suppressing invasive species.

Key messages

- In 2020, nearly 94% of European forests are classified as semi-natural, while plantations cover around 3.9%. Forests undisturbed by man amount to 2.2%.
- During the period 2005-2015, European forests became more diverse in their tree species composition. At the stand level, they consist of two or more tree species on 67% of the forest area
- Currently, about 24% of European forests are in protected areas designated for biodiversity or landscape protection.
- In 2015, the average volume of deadwood was 11.5 m^3/ha, equal to about 7% of the average volume of the growing stock of European forests.
- Genetic resources conservation resulted in the rise of the total number of conserved native species populations between 1990 and 2020, from 466 to 4 493 units (in 34 reporting countries).
- Populations of common forest bird species, as a robust indicator reflecting ecosystem conditions, remained relatively stable for almost 40 years.
- Achievements include increasing protected forest and Natura 2000 areas, implementation of close-to-nature and integrative forest management practices, and improving biodiversity monitoring. The major challenges in Criterion 4 are to harmonize nature conservation and forest policy objectives, as well as to improve monitoring of relevant biodiversity aspects.

Indicator 4.1 Diversity of tree species

Area of forest and other wooded land, classified by number of tree species occurring

Key findings

- Over the period of 2005 to 2015, European forests have become more diverse in tree species composition, at a steady pace. They are composed of two or more tree species on almost 67% of the forest area. About 33% of the forest stands contains just single tree species, mainly coniferous.

Introduction

Species diversity and the dynamics of forest ecosystems differ considerably throughout Europe. This is reflected by the 14 pan-European forest categories and 76 corresponding forest types[8]. Tree species composition in a forest is affected both by natural factors (climate, edaphic and hydrological site conditions, stage of stand development) and by present and past human activity (forestry, agro-forestry, grazing). Forests composed of several tree species are often richer in biodiversity, more resilient and functionally diverse than those of only one tree species. Changes in forest management practices aimed at the establishment of a more diverse forest stands, natural regeneration but also the spontaneous expansion of forest on abandoned agricultural lands are key drivers for the trend of slowly moving away from single-species forests. However, the knowledge gap exists in how to best shape future forests to be resilient, productive and functional in face of the climate change challenge. Recent research alerts that overall tree species richness is increasingly at risk in Europe, prominently through invasive species. Still, the climax stages of some natural forest ecosystems are dominated by only one or two species. Examples are natural boreal pine forests on dry sites, natural sub-Alpine spruce stands and beech forests as well as the stands of other tree species in earlier vegetation stages.

Status

29 countries reported data for the year 2015. These countries represent 83% of the total forest area in Europe. The data show that around one-third of European forests are dominated by a single tree species (Figure 4.1-1), mainly conifers - mostly pine or spruce (both artificial and natural), but also eucalypt and poplar plantations. Around two-thirds of the forests in Europe are dominated by two or more tree species. Half of the forest stands contain two to three tree species. 13.1% of the forest has four to five tree species and 4.6% of the forest is composed of six or more tree species.

The single-species forest is most common in South-East Europe, with a share of 62.3% of its forest area (Figure 4.1-2). South-West European forests are generally most diverse in tree species composition and they also have the largest proportion of stands composed of six tree species or more, accounting for 19.9% of its forest area. Forest area by tree species abundance category is shown in Figure 4.1-3.

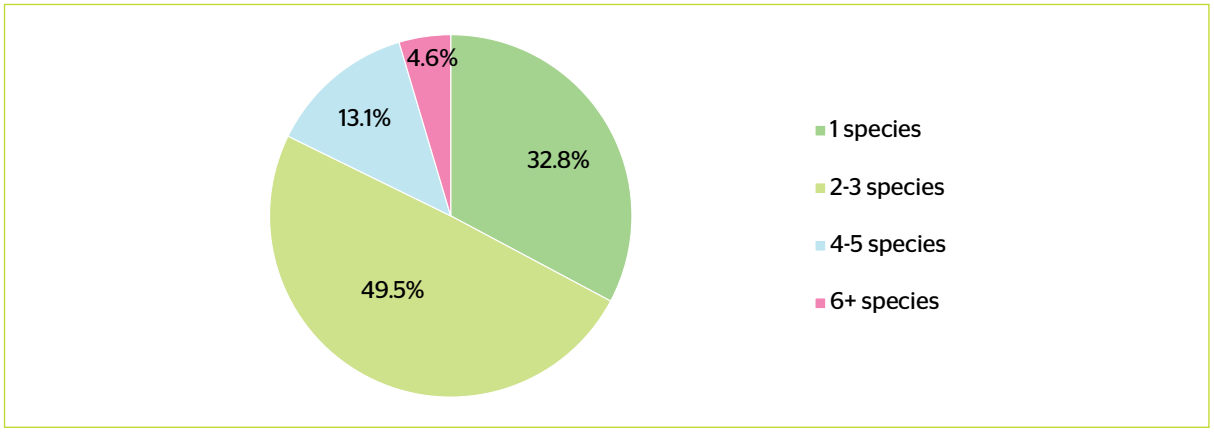


Figure 4.1-1: Forest area in Europe classified by a number of tree species occuring, 2015

Note: Data coverage as % of total regional forest area: 83%.

[8] EEA, 2006. European forest types. Categories and types for sustainable forest management reporting and policy. EEA Technical Report No 9/2006. ISSN 1725 2237. European Environment Agency, Copenhagen.

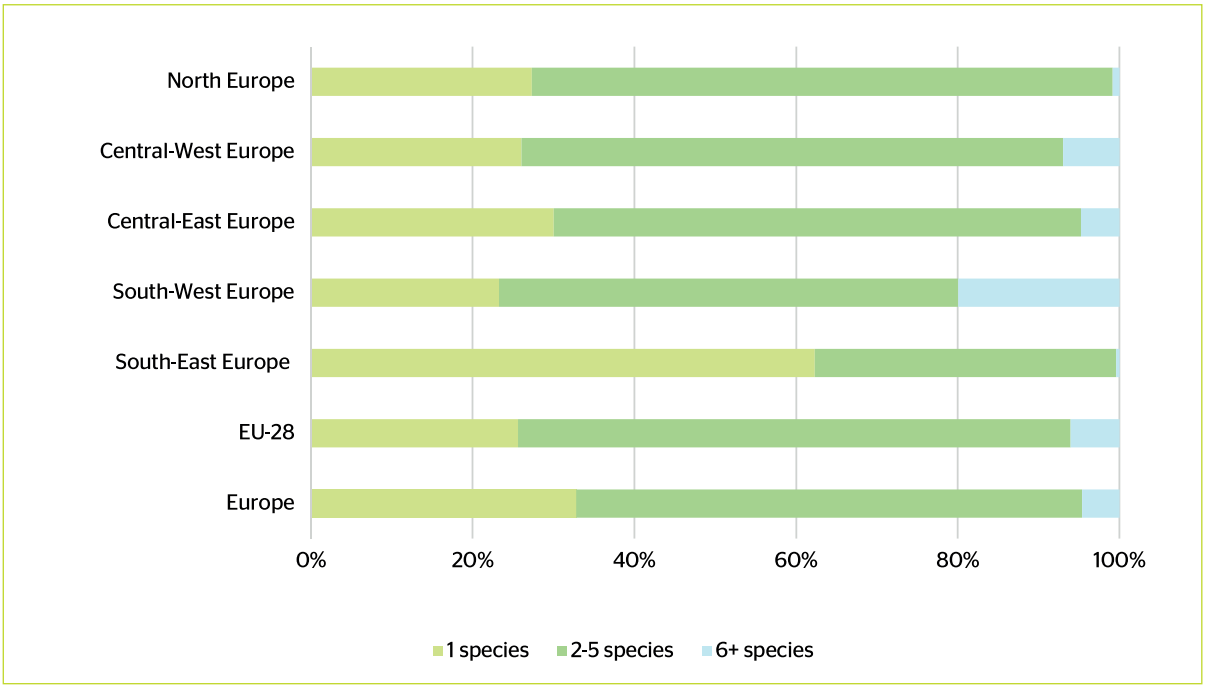


Figure 4.1-2: Forest area classified by a number of tree species occurring, by region, 2015

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 62%, C-EE 94%, S-WE 70%, S-EE 73%, EU-28 83%, Europe 83%.

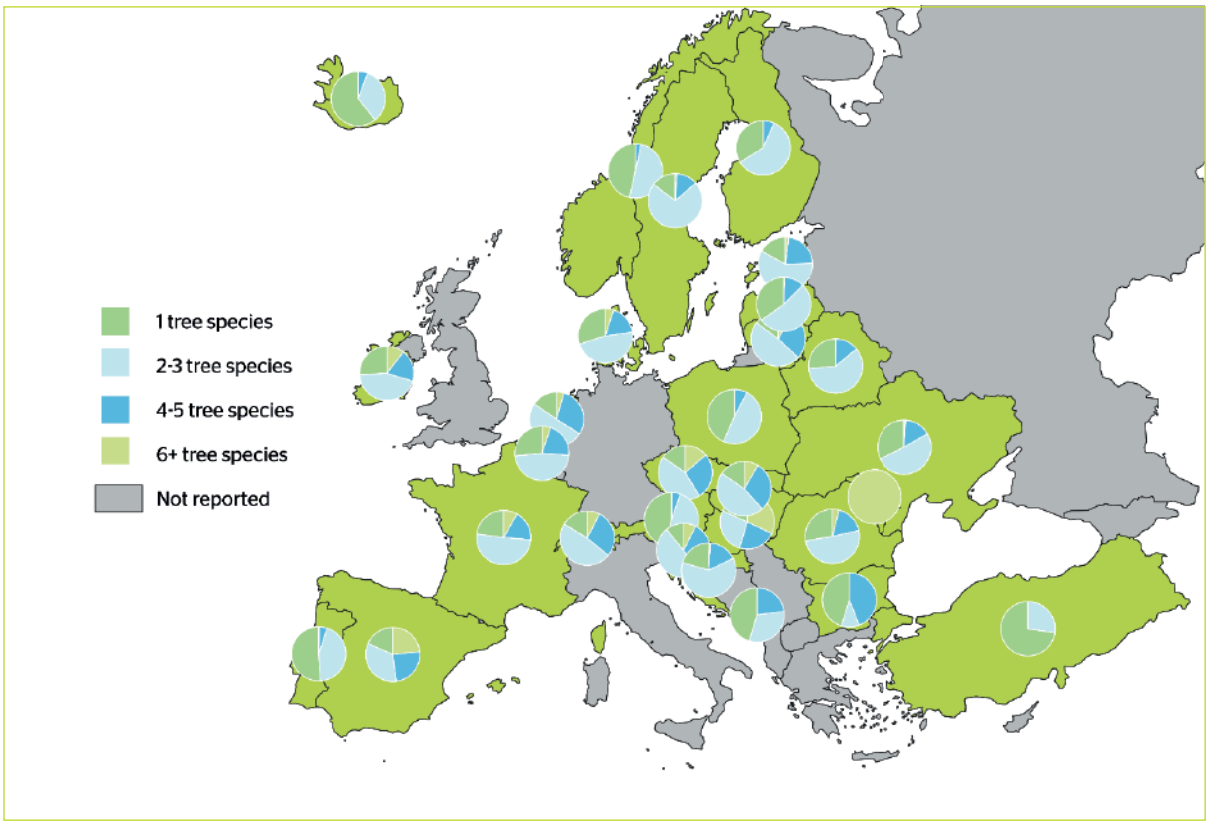


Figure 4.1-3: Forest area by a number of tree species occuring, by country, 2015

Trends

Lack of data for the years 1990 and 2000 allows only to base the trend analyses on data from the years 2005, 2010 and 2015. Thus the regional trends are based on data from 26 rather than only 14 countries if data were to be compared from the year 1990 or 20 countries if data from the year 2000 were included.

The area of forests dominated by a single tree species has been decreasing at a slow, yet steady, pace (Figure 4.1-4. Between 2005 and 2015, the relative share of European forest formed by a single tree species decreased in favour of more tree-species diverse forest at a rate of around 0.1% annually. North Europe's forests, in particular, gained a more diverse tree species composition during that period. All regions have seen an increase in the area of more species-diverse forest structures, particularly in the category of 2-5 species. In South-East Europe, the area of forests richer in species increased less than the area of single-species forests (Figure 4.1-4), being reflected in the change of share of these categories (Figure 4.1-5).

The category of 6+ species represents a rather minor share of the total, without obvious change over time.

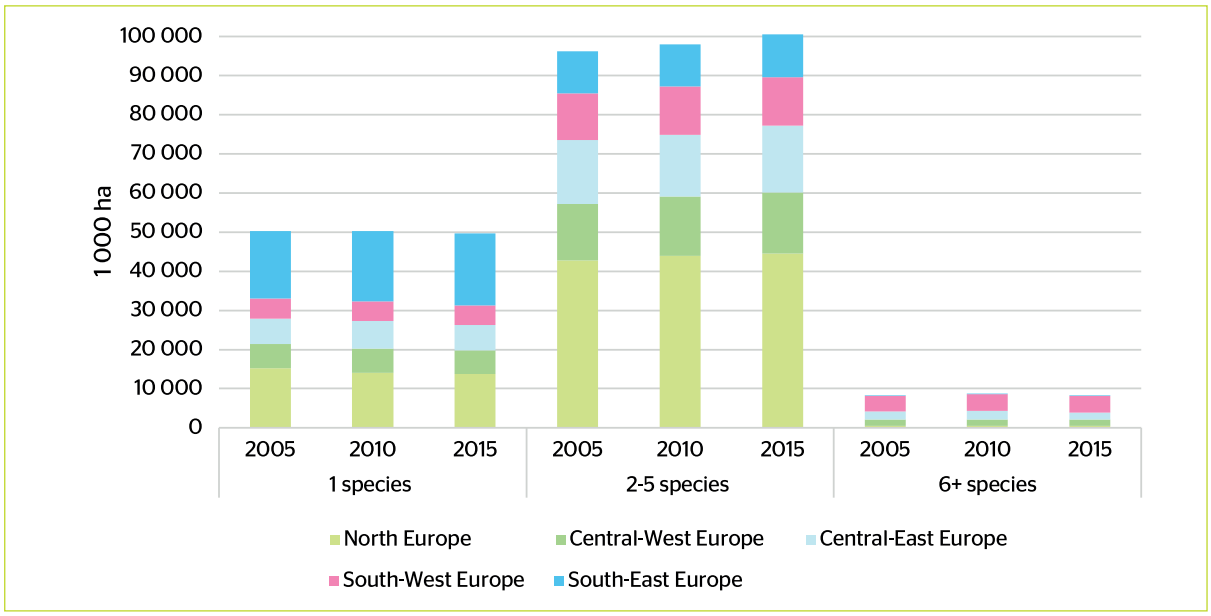


Figure 4.1-4: Trends in area of forest classified by number of tree species occurring, by region, 2005-2015

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 62%, C-EE 57%, S-WE 70%, S-EE 73%, EU-28 73%, Europe 71%.

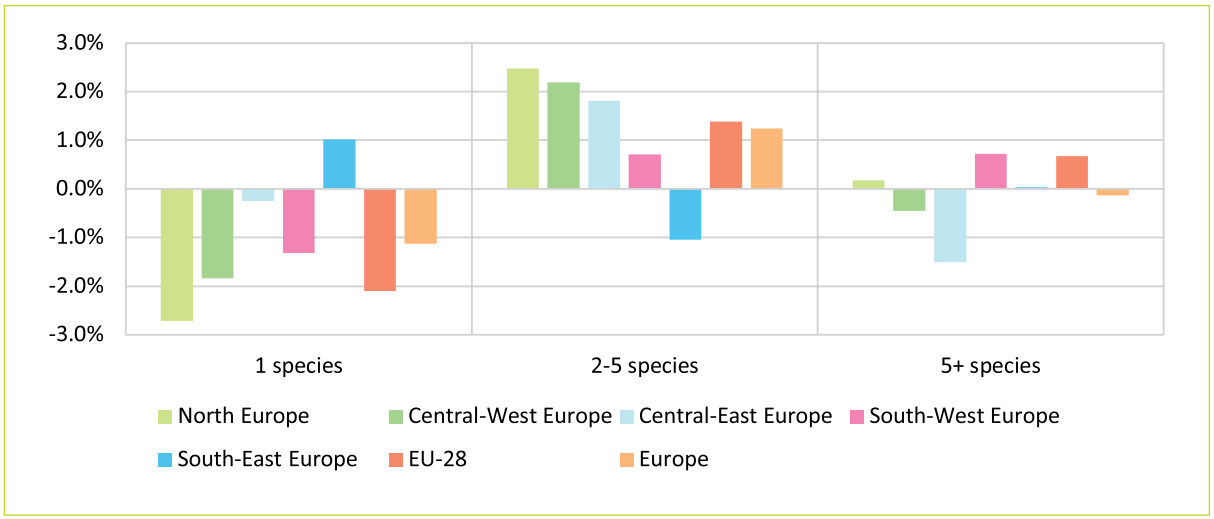


Figure 4.1-5: Changes in the share of forest area classified by the number of tree species occurring, by region, 2005-2015

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 62%, C-EE 57%, S-WE 70%, S-EE 73%, EU-28 73%, Europe 71%.

Indicator 4.2 Regeneration

Total forest area by stand origin and area of annual forest regeneration and expansion

Key findings

- About 66% of the total forest area in Europe originates in natural regeneration or natural expansion and 5% is coppiced. Afforestation and regeneration by planting and/or seeding gave an origin to 29%.
- The proportion of natural regeneration and expansion is slightly increasing in all European regions, with the exception of North Europe, where regeneration by planting is most common.

Introduction

Forest regeneration is a prerequisite for maintaining forest area in the long term. Natural regeneration means re-establishment of a forest stand through natural seeding or coppice sprouting. Artificial regeneration takes place by planting or artificial seedin. The type of regeneration in forest management depends on many variables, such as applied management systems, tree species preferences or the scale of regeneration. Forest regeneration should be clearly distinguished from forest expansion, which is the increase of forest area at the expense of land that was previously used for other purposes. Natural forest expansion refers to the forest estbalishment through natural succession while afforestation is actively pursued by either planting or deliberate seeding.

Natural forest regeneration can contribute to conserving the diversity of genotypes and maintaining natural tree species composition, structure and ecosystem dynamics. However, sometimes it may not be the ideal way to achieve ecological or economic goals. For instance, converting forest monocultures or stands with introduced tree species to more site-adapted forests may require planting to introduce missing tree species. Using new provenances of native tree species for regeneration can also become a viable option for enhancing the resilience of forests to the impacts of climate change or ensuring sufficient wood production. The same applies to the introduction of new tree species. The growing risk of large-scale calamities such as storms, bark-beetle infestations and wildfires, as experienced e.g. in 2018 and 2019, also increases a need for artificial regeneration in order to swiftly restore the disturbed areas.

Status

35 European countries representing more than 95% of Europe's forested area reported the information on stand origin. The results are presented for even-aged and uneven-aged forests together. Table 4.2-1 presents regeneration types by regions. 143 million ha, or 66.2%, of forests in Europe originate from natural regeneration or natural expansion. Forests established by afforestation and planting/seeding represent about 28.9% (62 million hectares), while coppices about 4.8% (10 million hectares). The share of stand-origin types varies between regions. Through natural regeneration and natural expansion was established above 60% of total forested area in all regions but Central-East Europe. Central-East Europe reports 48.3%, while forests established by afforestation or regeneration by planting and/or

Table 4.2-1: Forest area by stand origin types, by region, 2015

Region	Natural regeneration and natural expansion		Afforestation and regeneration by planting and/or seeding		Coppice	
	1 000 ha	%	1 000 ha	%	1 000 ha	%
North Europe	48 765	68.5	22 434	31.5	3	0.0
Central-West Europe	23 398	60.9	13 599	35.4	1 433	3.7
Central-East Europe	21 770	48.3	19 780	43.8	3 566	7.9
South-West Europe	25 645	82.3	4 820	15.5	695	2.2
South-East Europe	23 102	78.4	1 636	5.6	4 722	16.0
EU-28	98 180	62.2	53 890	34.1	5 902	3.7
Europe	142 679	66.2	62 270	28.9	10 419	4.8

Note: Data coverage as % of total regional forest area:
Natural regeneration and natural expansion and afforestation and regeneration by planting and/or seeding: NE 100%, C-WE 100%, C-EE 100%, S-WE 100%, S-EE 73%, EU-28 97%, Europe 95%;
Coppice: NE 97%, C-WE 92%, C-EE 52%, S-WE 11%, S-EE 69%, EU-28 70%, Europe 70%.

seeding, with 43.8%, represent the highest share among all regions. Coppice stands are is most common in South-East Europe (16%).

Out of 35 countries providing data, 17 reported more than two-thirds of the forest area as established by natural regeneration and natural expansion categories in 2015 (Figure 4.2-1). Especially Croatia, Estonia, Georgia, Italy, Latvia, Liechtenstein, Norway, Slovenia, Spain, Switzerland and Turkey reported a percentage of 80% and higher. The proportion of forests established by afforestation and planting and/or seeding above 60% are found in eight countries, namely Belgium, Czech Republic, Denmark, Iceland, Ireland, Poland, The Netherlands and the United Kingdom. In some European countries, explicitly in Bulgaria, Hungary, Montenegro, Portugal, Romania, Turkey and Ukraine, the area of coppice forests is larger than ten percent and accounts, in total, to 8.9 million ha in 2015.

A few countries noted that coppicing was reported as natural regeneration, which indicates that the total area can be even higher.

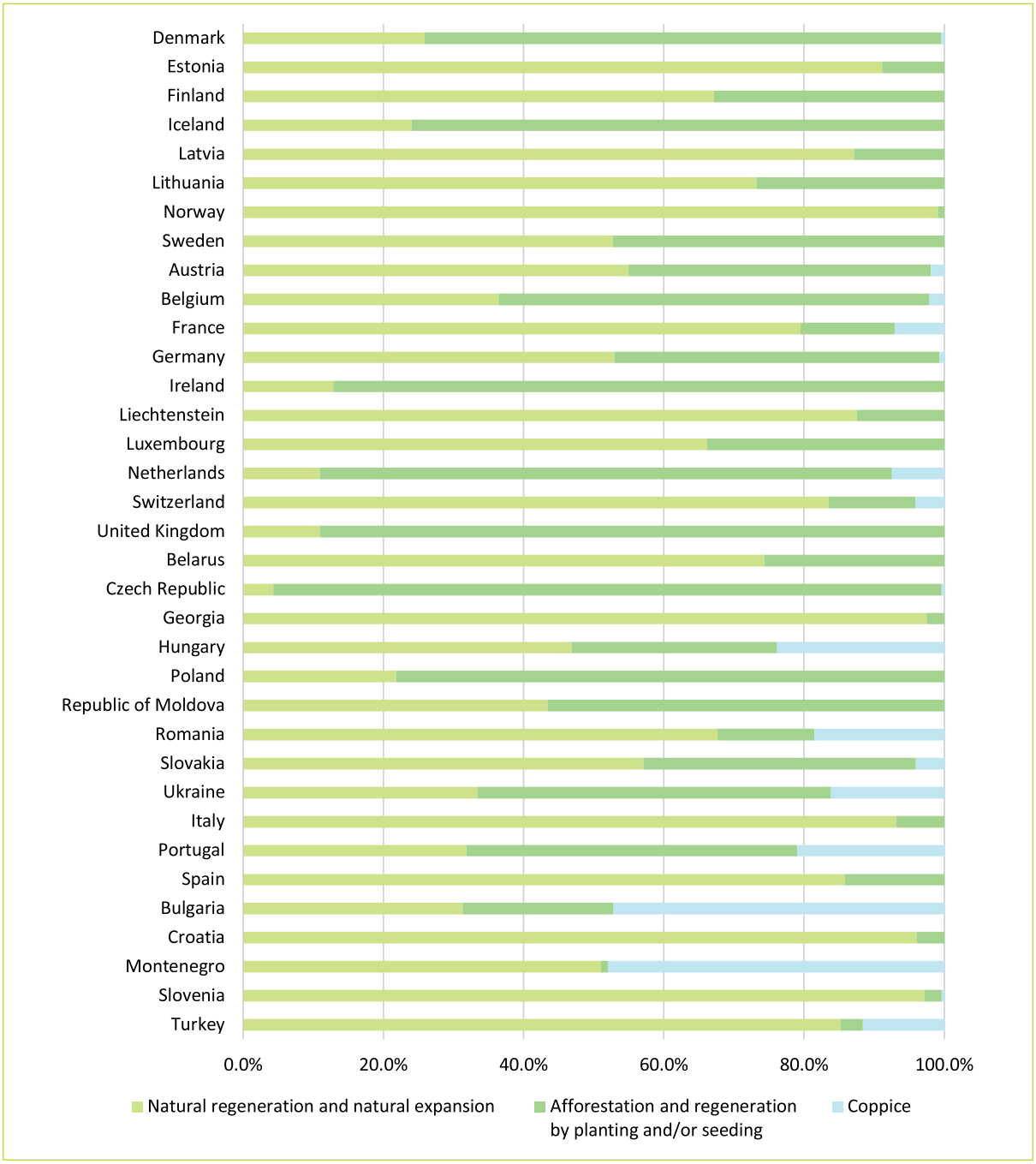


Figure 4.2-1: Forest area by stand origin, by country, 2015

Note: Based on available data.

A total of 17 countries distinguish all individual forest origin types in 2015. As the number of reporting countries is limited, the presentation by particular regions may cover in some cases only a portion of the total forest area (Figure 4.2-2).

Planting/seeding dominates in annual regeneration in both North (71.2%) and Central-East Europe (66%). In Central-West Europe natural regeneration is the most common regeneration type. For example, 74.7% of the annual regeneration in Germany, respectively 85.3% in Switzerland, is natural.

The share of artificial afforestation from the total area regenerated in 2015 is highest in South-West Europe, followed by South-East Europe. For Iceland, Ireland and the United Kingdom, this share is 78.4%, 41.3% and 36% respectively.

The largest annual (2015) proportions of natural expansion are found in South-West and South-East Europe. Countries such as Bulgaria, Turkey, Montenegro and Portugal together report a forest area of about 163 thousand ha being subject to natural expansion. The natural expansion also has a notable share of the annual regenerated forest area in both Belarus (30.8% or 17 thousand ha) and Austria (22.4% or 9 thousand ha). Taking the above figures into account, the increase of new forest area is most visible in South-East and South-West Europe.

Coppice sprouting is used mainly in South-East Europe where Bulgaria and Turkey have reported 132 thousand ha regenerated this way.

The proportions of different annual regeneration types in EU 28 and Europe are rather similar with regeneration by planting/seeding and natural generation making up for the majority of regenerated forest area (70.8% and 63.1%).

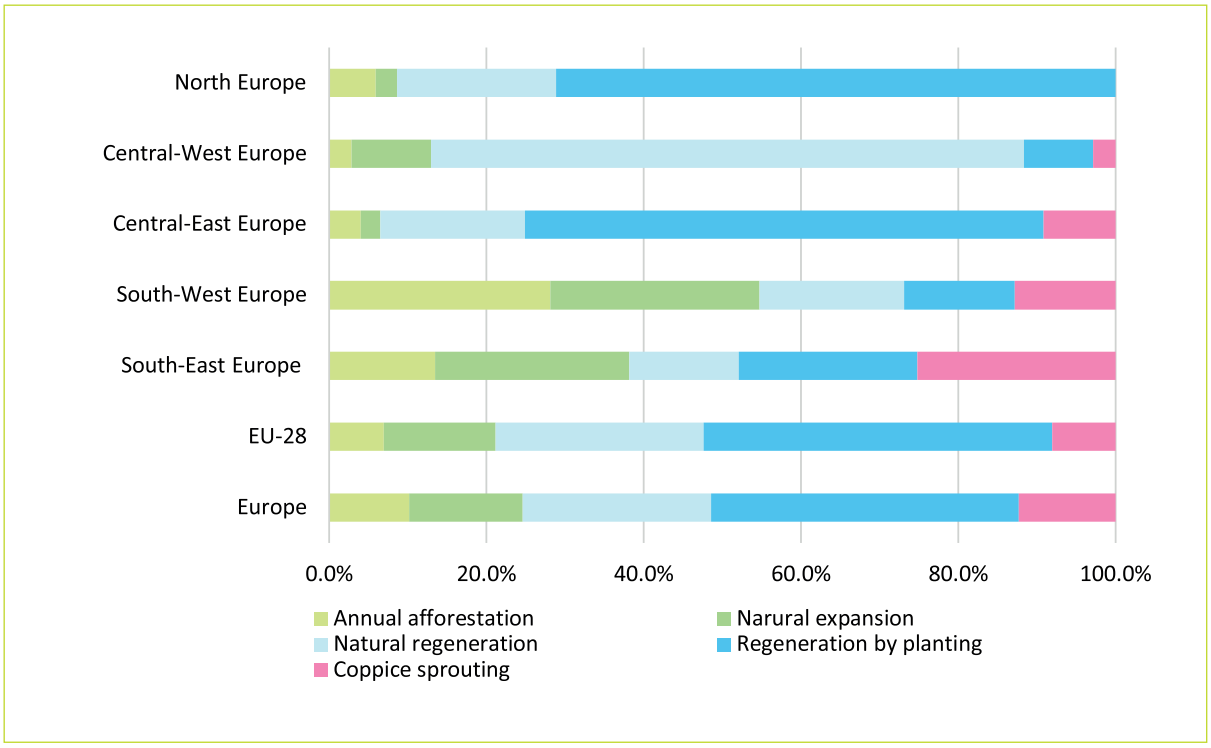


Figure 4.2-2: Share of forest expansion and regeneration types from the area regenerated, by region, 2015

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 43%, C-EE 26%, S-WE 11%, S-EE 71%, EU-28 60%, Europe 53%.

Trends

28 European countries provided data on origin of stands for the years 1990, 2000, 2005, 2010 and 2015 (Figure 4.2-3). Forest area originating from afforestation or regeneration by planting and/or seeding has reached 53.2 million ha in Europe in 2015 (EU-28 45.0 million ha) as compared to 41.3 million ha (EU-28 34.6 million ha) in 1990. This is an increase of more than 29%. Between 2010 and 2015 it expanded by nearly 4%.

The area of coppice forests grew by 1.05 million ha between 1990 and 2015 in Europe, of which 224 thousand ha between 2010 and 2015.

A more detailed analysis by European regions shows that the share of forest originating from natural regeneration and natural expansion has increased in all regions except North Europe (Figure 4.2-3). In North Europe, the share of forest established by planting/seeding continued to grow during the last 25 years. It can be observed that the share of forests originating from natural regeneration or natural expansion is rather stable in Central-East and Central-West Europe, whereas the trend in South-East Europe, and even more South-West Europe, has noticeably increased since 1990.

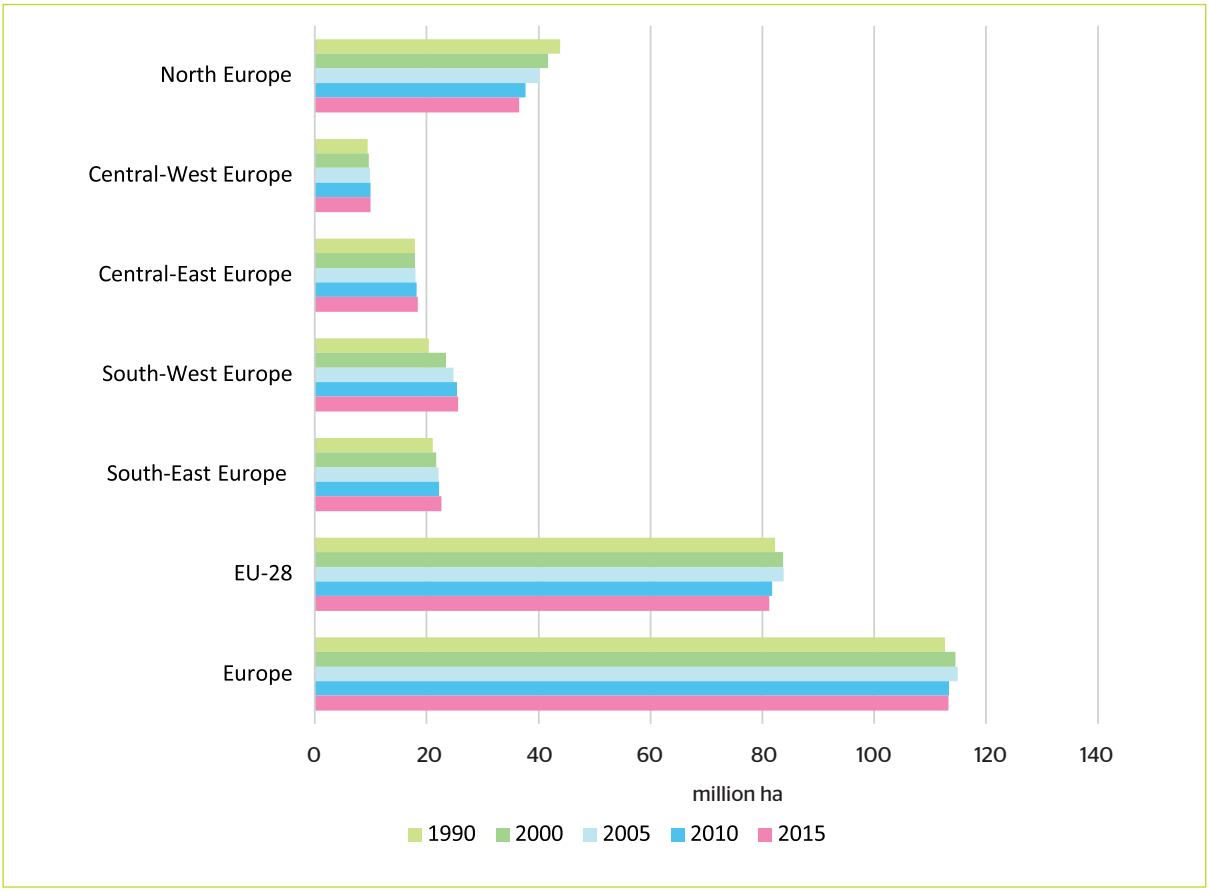


Figure 4.2-3: Trend in the area of forests originated from natural regeneration or natural expansion, by region, 1990-2015

Note: Data coverage as % of total regional forest area: NE 82%, C-WE 55%, C-EE 74%, S-WE 100%, S-EE 71%, EU-28 79%, Europe 76%.

Indicator 4.3 Naturalness

Area of forest and other wooded land by class of naturalness

Key findings

- The area of semi-natural forest, forest plantations and forest undisturbed by man increased in Europe over the 30-year period 1990-2020, reflecting expansion of total forest area.
- In 2020, around 94% of European forests are classified as semi-natural. Forest plantations represent 3.8% and forests undisturbed by man 2.2% of the forest in Europe.
- The highest share of undisturbed forests can be found in countries of North Europe, South-East and Central-East Europe. The share of plantations is highest in the Central-West, South-East and South-West Europe.

Introduction

The degree of naturalness of forest reflects the intensity and history of human interventions. Different intensities of utilisation are characterised not only by the remaining forest area in the country but also by changes in structures and species composition within the forested areas. Degrees of forest naturalness are described in this report by three categories of forest area: undisturbed by man, semi-natural and plantations. Forests undisturbed by man are those in which the natural forest development cycle persists or was restored and show characteristics of natural tree species composition, natural age structure, deadwood component and natural regeneration and no visible signs of human activity. Forests undisturbed by man have high conservation value, especially when they form large continuous forest areas allowing also natural ecosystem dynamics to occur. Undisturbed forests also serve as reference areas for understanding ecological principles and contribute to the development of forest management methods.

Plantations usually represent ecosystems on their own, established artificially by planting or seeding, often with introduced tree species, and intensively managed. Semi-natural forests are neither undisturbed by man nor plantations but display some characteristics of natural ecosystems. However, stands which were established as plantations but that have been without intensive management for a significant period of time are also considered a semi-natural forest.

Status

The analyses of classes of naturalness in 2020 are based on data from 33 European countries. Most forests in Europe (199.6 million ha of the forest area, or 94%) are classified in 2020 as semi-natural. Undisturbed by man cover 2.2% and plantations 3.8% of the forest area (see Table 4.3-1, Figure 4.3-1).

Table 4.3-1: Forest area by classes of naturalness, by region, 2020

Region	Undisturbed by man		Semi-natural		Plantations	
	1 000 ha	% of forest area	1 000 ha	% of forest area	1 000 ha	% of forest area
North Europe	2 769	3.9	67 759	95.0	771	1.1
Central-West Europe	107	0.3	34 864	89.5	3 995	10.2
Central-East Europe	880	2.0	42 878	96.7	591	1.3
South-West Europe	93	0.3	26 396	95.6	1 133	4.1
South-East Europe	836	2.8	27 710	92.0	1 571	5.2
EU-28	3 655	2.4	144 085	93.2	6 777	4.4
Europe	4 684	2.2	199 607	94.0	8 061	3.8

Notes: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 99%, S-WE 89%, S-EE 74%, EU-28 95%, Europe 94%.

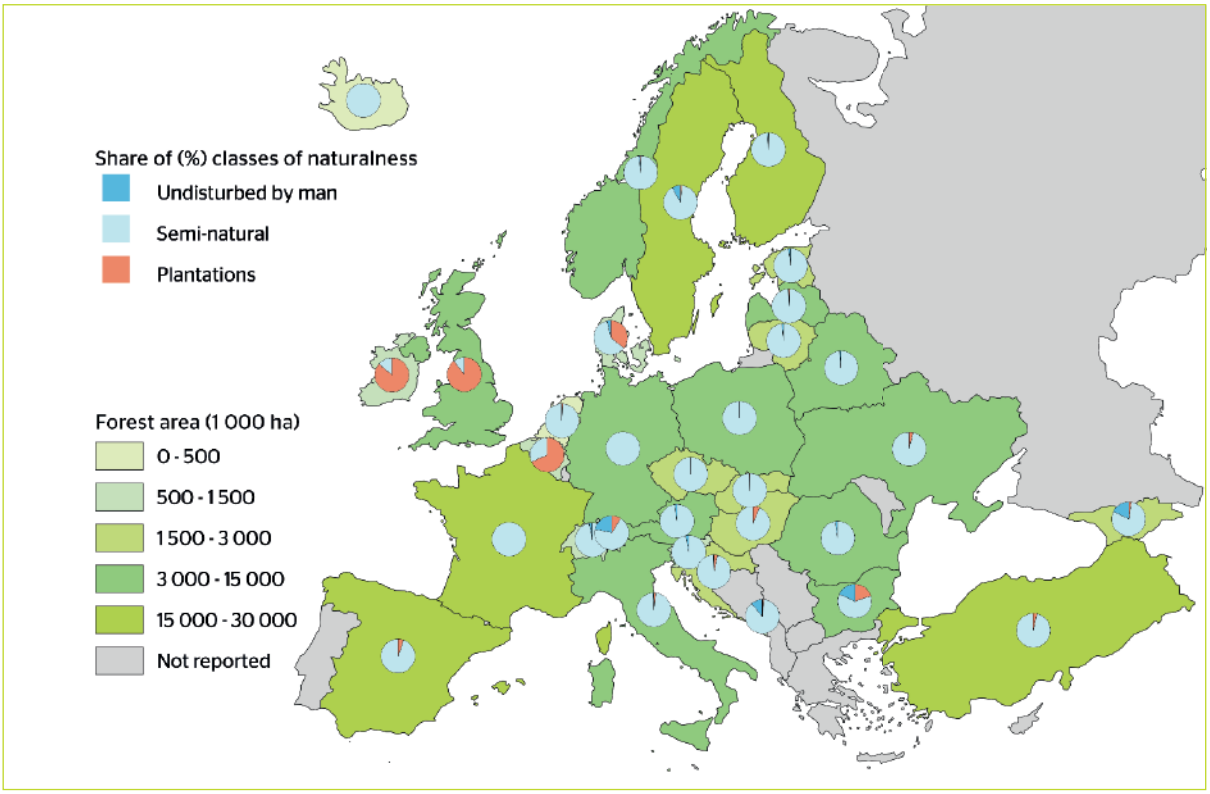


Figure 4.3-1: Forest area by classes of naturalness, by country, 2020

Note: Based on available data.

Due to the definition, the semi-natural forest includes a broad range of forests with different levels of naturalness. Countries reported also on semi-naturalness in subclasses, namely naturally established, naturalised introduced species, established by planting and/or seeding, coppice and unknown origin (Table 4.3-2). About 63.3% are naturally established, followed by 28.4% established by planting and/or seeding. The highest share of naturally established forests is located in North Europe.

Table 4.3-2: Naturalness by subclasses of semi-natural forest, by region, 2020

Region	Semi-natural forests				
	Naturally established	Naturalised introduced species	Established by planting and/or seeding	Coppice	Unknown origin
	1 000 ha				
North Europe	44 980	21	22 701	3	71
Central-West Europe	3 411	117	4 482	159	119
Central-East Europe	21 196	422	17 648	3 340	0
South-West Europe	20 375	256	2 102	3 663	0
South-East Europe	21 799	203	831	3 295	0
EU-28	67 381	630	40 261	5 911	190
Europe	111 760	1 017	47 764	10 460	190

Note: Data coverage as % of total regional forests area:
Naturally established: NE 100%, C-WE 16%, C-EE 94%, S-WE 89%, S-EE 71%, EU-28 73%, Europe 78%;
Naturalised introduced species: NE 92%, C-WE 3%, C-EE 26%, S-WE 30%, S-EE 14%, EU-28 44%, Europe 41%;
Established by planting and/or seeding: NE 100%, C-WE 60%, C-EE 88%, S-WE 89%, S-EE 14%, EU-28 84%, Europe 74%;
Coppice: NE 97%, C-WE 16%, C-EE 46%, S-WE 30%, S-EE 61%, EU-28 52%, Europe 57%;
Unknown origin: NE 97%, C-WE 17%, C-EE 46%, S-WE 30%, S-EE 14%, EU-28 60%, Europe 49%.

In Europe, the share of forests undisturbed by man (4.7 million ha) is 2.2% of the total forest area. The highest share of undisturbed forests in the forest area can be found in North Europe, South-East and Central-East Europe. While the share of plantations is the highest in the Central-West, South-East and South-West Europe. The highest area of forests undisturbed by man was reported by Sweden (2 249 thousand ha), Bulgaria (704 thousand ha) and Georgia (500 thousand ha). The threshold years used by countries to define undisturbed by man vary between the reporting countries. In 14 European countries, the share of forest undisturbed by man was reported as being higher than 1% (Figure 4.3-2). Forest undisturbed by man are mostly located in remote or inaccessible areas where extreme climatic or topographic conditions prevail.

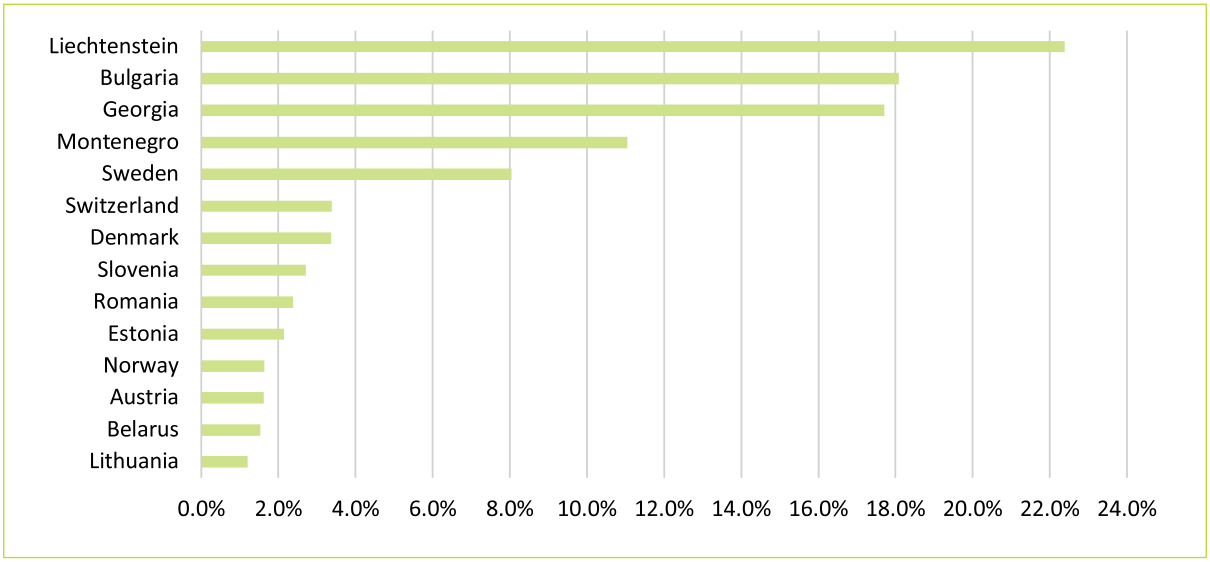


Figure 4.3-2: Share of forest undisturbed by man in the total forest area, by country, 2020

Note: The area in Liechtenstein correspondents to 1500 ha, whereas the area in Bulgaria and Georgia correspondents to 704 000 and 500 000 ha, respectively. Only countries reporting share higher than 1% are displayed.

Forest plantations cover about 8.1 million ha of the total area in Europe. Plantations are important for wood production in many countries, in nine countries their share is above 5% (Figure 4.3-3). The definition of plantation includes an explanatory note that the stands of native tree species that were established as plantations but that have been without intensive management for a significant period of time could be considered semi-natural forests. This might influence the interpretation, especially regarding the old plantations that have been partly shifted to semi-natural forests.

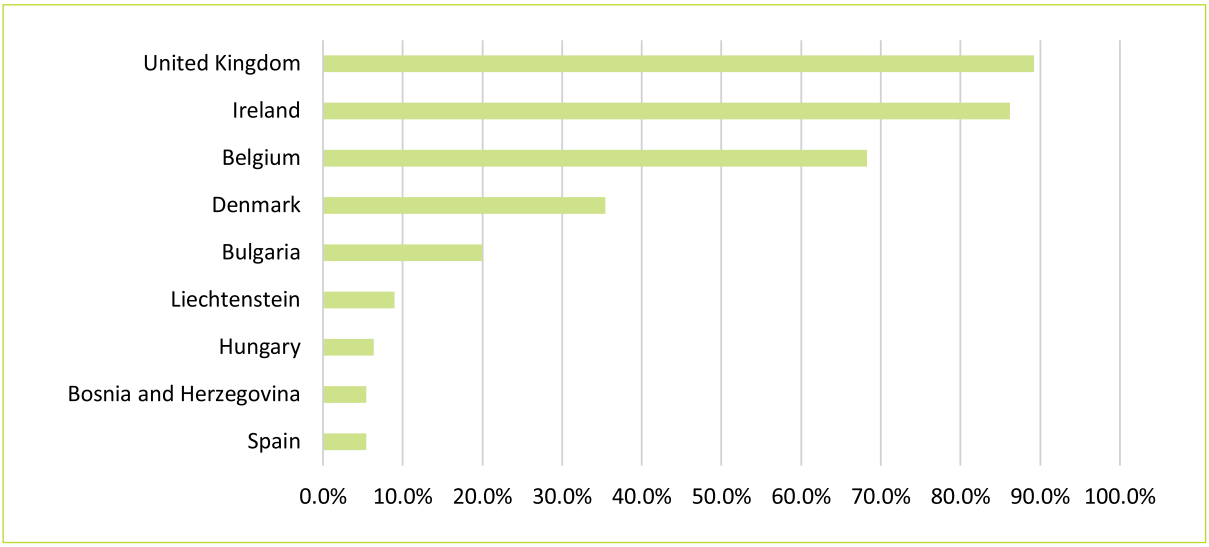


Figure 4.3-3: Share of plantations in total forest area, by country, 2020

Note: Only countries with a share of plantations higher than 5% are displayed.

Trends

The area of semi-natural forest increased by 13.1%, plantations increased by 14.5%, and the area undisturbed by man increased by 42.3% in Europe over the past 30 years (Figure 4.3-4). These changes can be partly explained by the increase of the total forest area, afforestation and gradual development of the defintions and their interpretation. The increase of the area of undisturbed forests may reflect forest protection measures, as in several countries former semi-natural forest that was initially designated as protected areas have subsequently been considered as an undisturbed forest.

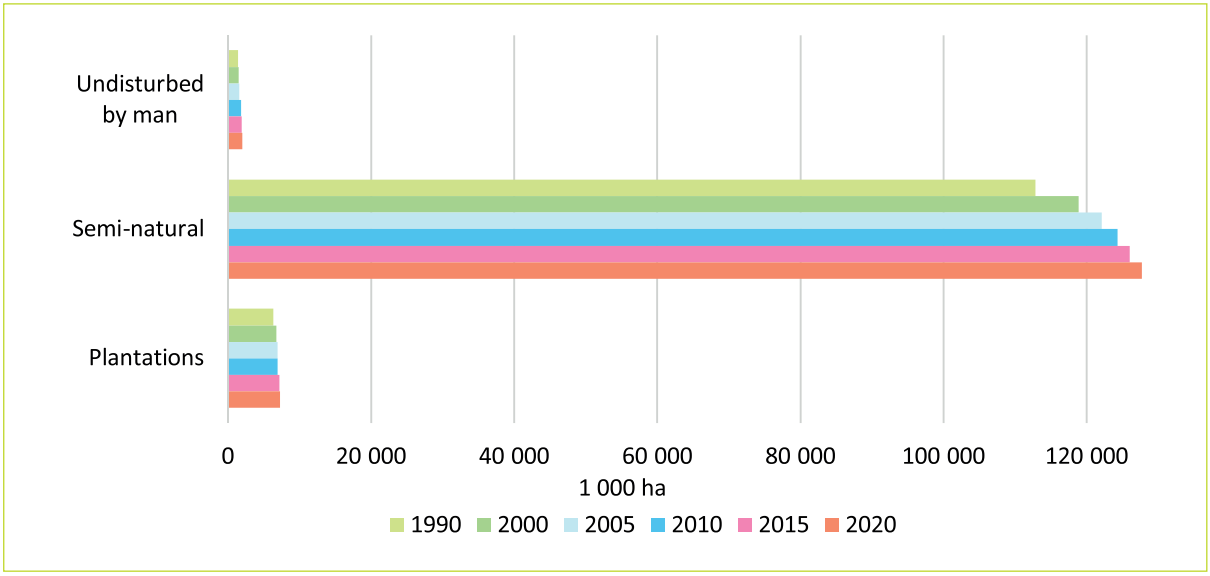


Figure 4.3-4: Area of forest naturalness classes in Europe, 1990-2020

Note: Only data of countries reporting on all reporting years were considered. Data coverage as % of total regional forest area: Undisturbed by man 54%, Semi-natural 60%, Plantations 57%.

Indicator 4.4 Introduced tree species

Area of forest and other wooded land dominated by introduced tree species

Key findings

- Introduced tree species have little occurrence in European forests covering about 3% of the forest area. Their potential may be subject to re-evaluation in the light of adaptation to and mitigation of climate change impacts and growing demands for forest products and services.
- The highest share of introduced tree species (almost 9% in 2020) can be found in Central-West Europe with a steady increase. No substantial changes have taken place in the rest of Europe.
- The area dominated by invasive alien tree species is about 0.5% of Europe's forests and is slightly increasing.

Introduction

Spread of tree species outside their natural range has taken place mainly as a result of human activity, although in some cases also accidentally, e.g. as a by-product of trade. Introduced species are of main importance for afforestation and reforestation. Over centuries, non-native, and usually fast-growing, tree species were planted to increase forest cover and satisfy the growing demand for wood in Europe. Non-native tree species have also been introduced to quickly restore vegetation cover of disturbed forests, or to reduce erosion.

Forests of introduced tree species make significant contributions to the economy and provide multiple products and ecosystem services. Their potential is being re-evaluated in the light of adaptation to and mitigation of climate change impacts and of growing societal demands for forest products and services. However, introducing tree species may become problematic due to their ecological characteristics such as negative impacts on native species, invasiveness or contributing to spread of diseases and pests. They may change and put substantial pressure on biodiversity and the function, structure and dynamics of forest ecosystems. Some introduced species feature on lists of invasive alien species introduction and consequent spread of which can cause socio-cultural, economic and/or environmental harm.

Status

The share of forest dominated by introduced tree species is small in Europe, amounting to 3.1% of the forest area (6.2 million ha in 2020, reported by 30 countries).

The largest share of introduced species is currently (in 2020) found in the Central-West and South-West Europe, where they occupy 8.9% (i.e. 2.2 million ha) and 4.5% (i.e. 1.3 million ha) of the forest area, respectively. In contrast, less than 1.4% of introduced tree species was reported in North Europe (1.0 million ha).

Europe's plantations comprise 52.8% of introduced tree species. In some countries, the share is even higher. Nine out of the 24 countries report more than 70% share of introduced tree species in their plantations. Ireland, Iceland, Denmark, Hungary, Belgium, and the Netherlands are countries with the largest share of introduced tree species, planted to expand forest cover (Figure 4.4-1). Introduced tree species are also used for afforestation and reforestation. For example, in Iceland, where *Betula pubescens* is the only native forest species, the share of introduced tree species (mainly *Picea sitchensis, Pinus contorta* and *Larix spp.*) reaches more than 57%. In Ireland and Denmark, introduced tree species cover about 63% and 44% of the forest area, respectively. Non-native, fast-growing species such as *Picea abies, Picea sitchensis, Pinus contorta* were introduced by planting to increase timber production.

The most important introduced tree species traditionally used in Europe for timber production include *Pseudotsuga menziesii, Picea sitchensis, Pinus contorta* (and other *Pinus* spp.), *Larix* spp., *Populus* hybrids and clones, *Robinia pseudoacacia, Quercus rubra* and a number of *Eucalyptus* species. The largest and most widespread introduced tree species are *Pinus* spp. that cover a little more than 1.6 million ha in Europe (Table 4.4-1). *Picea* spp. (*P. abies,* and especially *P. sitchensis*), are less widespread (about 0.8 million ha in Central-West and North Europe) but have significant commercial importance.

The *Eucalyptus* spp. cover 1.5 million ha in South-West Europe and represent a large fraction of the forested area in e.g. Portugal. Another example is Douglas fir *(Pseudotsuga menziesii)*, which has become an important introduced tree species, especially in Central-West Europe. The species is valued for its high

growth rates and timber quality. It is regarded as quite resistant to pests and diseases and to some degree for its resistance to droughts. Douglas fir covers about 0.5 million ha in Europe. The presence of *Larix* spp. (e.g. *L. decidua, L. kaempferide, L. europea, L. leptolepis*) and *Populus* spp. (other species excluding *P. tremula*) have been reported in all parts of the European continent (Table 4.4-1).

Table 4.4-1: The forest area occupied by introduced tree species, by region, 2015

Region	*Pinus* spp.	*Eucalyptus* spp.	*Pseudotsuga* spp.	*Picea* spp.	*Populus* spp.	*Larix* spp.	*Quercus* spp.
	1 000 ha and percent of the total forest area (in brackets)						
North Europe	642 (1.0)	0 (0.0)	0 (0)	184 (0.5)	5 (0.1)	61 (0.2)	0 (0)
Central-West Europe	439 (1.8)	0 (0.0)	472 (2.0)	576 (3.0)	231 (1.0)	132 (1.0)	79 (0.4)
Central-East Europe	84 (0.9)	1 (0.0)	14 (0.1)	9 (0.3)	49 (0.4)	8 (0.1)	102 (0.4)
South-West Europe	402 (2.2)	1 496 (6.8)	21 (0.1)	0 (0)	103 (0.6)	0 (0)	17 (0.1)
South-East Europe	65 (0.3)	3 (0.0)	10 (0.0)	0 (0)	34 (0.6)	2 (0.1)	0 (0)
EU-28	1 633 (1.1)	1 500 (3.2)	517 (0.6)	768 (1.3)	422 (0.6)	203 (0.3)	198 (0.3)

Note: Data coverage as % of total regional forest area: NE 95%, C-WE 100%, C-EE 80%, S-WE 100%, S-EE 81%, Europe 91%.

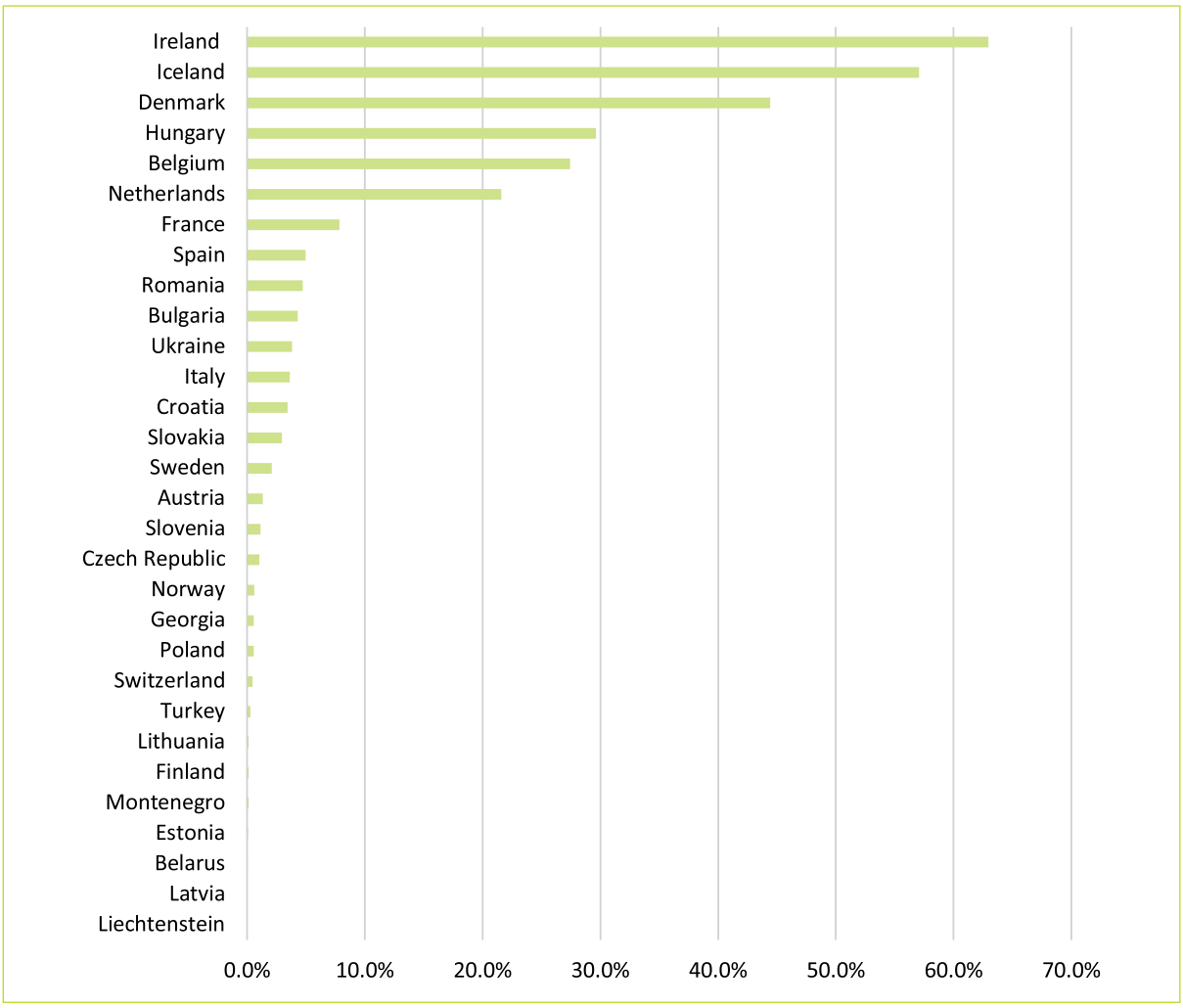


Figure 4.4-1: Share of forest area dominated by introduced tree species, by country, 2020

Note: Only countries reporting on the forest area dominated by introduced species are displayed.

Some introduced tree species are referred to as being invasive-alien. Although their coverage is limited (about 0.5% of Europe's forest area, or 1 million ha), their spreading is seen with some concern. *Robinia pseudoacacia* has been widely used for many purposes such as ornamentation, timber, fuelwood, afforestation of dry land, soil stabilisation, and to provide nectar for honey production. *Robinia pseudoacacia* is the most commonly reported invasive alien species covering more than 1.4 million ha. It is e.g. not considered invasive in Hungary where it occupies 22.2% (approximately 0.5 million ha) of the country's forest area.

Ailanthus altissima, an early successional tree species introduced from China is another frequently reported invasive alien tree species. In spite of its modest coverage, it is considered as very aggressive due to its fast-spreading and toxicity. *Ailanthus altissima* has mainly been used as an ornamental species or for roadside plantings and is one of the most widespread invasive plant species in Europe.

One major driver that amplifies its rapid spread is the proximity to railroads and roads where it can be frequently observed nowadays. Many other invasive alien tree species are black-listed or controlled in Europe, including *Acer negundo, Acacia* spp., *Prunus serotina*, and *Quercus rubra*.

Trends

In the 21 countries that provided time-series data, the area of introduced tree species in Europe remained relatively stable over the last 30 years (Figure 4.4-2). A slight decrease in the area occupied by introduced tree species is observed in Southern Europe over the past decade. This may be attributed to the way how introduced species are perceived and the emphasis being placed on native species. In most of the countries, only marginal changes occurred in the extent of the area dominated by invasive alien tree species. In particular, there has been a visible decline in the area of introduced tree species in France over the last 15 years.

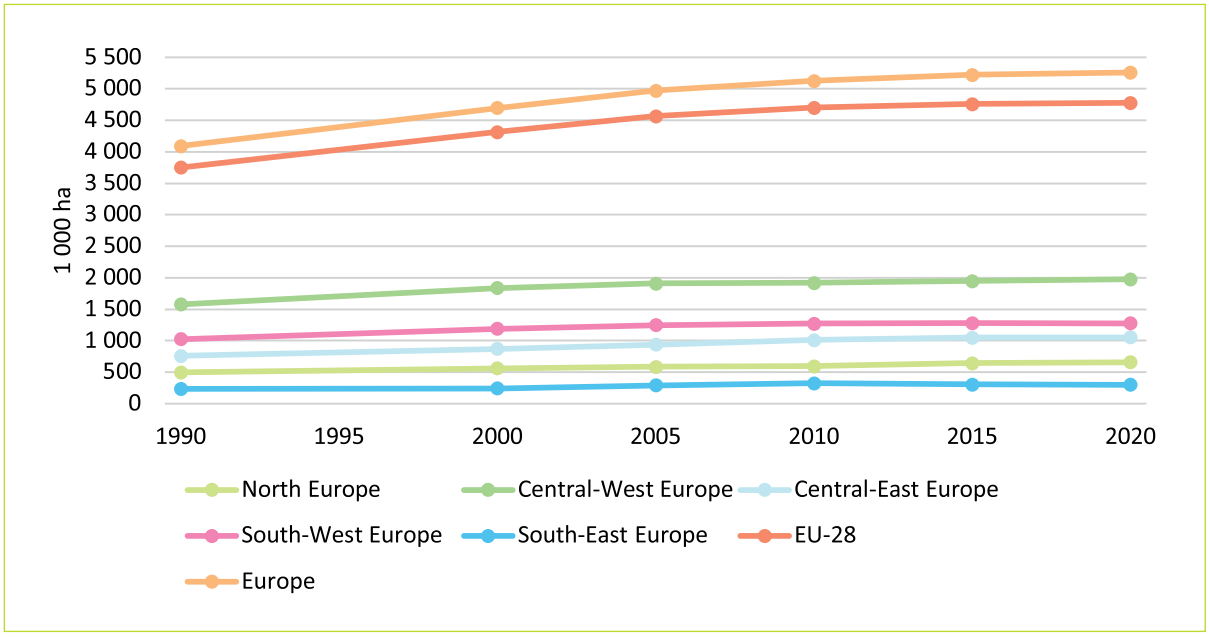


Figure 4.4-2: Trend in the forests area dominated by introduced tree species, by region, 1990-2020

Note: Data coverage as % of total regional forest area: NE 82%, C-WE 57%, C-EE 56%, S-WE 89%, S-EE 69%, EU-28 73%, Europe 71%.

Indicator 4.5. Deadwood

Volume of standing deadwood and of lying deadwood on forest and other wooded land

Key findings

- The average volume of deadwood in 2015 is above 11 m³/ha, equal to above 7% of the average volume of the growing stock density of European forests.
- Total deadwood volume by country ranges between 2.3 m³/ha (Portugal) and 28.0 m³/ha (Slovakia) and, by region, between 5.8 m³/ha (South-West Europe) and 18.4 m³/ha (Central-West Europe).
- Over the last 25 years, the amount of deadwood has increased in all European regions, except in Central-East Europe; more frequent disturbances resulting also from changing climatic conditions and more nature-oriented forest management practices might be the causes.

Introduction

Deadwood consisting of standing or lying dead trees and wood residues of various size, is an essential component of forest ecosystems. It provides microhabitats for a broad diversity of animal and plant species (mammals, birds, amphibians, insects, saproxylic fungi, moss and lichen communities). Deadwood is also an important factor in nutrient cycles (N, P, Ca and Mg); it influences soil development and reduces soil erosion. Furthermore, deadwood is also an important forest carbon pool, since it slows the release of carbon dioxide due to decomposition and, in this way, it contributes to the mitigation of global warming. The amount of deadwood in forests depends on many factors, such as tree species composition, stand structure and development stage, type and frequency of natural disturbances, type of management, and soil and climate characteristics. As European forests have been intensively managed for a long time, the late development stages which are usually the richest in deadwood are missing or scarce. Forest management practices that excessively reduce the amount and quality of deadwood may endanger forest biodiversity and harm the services provided by forest ecosystems. On the other hand, excessive deadwood in the forest may increase the risk of forest fires and insects' outbreaks and hinder recreational activities or forest operations.

Important information on deadwood is its amount (volume or weight per hectare), alone or compared to the growing stock, its type (standing or lying), its composition by species, size and decomposition class. In general, lying deadwood is richer in species than standing deadwood, however, some species or communities might be confined only to standing or lying deadwood. Currently, estimates of deadwood biomass are generally available from national forest inventories, which have included deadwood among the attributes surveyed in response to the increased awareness of its ecological importance. The data source for the indicator is, for almost all countries, the national forest inventory alone or combined with other sources. For the present report, countries were asked to provide updates for deadwood for 2015 and additional trend information for the years 1990, 2000, 2005 and 2010.

Status

Information on deadwood for the year 2015 was reported by 28 countries, which accounts for 87% of the forest area in Europe. The values here below concern deadwood in the forest, while data on deadwood on other wooded land do not allow a comprehensive assessmen. At the European level, the weighted average volume of the total deadwood for the reporting countries in 2015 is 11.5 m³/ha and accounts for 7.1% of the weighted average volume of the growing stock. For EU-28 countries, the corresponding figures are 11.9 m³/ha and 6.9% of the growing stock, respectively. Lying deadwood is the predominant component in most countries (about 60% of the total deadwood on average), but in a few countries (Denmark, Belarus, Hungary, Ukraine and Turkey) the standing deadwood prevails. At the regional level, the total deadwood in the year 2015 ranges from 5.8 m³/ha (South-West Europe) to 18.4 m³/ha (Central-West Europe). Excluding Belarus (reported below 2 m³/ha), the total deadwood reported by countries for the year 2015 ranges between 2.3 m³/ha (Portugal) and 28.0 m³/ha (Slovakia); the percentage of total deadwood compared to the growing stock volume ranges from values below 3% (Denmark, Poland, Ukraine and Romania) to values above 10% (Latvia, France, Slovakia and Turkey) (Figure 4.5-1).

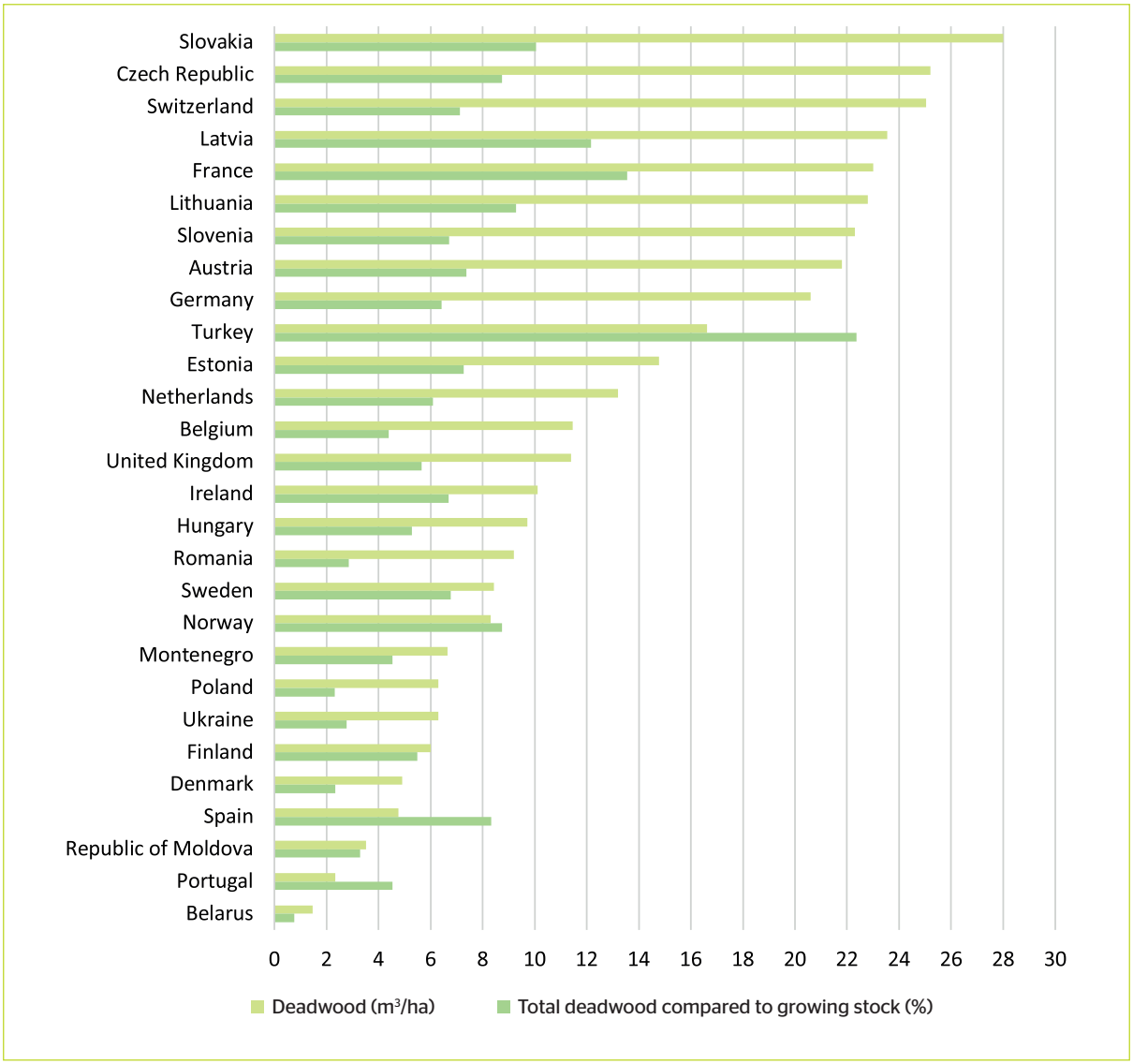


Figure 4.5-1: Deadwood volume per hectare and proportion of deadwood volume to growing stock, by country, 2015

Note: 28 countries representing 87% of the total regional forest area; ranked in descending order of average deadwood volume.

Trends

The analysis of trend is based on the 15 countries which provided a sufficiently complete series of data for the period 1990-2015 and covers 38% of the forest area in Europe. Figure 4.5-2 shows the changes of standing and lying deadwood by region. The data coverage is good enough for North and Central-West Europe, where it shows an increase of both standing and lying deadwood over the period considered, and for Central-East Europe, in which the trend is opposite.

A general increase of deadwood volume can be assumed with caution for the other two southern regions, and for Europe and EU-28. The increase could be explained by more frequent disturbances such as storms, insects' outbreaks and forest fires caused also by changing climatic conditions. A greater volume of deadwood in forests might have been also favoured by more nature-oriented forest management practices and certification schemes.

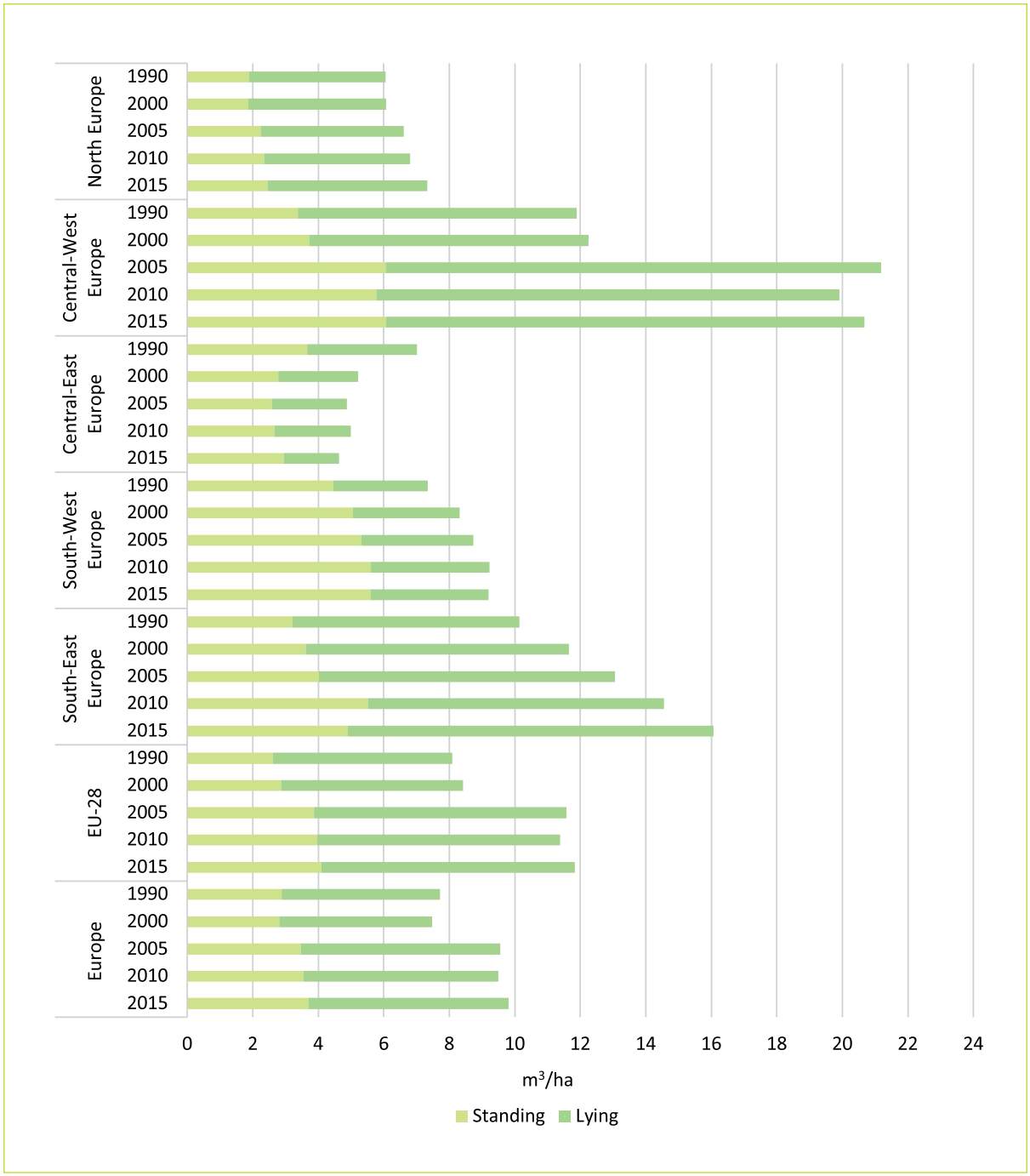


Figure 4.5-2: Weighted average volume of standing and lying deadwood, by region, 1990-2015

Note: Based on data of the countries for which a sufficiently complete set of data was available; missing data were replaced by the nearest available value. Data coverage as % of total regional forest area: NE 52%; C-WE 46%; C-EE 46%; S-WE 30%; S-EE 5%; EU-28 33%; Europe 38%.

Indicator 4.6 Genetic resources

Area managed for conservation and utilisation of forest tree genetic resources (in situ and ex situ genetic conservation) and area managed for seed production

Key findings

- The total number of conserved native species populations have risen from 466 in 1990 to 4 493 in 2020 in 34 countries for which data was available for these years (additional 9 810 native species populations are conserved in two countries for which data on 1990 was not available). The coverage is still relatively low, but the number of genetic conservation units is steadily increasing.
- 95% of the conserved populations refer to native tree species in 36 countries; the remaining 5% are genetic conservation units established to conserve the genetic diversity of non-native species.
- 31 countries reported the potential for production of forest reproductive material for a total of 156 tree species.
- The geographical representativeness of populations managed for genetic conservation of native species in Europe requires significant intensification of efforts. There still exist considerable gaps, even for common tree species. Such gaps indicate that a large amount of valuable genetic resources of European species are currently not being conserved. On average, only 19% of species are conserved for genetic resources in each country.

Introduction

The conservation and sustainable use of Forest Genetic Resources (FGR) is a vital component of sustainable forest management. Diversity in genetic resources ensures that forest trees can survive, adapt and evolve under changing environmental conditions. Genetic diversity is also needed to maintain the vitality of forests and to cope with pests and diseases. Forest management in Europe is based largely on the management of wild and semi-wild tree populations. The establishment of new forests through artificial or natural regeneration always involves the deployment of genetic material.

In this context, **native species'** populations are local populations of species officially recognised as part of the natural flora of the country and may be conserved *in situ* or *ex-situ*. **Non-native species'** populations, by contrast, are those of either exotic species introduced into Europe or species non-native to the country that can only be conserved *ex-situ*.

Following the establishment of the European Information System on Forest Genetic Resources (EUFGIS) in 2010, 35 European countries started to make use of the "pan-European minimum requirements for dynamic genetic conservation units (GCUs) of forest trees" as the minimal data relating to the dynamic conservation of native and non-native populations managed for *in situ* or *ex situ* conservation. These minimum requirements emphasise the maintenance of evolutionary processes within tree populations to safeguard their potential for continuous adaptation to changes in the environment and local conditions.

All **forest reproductive material** (FRM), such as fruits, seeds, cones and parts of plants for vegetative propagation, collected for the establishment of forest stands, originate in specific areas established (orchards) or selected (forest stands) for this purpose. FRM in the European Union can be marketed if it belongs to one of the four categories[9] pecified in Council Directive 1999/105/EC and if it has been approved. Data on populations managed for the production of FRM have been collected consistently since 1990, and the Forest Reproductive Material Information System (FOREMATIS), released in 2016, provides a repository of approved basic materials data on regulated FRM species for all the Member States. For this indicator, Countries report (a) the total number of FRM production units (basic materials) for each of the four categories (b) the total number of species for which there is at least one FRM production unit.

Revised analytical concept

Since the State of Europe's Forest 2015 report, the analytical concept for the indicator on genetic resources has been revised by the EUFORGEN Programme to offer a better assessment of the status of FGR in Europe and improved monitoring of progress towards conservation of FGR. This revision was carried out because EUFORGEN member countries agreed that an assessment based on the area of conservation units (as was done until 2015) was not sufficiently informative to provide a good indication of the status of FGR, principally because it does not reveal the fraction of genetic diversity conserved.

The revision is the result of a consultation process between the European countries, led by the

[9] (i) **Source-identified** FRM comes from basic material which is either a seed source or stand located within a single region of provenance, with no recognised superior qualities. (ii) **Selected** FRM comes from registered stands which are selected based on their superior phenotypic characteristics, e.g., better form, growth rate, health. (iii) **Qualified** FRM comes from designed populations (seed orchards, parents of families, clonal mixtures) or clones, where the individuals have been phenotypically selected for their outstanding characters. (iv) **Tested** FRM comes from designed populations where the components have been genetically evaluated and proven to be superior. Alternatively, the superiority of the reproductive material itself may be shown through comparative testing.

EUFORGEN Programme, aimed at making the indicator reliable, specific, simple, relevant and useful. The revised analytical concept is composed of three sub-indicators (Dynamic conservation of **native species**, of **non-native species**, and potential for production of **FRM**) that are in turn divided into verifiers. These verifiers aim to quantify conservation efforts and assess conservation strategies in multiple dimensions.

1) The sub-indicator on the genetic conservation of **native** species is composed of four verifiers: one integer value (conservation effort) and three indices (0 1). These values can be conveniently presented in a radar chart (see Figure 4.6-2 and 4.6-3). The three corners of the triangle represent respectively the diversity of conserved species, the representativeness of the different ecozones in conservation efforts, and the presence of more GCUs of the same species in the same ecozone, as a measure of insurance of conservation. A maximal triangle in the radar chart would denote a perfect state of conservation while a smaller one represents a need to increase conservation efforts along one or more dimensions.
2) The sub-indicator on the genetic conservation of **non-native** species is defined by a single verifier that shows the number of conserved populations (conservation effort).
3) The sub-indicator for the potential for production of **FRM** is composed of two verifiers: the number of FRM production units and the number of species for which at least one unit exists.

Information for the verifiers of the revised indicator is based on the number and geographical location of populations and the diversity of species, rather than on the area of conservation units, as in the previous reporting. This change allows a more accurate assessment of the status of genetic resources conservation and permits the indicator to be independent of the number of species occurring in each country. Verifiers are expressed as ratios, whenever possible, to enable progress within countries to be monitored and to permit meaningful comparisons of different strategies within species. Furthermore, the revised indicator now also provides a measure with which to assess progress over time.

Status

39 countries reported their 2020 data on the revised indicator (or part of it) to the EUFORGEN Secretariat at the European Forest Institute (see Annex Table 32). Of these countries, 36 provided data on the Dynamic conservation of native and non-native populations back to 2005, 34 provided data back to 1990. Most of the countries (34) used EUFGIS (European Information System on Forest Genetic Resources http://portal.eufgis.org) to report on the Dynamic conservation of native and non-native populations. The EUFGIS database is populated by national data providers and contained data on 3 873 GCUs in June 2019. The units comprise 4 902 distinct tree populations registered in EUFGIS and most of them (95%) are managed for the conservation of **native** species (the remaining 5% are managed for the conservation of **non-native** species). The total number of populations conserved for FGR (15 117) is the result of a consultation process with all countries, which allowed some of them to report data independently from EUFGIS (see Annex Table 32)

Regarding the Potential for Production of FRM, 31 countries provided current data, while 17 provided data from 2010. Areas managed for **FRM** production include seed sources, stands and seed orchards for all four categories of Council Directive 1999/105/EC. Of the 31 countries that have reported their data on **FRM**, 25 countries partially used the FOREMATIS portal (http://ec.europa.eu/forematis/) but only four verified these data (see Annex Table 32). The data on FRM is also the result of a consultation process between all countries, which allowed to present the data independently from FOREMATIS.

Tree populations managed for genetic conservation

A total of 15 117 tree populations are actively managed for dynamic genetic conservation; 14 303 populations in 36 countries for native species and 814 populations in 10 countries for non-native species. For the production of FRM, 1 384 348 units are registered in 31 countries covering 156 tree species (including subspecies and hybrids). The list of species against which the indexes are computed was composed by the EUFORGEN Programme and will be expanded as needed and appropriate.

A large proportion of the trees targeted for genetic conservation of **native** species are widely occurring stand-forming tree species that are important for forestry. Five economically relevant tree species (*Abies alba, Fagus sylvatica, Picea abies, Pinus sylvestris, Quercus robur*) alone account for about half of the total number of populations managed for genetic conservation of native species. Many other economically important tree species have only a

few populations managed for the same purpose. Furthermore, very few populations are managed for the genetic conservation of scattered tree species. These species may have low economic importance, but they often have high value in terms of maintaining forest biodiversity and ensuring ecosystem stability.

The geographical representativeness of populations managed for genetic conservation of native species in Europe showed a clear need for the intensification of efforts. Significant gaps exist, even in the case of common forest species where large areas are managed for genetic conservation (see Figure 4.6-1). The geographical representativeness of genetic conservation populations is even lower for most other tree species in Europe. These gaps mean that a part of valuable genetic resources of European tree species are not being conserved.

Radar charts (see Figure 4.6-2) show the actual conservation status of their genetic resources and the efforts that should be made: The species were chosen as an example, *Pinus sylvestris*, is one of the five most conserved species in Europe. The top right plot shows how the dynamic conservation effort (number of GCUs) has quadrupled since 2000, reflected in the growth of the other indices in the main radar chart, which have almost doubled in the last 20 years. In detail, in 2020 *Pinus sylvestris* is managed in 445 GCUs across more than 60% of the countries where it occurs (country involvement is 0.618). More than 40% of the ecotypes (the different environmental zones in which the species occurs in each country) are represented in the conservation effort (ecozone diversity is 0.436). One-third of the ecotypes host at least 2 GCUs (insurance index is 0.33). The increase in each verifier shows how conservation status has improved over the time series.

In the same way, Figure 4.6-3 shows the radar chart at the European level for 160 species, using the data in EUFGIS. On average, only 19% of species are conserved for genetic resources in each country. Almost 60% of the ecotypes in Europe host at least 1 GCU of each species (ecozone diversity = 0.576) and more than 35% at least 2 GCUs (insurance index is 0.373).

Regarding the genetic conservation of **non-native** species, the data reveal that the efforts concentrate on few species. Three species (*Pinus nigra, Pseudotsuga menziesii* and *Robinia pseudoacacia*) account for more than 76% of the conserved non-native populations in Europe. *Pseudotsuga menziesii* alone accounts for 41% of the conserved populations of non-native species.

For the production of **FRM**, *Fagus sylvatica, Picea abies* and *Pinus sylvestris* account for more than half of the total number of production units. In general, the emphasis in seed production is on a very small number of economically important species.

Trends

Following the adoption of the Pan-European minimum requirements, which have been implemented by most European countries, and thanks to the EUFGIS Information System, which permits a retrospective evaluation, we can accurately analyse trends in the genetic conservation of native and non-native species populations for all European countries since 1990. Trends in the potential for production of FRM are examined from 2010, as a result of the lack of prior information for many countries.

For the 36 countries that provided data, the conservation of genetic resources of **native** species shows some progress over the past years. In 1990, approximately 70% of the populations managed for genetic conservation of native species was represented by six economically important tree species. By 2015 the same percentage included ten species while now (2020) it includes 12 species. In all countries, the number of GCUs shows a clear and steady increase. Considering data from EUFGIS (Figure 6.4-3), the total number of conserved native species populations has increased from 466 in 1990 (not in the figure) to 3 038 in 2010 and 4 719 in 2020. It must be considered that around 2010 there was a considerable increase in the number of countries that have initiated conservation activities for new species and in the total number of genetic conservation units, principally thanks to the launch of the EUFGIS Information system in 2010. In the same way, considering the data received after the consultation process between countries (Annex Table 32), the total number of conserved native species populations has grown from 8 227 in 2010 to 14 303 in 2020. The number of units increased for 92 species (67%) since 1990 and for 48 species (35%) since 2015. No species has shown a decrease. The number of species has almost doubled from 47 in 1990 to 93 today, with 75% of countries showing an increase in the number of species conserved since 1990 and 31% since 2010.

The charts in Figure 4.6-2 and Figure 4.6-3 show an increase in conservation over time for *Pinus sylvestris* and for Europe as a whole, but also indicate the need to increase conservation efforts of FGR. At the European level (Figure 4.6-3) Dynamic onservation effort and Species diversity index have more than doubled since 2000, but the other two

c indices grew very slowly; growth in the number of GCUs and species diversity has not been matched by similar growth in either ecozone diversity or insurance index, suggesting that more investment is needed in the conservation of FGR.

Non-native species too have shown a steady increase in the number of GCUs, from 44 populations in 1990, to 412 in 2010 and 814 in 2020. In 1990, four species made up almost 94% of the total number of conserved populations of non-native species; in 2000 it was seven species, and by 2020 is ten species. In addition, the number of conserved non-native species grew, from six species in 1990 to 11 in 2005, to 20 today (2020). One-fifth (20%) of countries reported an increase in the number of non-native species conserved.

Currently, 31 countries report a total of 1384348 units[10] registered Basic Material in national registers as a seed source, stand, seed orchard, parents of family clone or clonal mixture; static *ex-situ* conservation, as clonal archives and gene bank collections, are not included here) for production of **FRM**, but only 22 also reported data for 2015 and only 17 also for 2010. The 22 countries that provided data for FRM production in 2015 and 2020 reveal an increase of 30%, from 1 038 386 in 2015 to 1 349 187 in 2020. However, the 16 countries that reported data from 2010 show a decrease of 10%, from 1 492 639 in 2010 to 1 338 808 in 2020. It is important to underline a steady increase in the number of species used for FRM production in 27% of countries since 2010 and in 24% of countries since 2015.

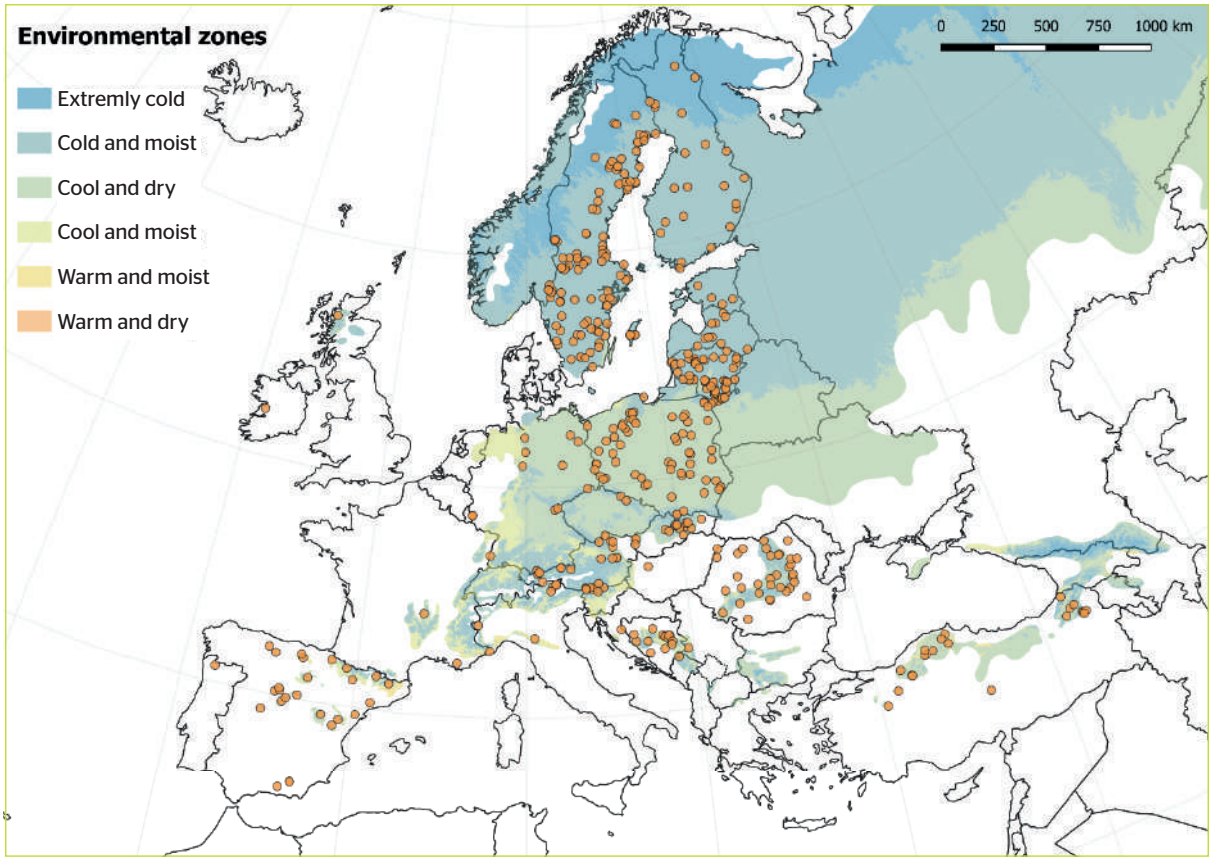
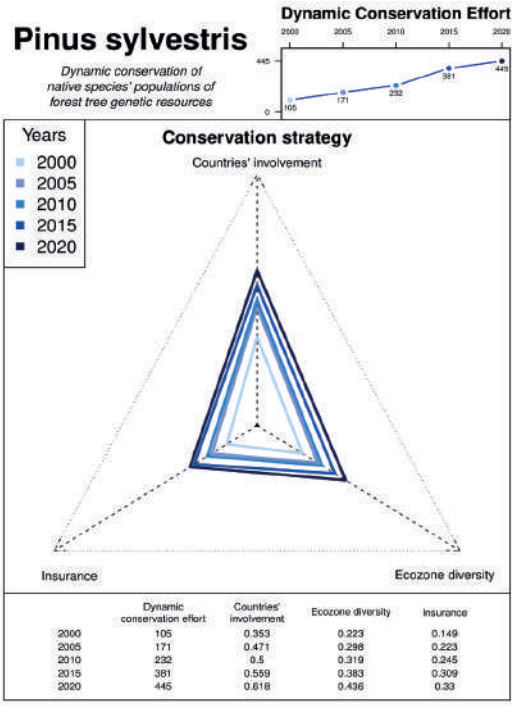


Figure 4.6-1: *Pinus sylvestris* distribution range displaying six environmental zones and the units managed for genetic conservation

Data sources: EUFGIS Portal (http://portal.eufgis.org) and EUFORGEN (www.euforgen.org).

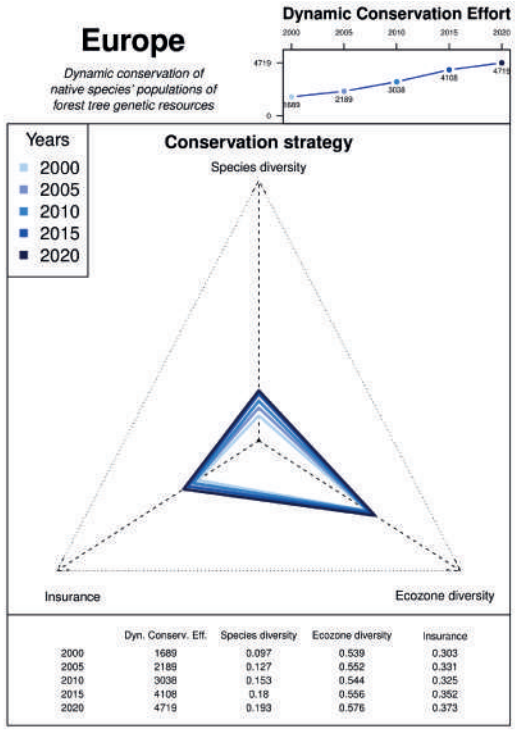
[10] the total number of units for FRM production doesn't take into account that for species in an advanced breeding programme the number may decrease along with improvement



	Dynamic conservation effort	Countries' involvement	Ecozone diversity	Insurance
2000	105	0.353	0.223	0.149
2005	171	0.471	0.298	0.223
2010	232	0.5	0.319	0.245
2015	381	0.559	0.383	0.309
2020	445	0.618	0.436	0.33

Figure 4.6-2: *Pinus sylvestris* graphical visualisation – scatter plot of Dynamic conservation effort and radar chart of Countries' involvement index, Ecozone diversity index, and Insurance index

Note: The numeric values are provided in the table below. Source: EUFGIS - July 2019.



	Dyn. Conserv. Eff.	Species diversity	Ecozone diversity	Insurance
2000	1689	0.097	0.539	0.303
2005	2189	0.127	0.552	0.331
2010	3038	0.153	0.544	0.325
2015	4108	0.18	0.556	0.352
2020	4719	0.193	0.576	0.373

Figure 4.6-3: Scatter plot of Dynamic conservation effort and radar chart of Species diversity index, Ecozone diversity index, and Insurance index for Europe

Note: The numeric values are provided below the graph. Source: EUFGIS - July 2019.

Indicator 4.7 Forest fragmentation

Area of continuous forest and of patches of forest separated by non-forest lands

Key findings

- Continuous forest areas larger than 100 000 ha, without considerable separation by other land uses, form 64% of European forests.
- The share of continuous forest areas larger than 10 000 ha, without considerable separation by other land uses, remained stable over the past 18 years, forming more than three-quarters of European forests.
- Afforestation and natural succession increased the proportion of smaller, fragmented forest patches on non-forest land, improving conditions for biodiversity especially in sparsely forested areas.

Introduction

The indicator provides insight into the spatial distribution of forests. Forest fragmentation is the breaking up of larger, contiguous, forested areas into smaller patches of forest; typically these patches are separated by land with uses other than forest, e.g. transport infrastructure, utility corridors, or other human development, although forests are fragmented also by natural features and processes. Forest fragmentation may affect forest ecosystems, forest-dependent flora and fauna. The reduction of species persistence, richness and abundance and, in more isolated fragments, trend to reduced movement by increasing fragmentation has been shown for various species (Haddad et al., 2015). However, these are rather the effects of habitat shrinkage and isolation than just any division of larger forest areas into smaller areas (Fahrig, 2018).

Forest fragmentation is generally considered at the ecosystem level. The presentation of the state and changes in forest fragmentation at the national level, as required here, renders a simplified approach necessary.

Corine Land Cover (CLC) dataset[11], based on the photointerpretation of satellite images, was used to describe the current state and changes of forest fragmentation (FOREST EUROPE, 2019; Vogt et al., 2019b).

Forest fragmentation is assessed by means of analysing the frequency of forest occurrence in a moving window of 23x23 pixels, as an expression of forest area density (FAD). In addition, such information is complemented by information on the size of a coherent forest area - classifying them into 5 classes: <100 ha, 100 ha to <1 000 ha, 1 000 ha to <10 000 ha, 10 000 ha to <100 000 ha and ≥100 000 ha.

Status

40 FOREST EUROPE signatory countries are covered by the CLC 2018 classifications. These countries represent 90% of forest area and 91% of forest and other wooded land area in the region.

Based on the above-mentioned assessment, the continuous forests represent a share of 91.7% and 92.2% in EU-28 and Europe, respectively. The highest share of continuous forests is in the region of North Europe (97.3% out of all forests in the region is classified as continuous), followed by regions of South-East Europe, Central-East Europe, South-West Europe and Central-West Europe (Table 4.7-1).

Table 4.7-1: Share of continuous forests and forest patches separated by non-forest land, by region, 2000-2018

Region	Share of continuous forests (of total forest area)		Share of forest patches separated by non-forest lands	
	%		%	
	2000	2018	2000	2018
North Europe	97.2	97.3	2.8	2.7
Central-West Europe	83.8	83.6	16.2	16.4
Central-East Europe	89.8	90.2	10.2	9.8
South-West Europe	90.6	89.0	9.4	11.0
South-East Europe	93.5	93.7	6.5	6.3
EU-28	92.0	91.7	8.0	8.3
Europe	92.4	92.2	7.6	7.8

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 52%, S-WE 100%, S-EE 100%, EU-28 100%, Europe 90%.

[11] https://land.copernicus.eu/pan-european/corine-land-cover/

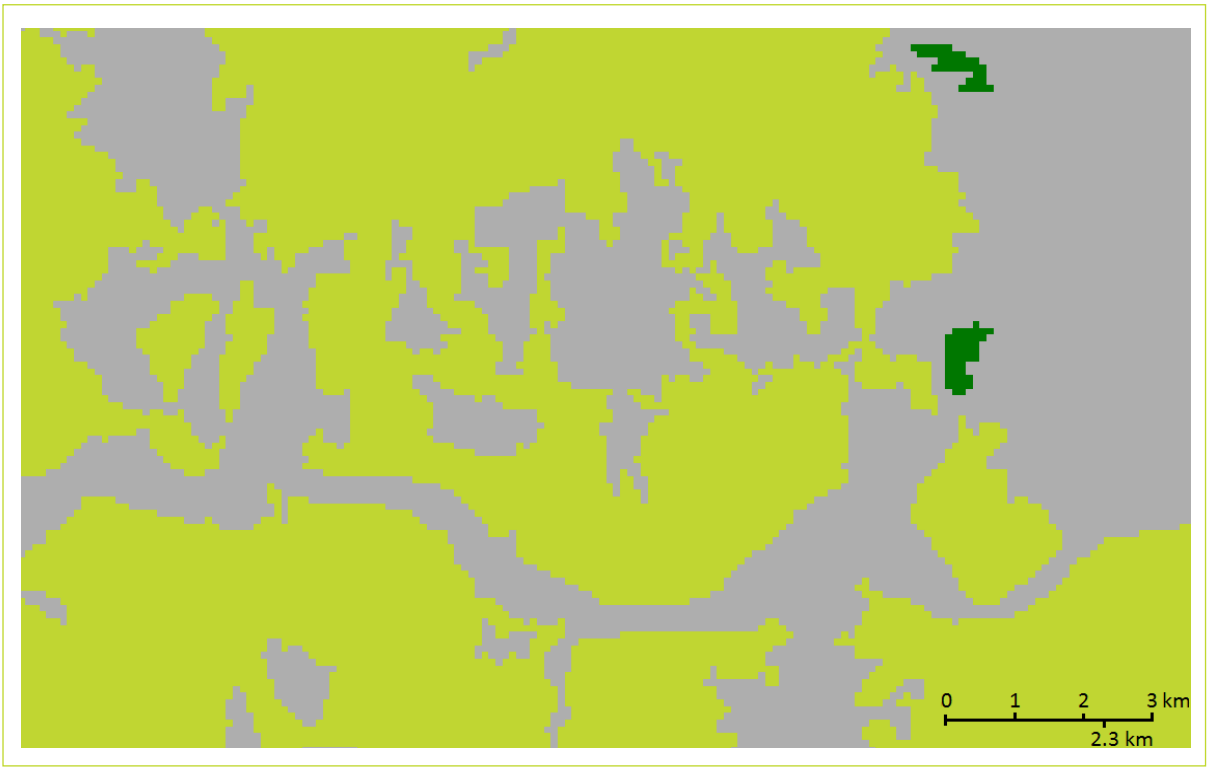


Figure 4.7-1: An example of continuous forests and of forests separated by non-forest land

*Note: FAD is calculated for each forested pixel (percentage of forested pixels in 2.3 by 2.3 km surrounding) in the assessed patch of forest; the patch is considered as **continuous forest** (displayed in **bright green**) if the average of its individual pixels' FADs is at least 40%; otherwise, **the patch** is classified as forest separated (displayed in **dark green**) by **non-forest land** (displayed in **grey**).*

Contiguous forest areas of over 100 thousand ha account for 64% of the forest area in Europe (Table 4.7-2). In North Europe, more than 85% of the forests belong to this size class. In Central-West Europe, the size classes over 100 ha are relatively evenly distributed. In all European regions, contiguous forests with an area of more than 100 thousand ha are more common than forest patches in any smaller size class. Contiguous forest areas under 100 ha are most common in Central-West Europe with 7.8%.

Table 4.7-2: Share of forest area in forest-patch-size classes, by region, 2000-2018

Region	0 - 100 ha		101 - 1 000 ha		1 001 - 10 000 ha		10 001 - 100 000 ha		100 001 ha and larger	
	%		%		%		%		%	
	2000	2018	2000	2018	2000	2018	2000	2018	2000	2018
North Europe	1.5	1.5	3.6	3.5	4.6	4.4	5.0	5.1	85.3	85.5
Central-West Europe	7.5	7.8	18.2	17.2	22.3	21.4	19.2	20.1	33.0	33.5
Central-East Europe	4.3	4.2	12.2	11.8	19.3	18.7	22.4	23.6	41.7	41.8
South-West Europe	3.8	4.9	11.5	12.0	14.3	13.7	16.8	16.4	53.7	53.0
South-East Europe	2.5	2.6	8.9	8.3	12.2	10.9	16.0	16.1	60.6	62.1
EU-28	3.5	3.8	9.1	9.0	11.8	11.6	11.1	11.9	64.5	63.7
Europe	3.3	3.5	8.9	8.7	11.7	11.2	11.9	12.4	64.2	64.2

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 52%, S-WE 100%, S-EE 100%, EU-28 100%, Europe 90%.

Trends

The trend in forest fragmentation was assessed by comparing forest cover maps derived from CLC 2000 and CLC 2018.

Results of the analysis show a stable percentage of continuous forests in Europe over almost 20 years period when their share was 92.4% and 92.2% in 2000 and 2018, respectively. The share of the continuous forest increased in North Europe, Central-East Europe and South-East Europe, and dropped in Central-West and South-West Europe (Table 4.7-1).

In the period of 2000-2018, the majority of forests in Europe remained in the class of the largest patches, larger than 100 thousand ha, with unchanged share 64.2%, when the share of forests in this class showed little increase in North Europe, Central-West, Central-East and South-East Europe, and drop in South-West Europe (Table 4.7-2). In the same region and period, the proportion of forests in patches between 10 001 - 100 000 hectares showed an increase by 0.5%, while the proportion of patches 101 - 1 000 hectares and 1 001 - 10 000 hectares dropped by 0.2% and 0.5% respectively. The proportion of patches smaller than 101 hectares dropped by 0.2%. The stable proportion of continuous forest indicates that conversion of continuous forests to other types of land cover is compensated for by the reverse conversion and does not result in a shrinkage of the area of habitats of forest-related species.

The overall increase in the total forest area in Europe is reflected in shares of individual types of change over the period 2000-2018 (Table 4.7-3), when the conversion of non-forest land cover to either continuous or separated forest patches was more frequent (6.1%) than conversion from continuous or separated forest patches to non-forest land cover (5.7%). Also, conversion of separated patches of forest to continuous forests was more frequent (0.9%) at the pan-European level than the reverse process (0.7%). The balance of transitions among non-forest land, continuous forests and separated forests shows a net increase of separated forests in the region, which indicates that forest area has increased in less forested areas.

The interpretation of forest fragmentation impact on biodiversity remains limited due to the diversity of forest species, their habitat requirements as well as species interactions (FOREST EUROPE. 2019b). In general, however, the appearance of new forests observed by means of a positive balance of non-forest land conversion to patches of forest separated by non-forest lands in all regions except South-East Europe, may result in positive effects on overall biodiversity and abundance of forest-related species, especially in areas with lower forest cover. Even though in areas with higher forest cover, the effect of forest expansion (positive balance of separated forests conversion to continuous forests) observed in all regions except South-West Europe, may also be positive for populations of forest-related species, its positive effect is probably not immediately obvious. Similarly, some conversion of larger forest patches to smaller in such areas might have marginal effects on the populations of forest related species (see e.g. Fahrig, 2018).

Table 4.7-3: Share of individual types of change among following categories: non-forest, continuous forest, forest patches, by region, 2000-2018

Region	Change						No change	
	Non-forest to continuous	Continuous to non-forest	Non-forest to patches	Patches to non-forest	Patches to continuous	Continuous to patches	Patches to patches	Continuous to continuous
	%							
North Europe	1.4	1.3	0.3	0.1	0.3	0.2	2.2	94.2
Central-West Europe	3.7	2.8	2.6	1.8	1.1	0.8	13.1	74.1
Central-East Europe	4.3	2.0	1.5	0.6	1.3	0.4	7.7	82.3
South-West Europe	9.4	12.0[12]	3.0	2.3	1.4	1.7	4.6	65.6
South-East Europe	7.7	7.7	1.2	1.2	1.0	0.8	3.7	76.7
EU-28	4.1	4.0	1.5	1.0	0.9	0.6	5.6	82.2
Europe	4.7	4.7	1.4	1.0	0.9	0.7	5.2	81.4

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 100%, C-EE 52%, S-WE 100%, S-EE 100%, EU-28 100%, Europe 90%.

[12] The higher frequency of changes in South-West Europe region is caused by transitions between forest classes (CLC 311, 312, 313, 324) and closely related classes, e.g. 323 - Sclerophyllous vegetation, 244 – Agro-forestry areas.

Indicator 4.8 Threatened forest species

Number of threatened forest species, classified according to IUCN Red List categories, in relation to total number of forest species

Key findings

- The availability of information on threatened forest species in Europe remains at the level of previous assessments.
- About 86% of threatened tree species reported by individual countries belong to the vulnerable or endangered IUCN red-list categories, around 12% to critically endangered, while a bit more than 2% are extinct within a country. This includes trees growing at the limits of their potential range, that are naturally rare in the respective country.
- The information available on other threatened species groups remains more heterogeneous and sometimes fragmentary, reflecting the difficulties with monitoring of particular species and improving coverage of national Red Lists. Thus, any changes need to be interpreted with care.

Introduction

Biodiversity depletion is often expressed in the number of species lost. Prevention of further species loss due to anthropogenic factors is a key objective of biodiversity conservation. Europe has been at the forefront of many international initiatives to halt biodiversity loss (Pullin *et al.,* 2009)[13]. Together with many national and regional strategies on biodiversity conservation, they form a framework for halting the further decline of species in Europe. According to IUCN, threatened species are those listed in the one of the following Red List categories: vulnerable, endangered or critically endangered (IUCN, 2019). A forest species is a species that is dependent on the forest for part or all of its day to day living requirements, or for its reproductive requirements. Therefore, an animal species may be considered a forest species even if it does not live most of its life in a forest (UNEP, 2001). Forest species considered in this indicator are divided into trees, birds, mammals, vascular plants, other vertebrates, other invertebrates and cryptogams and fungi. The relationships between forest species and the structures, climate and people affecting forest ecosysytems are complex. The interplay between the many factors influencing the threats to a species in the forest often makes it difficult to determine causalities and set measures to prevent its decline. Elements such as deadwood, tree microhabitats and other tree-based features are important structural elements for many threatened forest species. The quality and quantity of such structures may vary between different forest ecosystems and management approaches, as well their threshold values for supporting threatened forest species. There are indications of increased attention for integrating biodiversity conservation in forest management, which supports the conservation and promotion of such structural elements..

Data availability

The collection, of data on threatened forest species for the compilation of national Red Lists is a demanding and time-consuming process. The questionnaire for this report inquired after data on numbers of threatened forest species for trees, birds, mammals, other vertebrates, other invertebrates and cryptogams and fungi. The numbers provided refer to the nearest year in which respective Red Lists were confirmed or published. For this report, most extensive data were reported on forest tree species group (26 countries), followed by birds (25), mammals (23) vascular plants (23), other vertebrates (21), other invertebrates (20) and cryptogams and fungi (19).

While some national Red Lists cover, based on extensive monitorings, a broad set of species groups, some countries have provided no information or information limited to one of the species groups. This results from substantial differences in both the forest area and the abundance of forest species. Methods of data collection or legal structures may also change over time, not necessarily reflecting changing species dynamics. Several countries have used secondary data or numbers are stated by experts based on the availability of qualitative reports. The reliability and accuracy of the information may vary, depending on both the quality and coverage of the available data. Countries may employ different methods of data collection, categorisation and presentation, creating possible differences in presented data. Finally, countries may use different criteria and threshold values for the assessment of species being threatened.

In general, there is a species diversity gradient from species-rich southern Europe to more species-poor northern Europe. However, forest-occurring species are proportionally more abundant in the North and in countries with extensive forest cover. Therefore, comparisons of absolute numbers between countries are not always meaningful. Also, if the

[13] Some notable initiatives include the Convention on Biological Diversity (1992), the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979), EU Biodiversity strategy 2020 (2011), and the European 2020 targets, which were agreed on at the FOREST EUROPE Ministerial Conference in Oslo (2011).

total number of forest-occurring species is related to the unit area, i.e. divided by the area of forest land in a country, small countries may emerge as more species-rich. If Europe as a whole is considered, the situation of threatened forest species may appear different as if individual countries are considered. For example, species that have a limited distribution in one country may be nationally classified as threatened while they may be not threatened at European level.

Status

26 countries have since 1990 reported at least once on the total number of species of forest-occurring trees. The number of taxa ranges between five taxa (Iceland) and 280 taxa (Czech Republic). 35 countries have reported on the status of threatened forest-occurring tree species since 1990 (Figure 4.8-1).

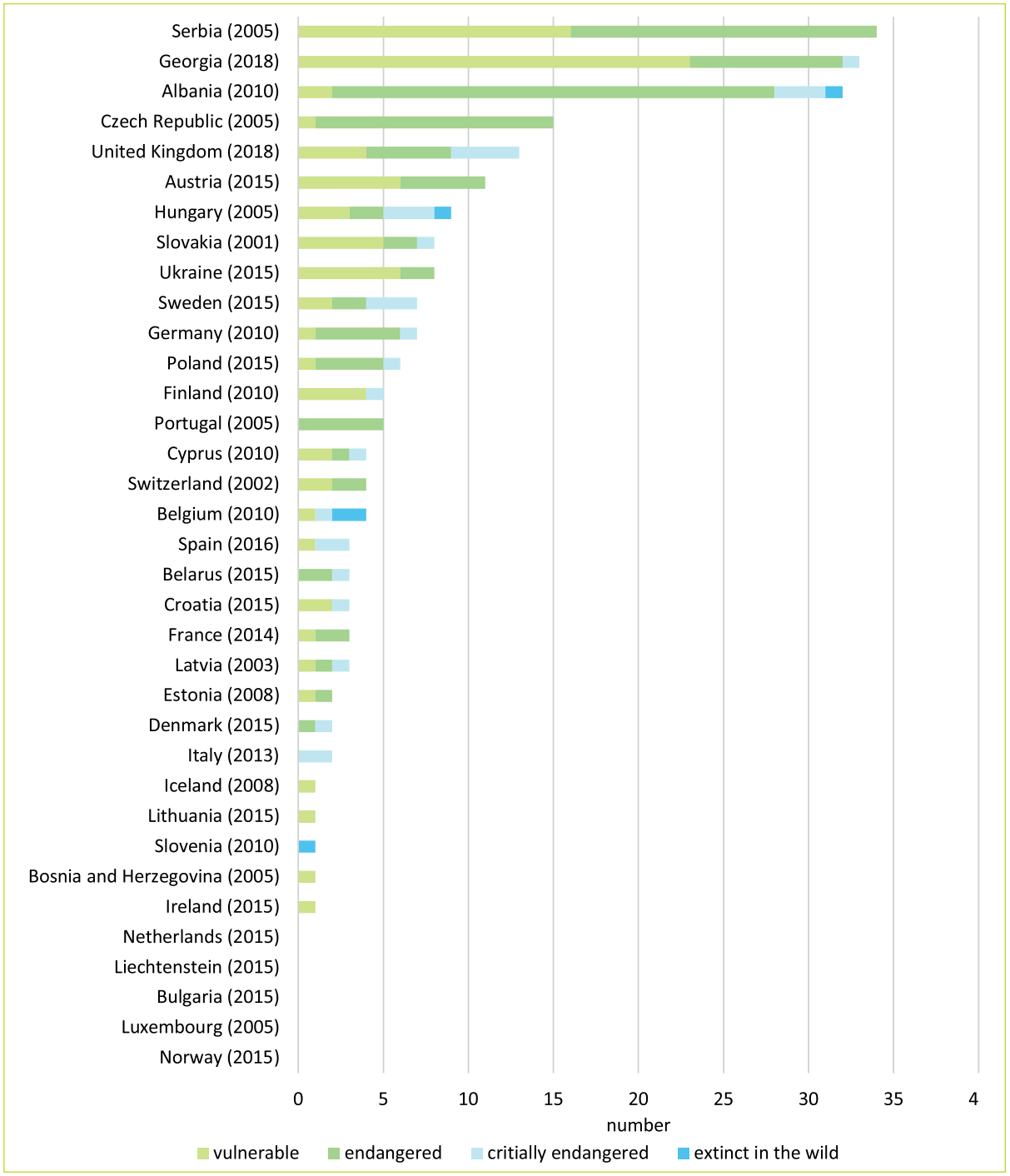


Figure 4.8-1: Number of threatened forest tree species by IUCN categories, by country

Note: The year of the most recently published data per country is provided in brackets.

Five countries reported no threatened tree species. (Figure 4.8-1). 24 countries also provided data on the total number of taxa in the country, making it possible to calculate the percentage of threatened forest-occurring tree species related to the total number of tree taxa in the country (Table 4.8-1). Figure 4.8-2 summarises the share of vulnerable, endangered, critically endangered and extinct forest tree species in relation to the total number of threatened forest-occurring tree species in all reporting countries. It shows that 59.3% of threatened forest trees species are considered endangered/critically endangered.

Differences in taxonomic classification may cause species to be counted differently between countries. The United Kingdom is rich in *Sorbus* taxa and has reported all of them to be threatened. Hungary reports around 30 threatened *Sorbus* taxa in the country. Due to difficulties of identification, they are, however, not reflected in the figures provided by Hungary. Sweden has declared *Fraxinus excelsior* and *Ulmus glabra* as threatened, though not threatened in most of Europe. Pests and pathogens, ash dieback and Dutch elm disease respectively have contributed to an accelerated decline of the tree species on a European scale and thus may lead, in cases, to adding them to the list of threatened forest-occurring tree species. Hungary and Slovenia each reported one tree species extinct in the wild, while in Slovenia before 1990, in Hungary since 2005.

Table 4.8-1: Number of threatened forest tree species compared to the total number of tree taxa, by country

Country	Total taxa	Total threatened taxa (extinct species excluded)	Share of threatened taxa (in %)
Austria (2015)	51	11	21.6
Belarus (2015)	155	3	1.9
Belgium (2010)	50	2	4.0
Bosnia and Herzegovina (2005)	97	1	1.0
Bulgaria (2015)	88	0	0.0
Croatia (2015)	238	3	1.3
Cyprus (2010)	36	4	11.1
Czech Republic (2005)	280	15	5.4
Denmark (2015)	31	2	6.5
Estonia (2008)	27	2	7.4
Finland (2010)	31	5	16.1
Germany (2010)	80	7	8.8
Hungary (2005)	53	8	15.1
Iceland (2008)	5	1	20.0
Italy (2013)	117	2	1.7
Liechtenstein (2015)	39	0	0.0
Lithuania (2015)	38	1	2.6
Poland (2015)	81	6	7.4
Portugal (2005)	87	5	5.7
Slovenia (2010)	74	0	0.0
Spain (2016)	150	3	2.0
Sweden (2015)	35	7	20.0
Switzerland (2002)	46	4	8.7

Note: The year of the most recently published data per country are provided in brackets.

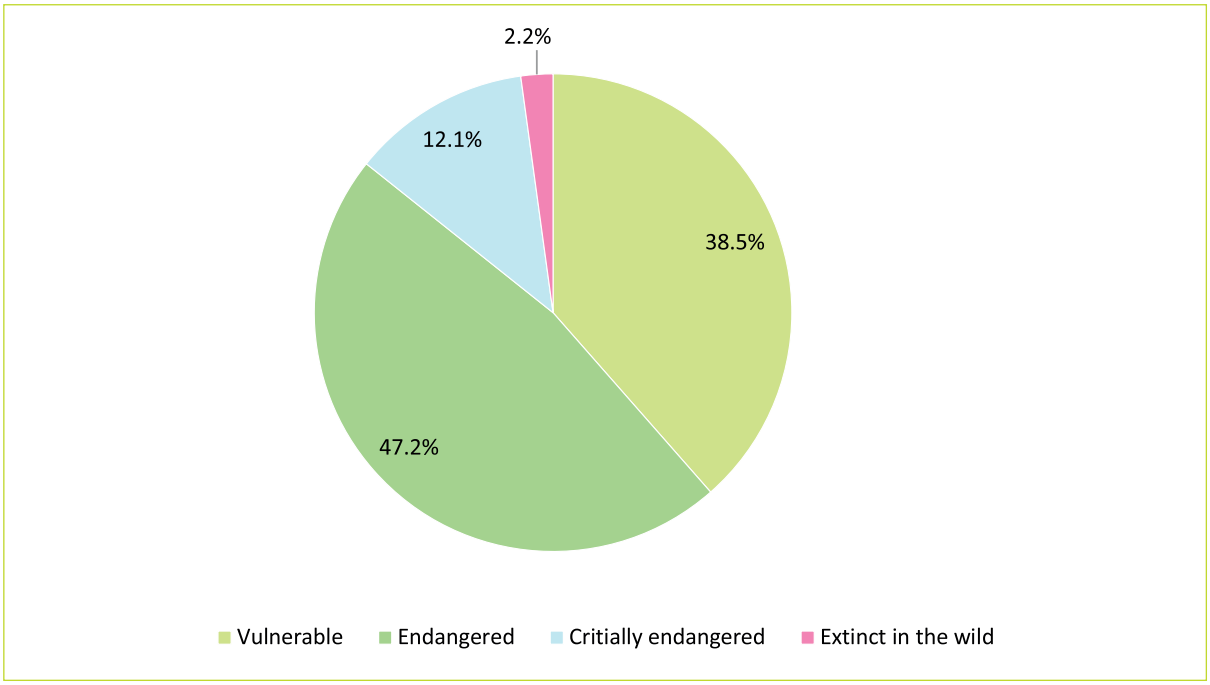


Figure 4.8-2: Share of vulnerable, endangered, critically endangered and extinct forest tree species compared to the total number of threatened forest tree species

Note: Data coverage as % of total regional forest area: Vulnerable 81%, Endangered 75%, Critically endangered 82%, Extinct in the wild 69%.

Besides the threatened forest tree species, many countries reported on other forest species groups. Belarus reported the highest number of threatened forest bird species among all reporting countries (57). Other countries reporting more than 20 threatened bird species were Spain (44), Slovenia (39), France (29), Hungary (27), Finland and Switzerland (both 22). In total 25 countries reported on threatened forest bird's species (Table 4.8-2).

The highest number of threatened mammals is reported from Switzerland (24). 23 countries reported on mammals. Information is particularly lacking in countries of South-East Europe, where three counties reported such information (Bulgaria, Croatia and Slovenia). Data for South-West Europe was provided by two countries (Spain and Italy). The best-covered region is North Europe (all but one country reported) where the number of threatened mammals ranges from zero for Iceland and one for Estonia to 12 in Sweden.

The highest absolute numbers of threatened vascular plants were recorded in France (611), Austria (267) and Hungary (261). Also, Slovakia reported the number of threatened vascular plants higher than 200 (230). Two countries reported that none of the forest vascular plants is threatened on their territory (Bulgaria and the Netherlands). In total 23 countries reported for this category.

21 counties have available data for other threatened vertebrates, 20 countries on other invertebrates and 19 countries reported on cryptogams and fungi. North Europe has the most complete data coverage for these groups with the noticeable number of 'other invertebrates' and 'cryptogams and fungi' reported as threatened. In Central-West Europe, Germany reported 1 284 fungi species as threatened. Also, Switzerland indicated high numbers of threatened fungi species (1 049). Austria reported six species as threatened for other invertebrates.

Besides tree species, several other forest-occurring species have gone extinct in countries where they previously occurred (Table 4.8-2).

Trends

There is a stable number of countries providing data on threatened forest species. The data, however, remain heterogeneous and sometimes fragmentary. Changes in the reported numbers on threatened species may not represent actual changes in species' status, due to increased efforts in data collection for Red Lists or changes in taxonomical categorisation. Countries noted that time trend analysis under these conditions should be interpreted with caution.

Table 4.8-2: Numbers of threatened forest species by species groups, by country

Country	Birds	Mammals	Other vertebrates	Other invertebrates	Vascular plants	Cryptogams and fungi
Austria	14	16	18	6	267	88
Belarus	57	15	13	75	153	105
Bulgaria	12	8	17	6	0	0
Croatia	13	7	4	11	34	257
Denmark	6	7	0	257	27	582
Estonia	11	1	1	5	37	36
Finland	22	5	2	528	48	448
France	29	6	10	11	611	-
Georgia	9	12	4	3	23	-
Germany	14	-	-	-	7	1 284
Hungary	27	6	-	-	261	-
Iceland	3	0	-	-	1	14
Ireland	1	-	-	10	7	2
Italy	10	11	2	-	-	-
Latvia	19	9	2	46	76	28
Netherlands	0	0	0	0	0	1
Norway	7	10	0	544	60	509
Poland	14	9	3	-	98	-
Slovakia	20	20	30	632	230	95
Slovenia	39	19	29	212	-	82
Spain	44	17	32	21	144	-
Sweden	15	12	3	304	50	528
Switzerland	22	24	23	244	61	1 049
Ukraine	18	20	12	68	114	42
United Kingdom	7	0	0	49	29	61

Note: Red List compilation years between countries vary, also compilation years for species groups within one country vary in some countries. The same species might be reported by several countries.

Table 4.8-3: Numbers of "extinct in the wild" forest species reported by species group, by region

Region	Birds	Mammals	Other vertebrates	Other invertebrates	Vascular plants	Cryptogams and fungi
North Europe	7	3	1	185	8	110
Central-West Europe	12	6	1	5	25	213
Central-East Europe	8	7	1	12	24	5
South-West Europe	1	1	0	0	0	0
South-East Europe	6	4	1	15	0	0
EU-28	30	18	3	213	54	315
Europe	34	21	4	217	57	328

Notes: Numbers have been aggregated for the countries per region, not reflecting an aggregate of extinct species per region. The same species might be reported by several countries, thus totals cannot be interpreted as a number of diverse species.
Data coverage as % of total regional forest area:
Birds: NE 97%, C-WE 98%, C-EE 52%, S-WE 30%, S-EE 17%, EU-28 76%, Europe 65%;
Mammals: NE 97%, C-WE 68%, C-EE 47%, S-WE 30%, S-EE 17%, EU-28 68%, Europe 59%;
Other vertebrates: NE 65%, C-WE 66%, C-EE 47%, S-WE 30%, S-EE 17%, EU-28 53%, Europe 48%;
Other invertebrates: NE 100%, C-WE 66%, C-EE 26%, S-WE 0%, S-EE 17%, EU-28 57%, Europe 51%;
Vascular plants: NE 97%, C-WE 96%, C-EE 52%, S-WE 0%, S-EE 14%, EU-28 69%, Europe 60%;
Cryptogams and fungi: NE 97%, C-WE 52%, C-EE 26%, S-WE 0%, S-EE 17%, EU-28 52%, Europe 48%.

Indicator 4.9 Protected forests

Area of forest and other wooded land protected to conserve biodiversity, landscapes and specific natural elements, according to MCPFE categories

Key findings

- In 2015, the reported total protected forest area accounted for nearly 50 million ha (23.6% of forest area in reporting countries) and around 4 million ha of other wooded land (20.5% of other wooded land). About 15% (or 31.2 million ha) of European forests are protected with the main objective of protecting biodiversity, while about 9% (18.2 million ha) aims at the protection of landscapes and specific natural elements.
- The protection for forest biodiversity varies considerably within Europe: while minimal or no intervention in protected forest areas dominate in North Europe and South-West Europe, larger protected forest areas with active conservation management for protecting forest biodiversity can be found in Central Europe. Areas protected for landscapes and specific natural elements can be found mainly in Central-West European countries.
- Over the past 20 years, the area of forests protected for biodiversity and for landscape conservation was increasing in Europe approximately by 418 thousand ha (about 0.3% of the forest area) annually. During the last five years, the annual increase of the area of protected forest was about 82 thousand ha.

Introduction

Protected areas are one of the oldest instruments for conserving nature and natural resources and constitute the main pillar of nature conservation laws across Europe. Countries report the areas of two classes defined by the MCPFE Assessment Guidelines for Protected and Protective Forest and Other Wooded Land in Europe (2003) according to their main objective: protection for biodiversity (MCPFE Class 1) and protection of landscapes and specific natural elements (MCPFE Class 2). Class 1 is subdivided according to the human intervention: 1.1 no active intervention; 1.2 human intervention is limited to a minimum; 1.3 conservation through active management. The classes 1.1, 1.2, 1.3 and class 2 support the conservation goal of biodiversity. However, protected forests classified as Class 2 are principally aimed at achieving the goals of landscape diversity, cultural, aesthetic, spiritual and historical values, and recreation.

An example of international nature conservation instrument applied in the European Union is Natura 2000, implemented by the Member States. The Natura 2000 network is a coherent ecological network of protected areas, including those for forest habitats, designated to ensure the conservation and sustainable use of nature in Europe.

Status

The information provided for the MCPFE classes varies for different years between countries. Information on areas of protected forest in 2020 was provided by 24 countries on Classes 1.2 and 1.3 and by 25 countries on Classes 1.1 and 2 regarding forests, and by 13 countries on Class 1.2 and 14 countries on Classes 1.1, 1.3 and 2) regarding other wooded land (OWL). 19 countries did not provide information for in 2020 although eight of these countries provided information for 2015.

In 2015, the reported total area of protected forest (Classes 1.1.-1.3 and 2) accounted for 49.3 million ha (or 23.6% of forests in reporting countries) and 4.1 million ha of OWL (or 20.5% of OWL). About 31.2 million ha (or 15%) of forests were protected with the main objective of protecting biodiversity (Classes 1.1.-1.3), while 18.2 million ha (about 9%) aimed at the protection of landscapes and specific natural elements (Class 2). (Table 4.9-1)

Countries with the highest proportion (above 40%) of their forests in protected areas (a total of Class 1 and Class 2) are Moldova (100%), Germany (81.1%), Netherlands (59.5%), Slovakia (43.7%), Italy (44.8%) and Hungary (42.5%); these include countries with forest cover ranging from about 11% (Netherlands, Moldova) to above 40% (Slovakia) of their total land area (Figure 4.9-1).

Table 4.9-1: Area of forest and other wooded land (OWL) protected to conserve biodiversity (MCPFE Classes 1.1-1.3) and landscape (MCPFE Class 2) in Europe, 2015

Management objective	Area of protected forests	Share of protected forest area in total forest area	Area of protected OWL	Share of proteced OWL in total OWL area
	1 000 ha	%	1 000 ha	%
Biodiversity, MCPFE Classes 1.1–1.3	31 160	14.9	2 877	14.3
1.1 No active intervention	3 697	1.8	394	2.0
1.2 Minimum intervention	6 382	3.2	1 036	5.2
1.3 Conservation through active management	21 081	10.5	1 447	7.2
Landscape, MCPFE Class 2	18 168	9.0	1 259	6.3
Total	49 328	23.6	4 135	20.5

Notes: Percentages of subclasses do not necessarily sum up to class totals due to diverse data coverage;
Data coverage on forests as % of total regional forest area: MCPFE Classes 1.1-1.3 93%, Class 1.1 93 %, Class 1.2 89%, Class 1.3 89%, Class 2 89%, Total 93%;
Data coverage on OWL as % of total regional OWL area: - MCPFE classes 1.1-1.3 76%, Class 1.1 75%, Class 1.2 75%, Class 1.3 75%, Class 2 76%, Total 76%.

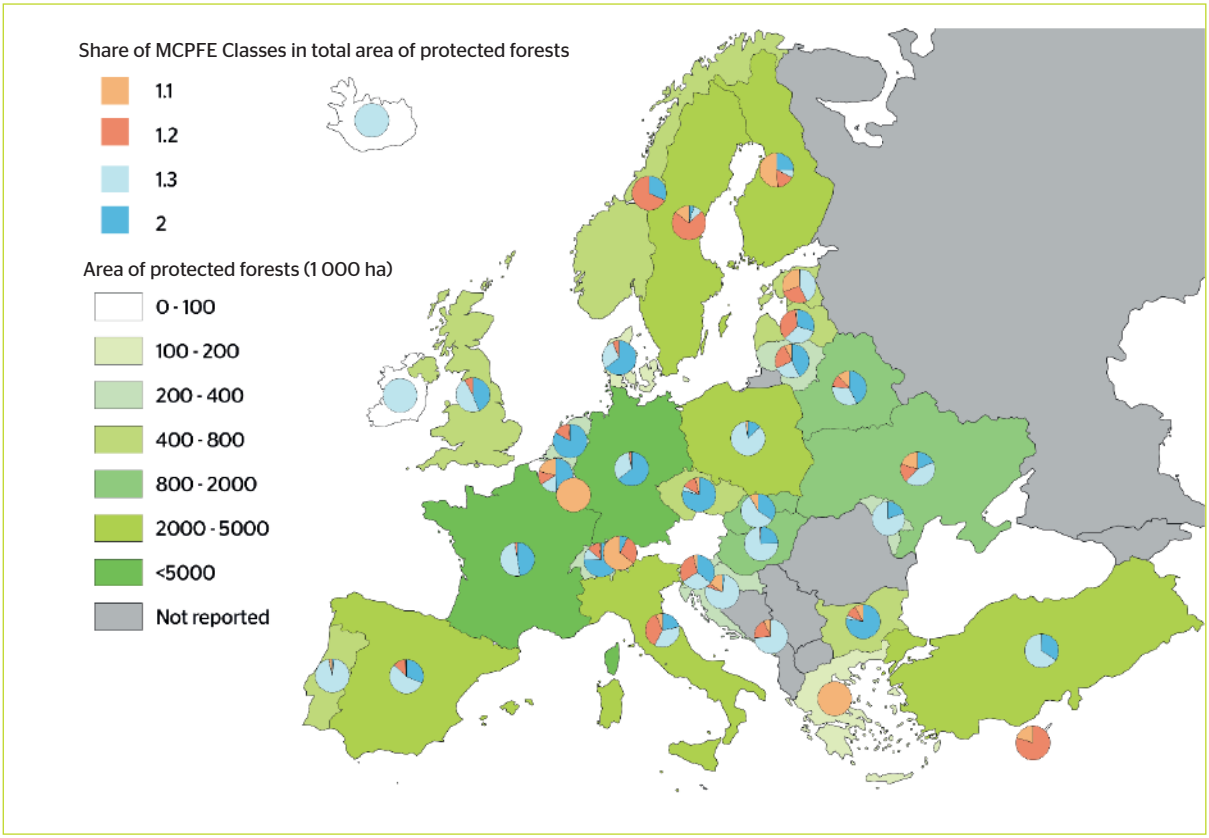


Figure 4.9-1: Area of protected forests and the share of MCPFE Classes in this area, by country, 2015

Note: MCPFE Class 1 for biodiversity protection subdivided to 1.1 - no active intervention, 1.2 - minimum intervention, 1.3 - conservation through active management and MCPFE Class 2 for landscape protection.

Forests protected for conservation of biodiversity (MCPFE Classes 1.1-1.3)

In 2015, the reported forest area within the category protected for the conservation of biodiversity (MCPFE Class 1 subdivided into sublasses 1.1-1.3) accounted for 31.2 million ha. This is equivalent to 14.9% of the total forest area of reporting countries which represent 93% of forests in Europe. OWL area within the same classes accounted for 2.9 million ha. European countries show considerable differences in proportions of the respective protected forest areas to the total forest area. The largest total areas of forest protected for biodiversity conservation are reported by in France, Germany, Italy, Poland, Turkey, Spain, Finland and Sweden. The share of this category from total forest area is highest in Central-West, Central-East and South-West Europe. Republic of Moldova, Italy, Poland, Hungary, Germany Slovakia and Liechtenstein show the share of protected forest area for biodiversity over 25% of their forest area (Figures 4.9-1 and 4.9-2a).

The share of the Class 1.1 (with no active intervention) is 1.8% (Table 4.9-1). Approximately half of this area (1.9 million ha) is located in Finland. Sizeable areas of over 100 thousand ha with no active intervention are located in Sweden, Ukraine, Italy, Estonia, Greece and Belarus (Figure 4.9-1 and Figure 4.9-2a).

The largest forest areas with the minimum intervention (Class 1.2) are located in North Europe and South-West Europe, namely in Sweden, Italy, Finland, Norway and Spain. The greater percentages of the protected areas with the minimum intervention referred to the total forest area are reported by Italy, Netherlands and Liechtenstein (ranging from 8-16%) (Figure 4.9-2b).

Large forest areas with active conservation management for biodiversity (Class 1.3) can be found in Central Europe. France, Germany, Poland, and Turkey have protected areas under this class with over three million hectares each, followed by Spain and Italy, with each over one million hectares.

Forests protected for conservation of lanndscape (MCPFE Class 2)

Landscape protection prevails mainly in Central-West European countries (9.6 million ha or 27.9% of the forest area), Table 4.9-2. The countries with the largest forest areas designated for landscape protection (Class 2) are Germany and France (over three million hectares), Spain and Turkey (over one million hectares) and Finland, Italy, Czech Republic, Bulgaria and Belarus (over 0.5 million ha). The share of protected forest area in Class 2 of the forest area is near to 50% in Germany and Netherlands, and between 15-25% in, the Czech Republic, Republic of Moldova, France, Switzerland (Figure 4.9-2b). The largest protected area of OWL within Class 2 is located in South-West Europe (around one million hectares), in Spain and Italy.

Natura 2000

The Natura 2000 sites designated by the Member States of the European Union, are considered by the reporting countries, according to the explanatory country information, mostly within the Class 1.3 (in Austria, Hungary, Poland, France, Slovakia), or Class 2 (in Denmark and Netherlands). There are countries either not considering Natura 2000 areas when reporting or only if overlapping with national categories of protected forest areas.

Trends

Estimated trends are based on 18 countries that provided data for 2000, 2005, 2010, 2015 and 2020. A clear trend involving an increase in the area of forests protected for biodiversity and landscape in Europe can be observed over the last 20 years (Figure 4.9-3). The protected areas for biodiversity and landscape in Europe increased in the last twenty years approximately 418 thousand ha annually (more than 0.31% of the forest area). In the last 5 years, the annual increase was close to 82 thousand ha (an annual increase of 0.27%).

Forests protected for conservation of biodiversity (MCPFE Classes 1.1-1.3)

The area of protected forests with no active intervention (Class 1.1) increased between 2000 and 2020 by more than 100% corresponding currently to 2.8 million ha. However, in the last five years, this category shows only low increase (Figure 4.9-3).

The largest annual increase rate over the last five years 2015-2020 (more than 0.65% annually) corresponds to the forest areas with the minimum intervention (Class 1.2). Since 2000 this

area increased by 0.9 million ha or 30.2%. The protected forest area with active management for biodiversity (Class 1.3) has increased most extensively – by 5.2 million ha or more than 72.4% since 2000 or 3.1 million ha since 2010. (Figure 4.9-3).

Forests protected for conservation of lanndscape (MCPFE Class 2)

The area designated for forest landscape protection increased by 0.8 million ha (or 7.6%) since 2000. In the last five years, the increase was close to 0.1 million ha (less than 1%).

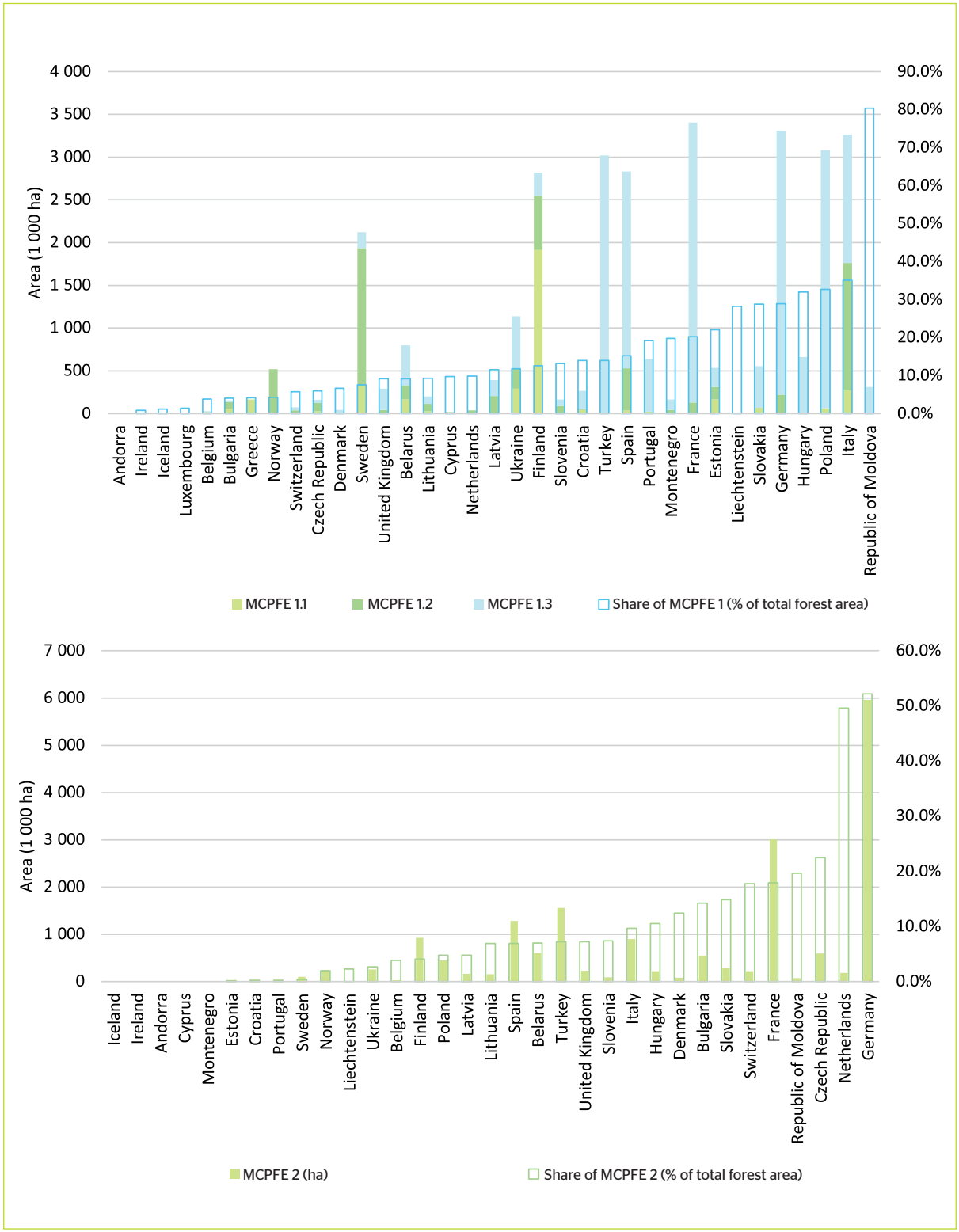


Figure 4.9-2: Forest area protected in MCPFE Class 1 (a) – upper graph and MCPFE Class 2 (b) – lower graph, and their shares to total forest area, by country, 2015

Table 4.9-2: Area and share of forest protected for biodiversity (MCPFE Classes 1.1-1.3) and landscape (MCPFE Class 2), by region, 2015

	MCPFE Category	North Europe	Central-West Europe	Central-East Europe	South-West Europe	South-East Europe	EU-28	Europe
Forests (1 000 ha)	1 Biodiversity	6 633	7 143	6 698	6 734	3 953	25 141	31 160
	1.1 Biodiversity - No active intervention	2 438	22	618	329	291	3 223	3 697
	1.2 Biodiversity - Minimum intervention	3 197	467	512	1 984	221	5 380	6 382
	1.3 Biodiversity - Conservation through active management	998	6 654	5 568	4 421	3 441	16 537	21 081
	2 Landscape protection	1 663	9 625	2 487	2 191	2 201	15 209	18 168
Forests (%)	1 Biodiversity	9.3	18.6	19.3	21.6	11.8	16.3	14.9
	1.1 Biodiversity - No active intervention	3.4	0.1	1.8	1.1	0.9	2.1	1.8
	1.2 Biodiversity - Minimum intervention	4.5	1.4	1.5	6.4	0.7	3.7	3.2
	1.3 Biodiversity - Conservation through active management	1.4	19.5	16.0	14.2	11.6	11.3	10.5
	2 Landscape protection	2.3	27.9	7.2	7.0	7.4	10.4	9.0

Note: Data coverage as % of total regional forest area:
Class1: NE 100%, C-WE 100 %, C-EE 78 %, S-WE 100%, S-EE 83%, EU-28 96%, Europe 93%;
Class1.1: NE 100%, C-WE 100%, C-EE 78%, S-WE 100%, S-EE 83%, EU-28 96%, Europe 93%;
Class1.2: NE 100%, C-WE 90%, C-EE 78%, S-WE 100%, S-EE 74%, EU-28 91%, Europe 89%;
Class1.3: NE 100%, C-WE 89%, C-EE 78%, S-WE 100%, S-EE 74%, EU-28 91%, Europe 89%;
Class 2: NE 100%, C-WE 90%, C-EE 78%, S-WE 100%, S-EE 74%, EU-28 91%, Europe 89%.

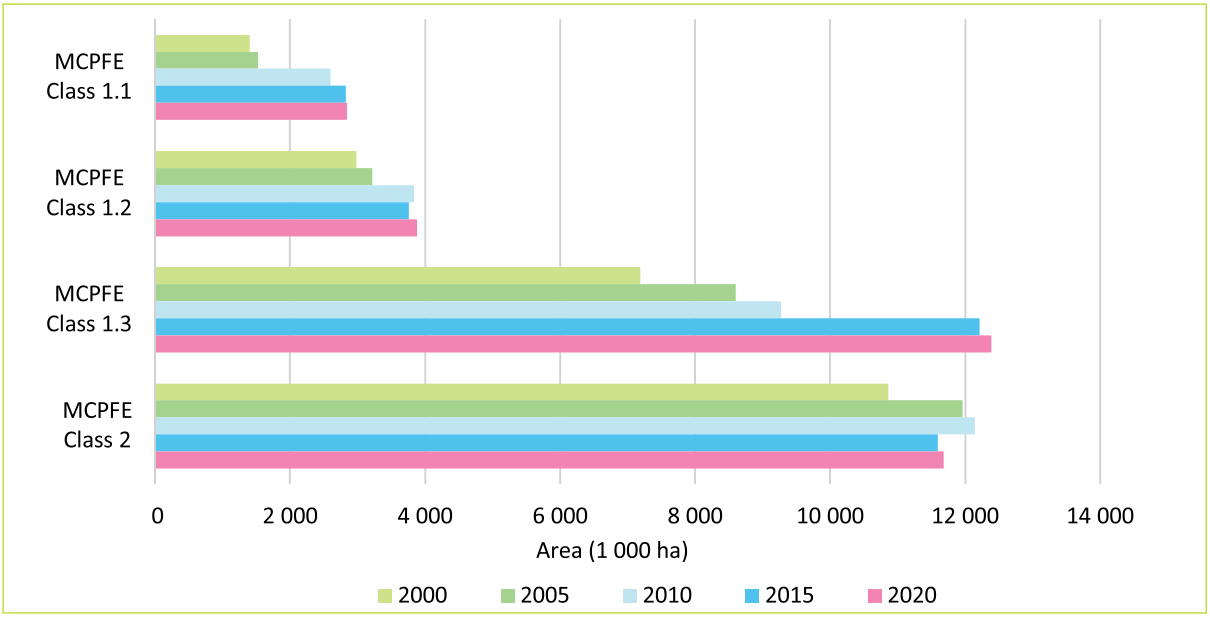


Figure 4.9-3: Trend in area of protected forest in Europe by MCPFE Classes, 2000-2020

Notes: Based on data of countries reporting complete series from 2000 to 2020.
Data coverage as % of total regional forest area: 60%.

Indicator 4.10 Common forest bird species

Occurrence of common breeding bird species related to forest ecosystems

Key findings

- The common-forest-bird index has been relatively stable during the last 37 years, suggesting also stable populations of common forest bird species in Europe.
- The common-forest-birds indicator is not clearly reflecting only forest management practices, bird populations are influenced by many factors other than forest management.

Introduction

Birds are widespread, occur in all types of habitats, use a complex variety of natural resources and are sensitive to changes in the environment. Birds are popular among the public which makes the message of an indicator more compelling as well as suitable for being monitored by citizen science initiatives. This supports the use of this indicator of biodiversity, particularly at larger spatial and temporal scales (Gregory *et al.* 2005).

The common forest bird species indicator, as presented in this chapter, was developed at the pan-European level by the Pan-European Common Bird Monitoring Scheme (PECBMS). Since birds are relevant indicators of biodiversity and common bird indicator has been used for farmland in Europe (www.pecbms.info), the common forest bird species indicator was included into the pan-European set of indicators for SFM set under criterion on biological diversity. This indicator informs about changes in breeding populations of bird species both common and characteristic for European forests. It is based on data from national breeding bird surveys provided by 28 countries. The surveys provide a sample-based assessment of national breeding populations of common bird species in an indices format presenting the relative population change in percent. National population indices of all species are then combined into the European indices[14]. National indices are weighted by national population size for each species in order to ensure that the European index reflects real population sizes of species. Species which are characteristic for forest habitats in Europe are selected and combined to a multi-species index and processed in a special software tool[15]. If the value of the multi-species index increases, it indicates growing forest bird populations, while a decrease signals a decline in populations.

Status

The indicator describes the proportion of the annual population of common forest bird species (Table 4.10-1) in a given year compared to the population of common forest bird species assessed in the reference year, which is for this indicator year 1980. In 2017 the population of common forest bird species was 102.8% of the population of common forest bird species assessed in 1980 (Figure 4.10-1). The indicator-smoothed value in the year 2017, is 97.4%, this value reflects the course of assessed proportions of bird species populations in preceding years. Results of common forest birds monitoring reflected in this indicator indicate that the populations of the common forest bird species are recently at the level of populations in the reference year 1980 (no significant drop or increase).

Table 4.10-1: List of all 34 common European forest bird species included in the indicator and an indication of their population trends, 1980-2017

Accipiter nisus =	*Dryocopus martius +*	*Phylloscopus collybita +*
Anthus trivialis -	*Emberiza rustica -*	*Phylloscopus sibilatrix -*
Bombycilla garrulus +	*Ficedula albicollis +*	*Picus canus +*
Bonasa bonasia -	*Ficedula hypoleuca -*	*Pyrrhula pyrrhula -*
Carduelis spinus -	*Garrulus glandarius +*	*Regulus ignicapilla =*
Certhia brachydactyla +	*Nucifraga caryocatactes =*	*Regulus regulus -*
Certhia familiaris =	*Parus ater -*	*Serinus citrinella -*
Coccothraustes coccothraustes =	*Parus cristatus -*	*Sitta europaea +*
Columba oenas +	*Parus montanus -*	*Tringa ochropus +*
Cyanopica cyanus +	*Parus palustris =*	*Turdus viscivorus =*
Dendrocopos medius +	*Phoenicurus phoenicurus +*	
*Dendrocopos minor **	*Phylloscopus bonelli =*	

*Note: Trend categories: + increase, - decline, = stable, * uncertain.*

[14] https://pecbms.info/methods/pecbms-methods/
[15] https://www.cbs.nl/en-gb/society/nature-and-environment/indices-and-trends--trim--/msi-tool

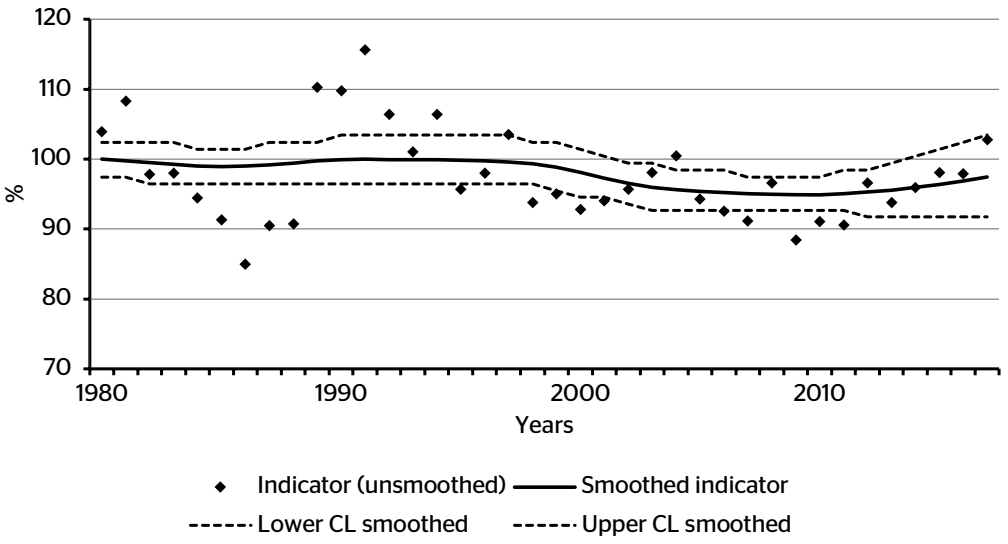


Figure 4.10-1: Trend in common forest bird species indicator for Europe, 1980-2017

Notes: The indicator includes includes 34 bird species for the time period 1980 2017, dots indicate the proportion of common forest bird species populations in a given year compared to populations assessed in the reference year 1980 (populations assessed in 1980 represent 100%). Solid line: smoothed values of the indicator; dotted lines: upper and lower confidence limits (CL) indicating the plausible range of smoothed values. Data source: European Bird Census Council (EBCC), BirdLife International, Royal Society for the Protection of Birds (RSPB) and Czech Society for Ornithology (CSO).

Trends

In the period of years 1980-2017, the proportions of common forest bird species populations fluctuated in the range +/-15% (between 85% in the year 1986 and 115.7% in the year 1991), compared to populations assessed in the reference year 1980. The smoothed line better describes a long-term trend, indicating rather stable forest bird populations in 1980s, small drop in 1990s, stable populations from 2000 to 2010 and small increase from 2010 to 2017. The confidence limits (Figure 4.10-1) inform on the range in which the smoothed index values may fluctuate. The values of indicator – proportions of forest bird species populations compared to populations in the reference year 1980 – suggest that forest management in the period 1980-2017 had no a negative impact on common forest bird species populations in the Europe.

However, the applicability of the Common forest bird species indicator to the SFM concept still remains open to some extent as the index values do not depend solely on state of forest ecosystem or their management (FOREST EUROPE 2019a). Population dynamics of common forest bird species may be influenced also by other factors, such as other land-uses and practices, climate change impacts or the conditions during migration to name a few.

To further improve the understanding of forest management effects on common forest bird populations, it is recommended to complement species records from sampling plots with information on forest state and management practices on these plots and the surrounding area. The work on the indicator within the PECBMS continues and there has been an effort to identify potential gaps in species represented in the indicator.

Indicator C.4: Policies, institutions and instruments to maintain, conserve and appropriately enhance the biological diversity in forest ecosystems

Key findings

Nearly all reporting countries have **policy objectives** regarding the maintenance, conservation and enhancement of forest biodiversity. **Quantitative targets** for the related policy objectives focus mainly on increasing areas of protected forest and increasing deadwood volumes as well as on halting the loss of species diversity. **Institutional measures** taken to achieve these objectives focus, among others, on improvements of forest management planning with a viewpoint on biodiversity, conservation of forests of high biodiversity value and enhanced coordination and collaboration between respective offices on biodiversity issues as well as on the conservation of forest genetic resources. Legal, financial and communication **policy tools** were applied by 23 countries to reach their objectives. Means were new or amended forest and related laws, public financial support for financial losses and increased expenses for special management as well as for communication through a variety of information channels. **Achievements** over the past five years focused on increasing protected forest and Natura 2000 areas, adjusting close to nature- and integrative forest management practices and improving biodiversity monitoring. Major **challenges** and **obstacles** to maintain and appropriately enhance the biological diversity in forest ecosystems include setting of a balanced and more effective sustainable protection of biotopes and species along with sustainable utilisation of forest resources, more demanding management systems, a lack of convergence of nature conservation and forest policy objectives.

Nearly all reporting countries have policy objectives formulated on the maintenance, conservation and enhancement of forest biodiversity.

Almost all reporting countries (27 of 30) have informed about national policy objectives to maintain, conserve and appropriately enhance the biological diversity in forest ecosystems. Due to rising concern about biodiversity loss, 14 countries from all European regions focus their objectives on the particular protection of forest biodiversity, eleven, partly the same countries, focus on the maintenance and enhancement of forest biodiversity. Eight countries stated as objective the restoration of forest biodiversity on the entire forest area where respective deficits exist. Four countries intend to increase their protected forest areas. Four more countries reported on the protection and enhancement of landscape diversity. Seven, mainly Central European countries, reported objectives on enriching tree species composition in afforestation and reforestation, priority to native species and natural regeneration. Close-to-nature forest management to conserve biodiversity, not only in protected areas but also in commercial forests, is in the focus of five countries. Integrated nature management was reported by three countries. Due to the potential and actual threat of invasive species and diseases, five countries reported as objective the monitoring of invasive species, systems to predict invasive species and the appropriate control or suppression of invasive species. The maintenance and conservation of forest genetic resources were reported as an objective by three countries. In one South-East European country, demining and restoration of confirmed minefields and mine suspected forest areas are prerequisites for active protection of the biodiversity in those forests.

Quantitative targets for the related policy objectives focus mainly on increasing protected forest areas and increasing deadwood as well as on halting the loss of biodiversity.

13 countries, nearly half of all reporting countries, conveyed having quantitative targets for the related policy objectives (see Table C.4-1). More detailed information on the targets is available in the country profiles.

Table C.4-1: Country-specific targets on the maintenance, conservation and appropriate enhancement of the biological diversity in forests

Country	Target
Austria, Belgium, Denmark, Estonia, Georgia, Germany, Ireland, Spain, Switzerland	Increase of the protected forest areas
Austria, Finland, Germany, Switzerland	Increase of deadwood
Belgium, Finland, Spain	Halting the loss of biodiversity
Austria, Estonia, Slovakia, Spain	Increase of the area of gene reserve forests
Austria, Estonia	Reductions of the areas without, but in need of regeneration
Austria, Ireland	Increase of broadleaves
Slovakia	Increase of the area of mixed forests through the reconstruction of non-native damaged spruce forests
Austria, Spain	No new occurrences of invasive plant species on forest areas
Slovakia, Slovenia	Adaptation of the production function to biodiversity measures
Luxembourg	4 habitat trees per hectare of public forests

Institutional measures taken to achieve these objectives focus, among others, on improvements of forest management planning with a viewpoint on biodiversity, conservation of forests of high biodiversity value and enhanced coordination and collaboration between respective offices on biodiversity issues as well as on the conservation of forest genetic resources.

To maintain, conserve and appropriately enhance the forest biodiversity, institutional measures were reported by 23 out of 31 countries. Improvements in forest management planning with a viewpoint on biodiversity conservation were implemented in nine countries. Forests of high biodiversity value were put under protection (reported by five countries). Additional eco-cells for nature recovery and conservation were created in three countries. Enhanced coordination and collaboration between the respective ministries and agencies to fulfil the objectives were conducted in two countries. New criteria for integrated nature management were reported by three countries. Conservation measures for forest genetic resources were implemented in three countries. Prohibitions of unjustified deforestation and of cattle grazing were enforced in two countries. Inventories, particularly biodiversity monitoring, were reported in two countries.

Legal, financial and communication policy tools were applied by 23 countries to reach the biodiversity objectives by means of new or amended forest and related laws, public financial support for financial losses and increased expenses and communication through a variety of information channels.

Legal tools: New forest or related laws were reported to be the main legal instruments in seven countries to contribute to the implementation of important measures for biodiversity. Three countries reported their forest laws were amended on aspects of e.g. tree species composition, deforestation, compensations for additional expenses or guidelines on biodiversity. Ministerial regulation, schemes, norms or guidelines on various aspects of biodiversity management were issued in five countries.

Financial tools: To increase the protected forest area, measures for protecting forests including compensations of financial losses and increased expenses were granted through the state budget in six countries. Public financial support for other measures supporting various aspects of forest biodiversity was granted in seven countries. Rural Development Programme support for the improvement of recreational infrastructure was reported by one country in order to better respond

to the social pressure on forest ecosystems and direct the visitors to the dedicated recreational forests.

Communication tools: Nine countries reported informational tools for the general public and decision-makers. They comprise web sites and other biodiversity-related information platforms, communication programs, promotion activities, cooperative information campaigns on biodiversity threats, biodiversity protection and enhancement as well as the publication of forest reports and of related scientific research results.

Achievements over the past 5 years cover increased forest areas in national networks of protected areas as well as in Natura 2000 areas, adjusting close-to-nature and integrative forest management and improving biodiversity monitoring.

19 countries reported on achievements on various biodiversity aspects. An increase of protected forest areas was reported as a particular achievement by six countries, some of them highlighting that they now cover the entire spectrum of forest types. Four EU countries reported as a particular achievement that Natura 2000 areas were increased and further implemented. Adjustments of forest management practices and procedures towards closer to nature or integrative forest management approaches were reported by five countries. Even so, the monitoring of forest biodiversity is quite demanding, five, mainly Central-West European countries reported on improved monitoring methodologies, agreed targets for respective indicators and feasible data obtained in recent inventories. In this regard, it was highlighted that tree species composition is changing in favour of native broadleaved species, preferably of local genotypes or provenances.

Major challenges and obstacles to maintain, conserve and appropriately enhance the biological diversity in forest ecosystems comprise, among other things, limited effectiveness of biodiversity protection in protected forest areas, more demanding management systems, a lack of convergence of nature conservation, forest and climate policy objectives.

Major challenges and obstacles to maintain, conserve and appropriately enhance biological diversity in forest ecosystems were reported by 19 countries. Even so, some reported a general increase in protected forest areas. The establishment of larger protected areas in urban regions, however, remains a challenge. The current effectiveness of biodiversity conservation often does not reach the required status. It is seen as a challenge to achieve a balanced and more effective sustainable protection of biotopes and species along with sustainable utilisation of forest resources, even with the help of forest management planning, contract-based nature conservation and market tools. The provision of the required financial resources for compensations of financial losses and increased expenses as well as contractual solutions was also difficult as reported by a few countries.

Seven countries reported, that enhancement of biodiversity in forests and a shift to an integrative or more close-to-nature forest management would require more demanding management systems, which are less affordable for many private forest owners and often exceed capacities of public management bodies. Improved convergence of nature conservation objectives with forest policy objectives and inconsistencies between diverging targets of sectoral policies were also reported as challenging by five countries. Ensuring the natural regenerative capacity of forests under climate change was reported as a challenge by four countries. One country noted a growing share of threatened species and decline of species in forests. A challenge is also to responsibly control introduced and in particular invasive tree species. Inadequate monitoring of relevant biodiversity aspects like species monitoring, but also monitoring on burned forest areas to evaluate the natural and human-induced evolution, was also reported by three countries.

Criterion 5

Criterion 5: Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (Notably Soil and Water)

Lead authors: **Markus Lier, Andreas Schuck**

Authors of chapters on indicators: **Christoph Fischer, Andy Moffat (5.1), Stefanie Linser (C.5)**

Reviewer: **Valerie Kapos**

Data sources: **National reports on the pan-European indicators for SFM (5.1, C.1)**

Forests are important for preventing soil erosion, protecting water resources, and maintaining other protective functions. Forests also play a vital role in the protection of infrastructure or inhabited areas from natural hazards such as avalanches, rockfalls, noise, dust, heat, and wind. Countries apply specific policies and measures to maintain and improve the above-mentioned protective functions, often within a framework of multifunctional forest management.

Key messages

- About 32% of the forest area is designated for soil, water, and other ecosystem function protection in 25 reporting countries.
- Forests designated for the protection of infrastructure and managed natural resources are reported for about 2% of Europe's forest area.
- Protective functions are often integrated into multifunctional forestry.
- Policy achievements comprise an increasing area of designated protective forests, restoration and afforestation activities, as well as the implementation of relevant legislation, strategies, and action plans to secure protective functions. The challenges faced in achieving policy objectives related to the maintenance and enhancement of protective functions of forests include reduced funding and staff, effects of air pollution, and ageing of designated protective forests.

Indicator 5.1 Protective forests – soil, water and other ecosystem functions – infrastructure and managed natural resources

Area of forest and other wooded land designated to prevent soil erosion, preserve water resources, maintain other protective functions, protect infrastructure and managed natural resources against natural hazards

Key findings

- There is a strong support to the concept of forests designated for protection of soil, water and other ecosystem functions amongst about 40% of European countries. Area of these forests is increasing since 1990. However, protective functions are often integrated into multifunctional forestry.
- Forets designated for the protection of infrastructure and managed natural resources are reported for about 2% of Europe's forest area while on forest and other wooded land it amounts to 2.6%. Most of the designated forest stands are located in mountainous areas.

Introduction

Forests are important for preventing soil erosion, protecting water supplies and maintaining other specific ecosystem functions. Countries apply specific policies and measures to support forests in order to recognise and safeguard these functions. Such measures include the identification of forests to be designated primarily for protective purposes, and the restriction or adaptation of certain management practices to enhance protective functions. Designations of protective forests are administrative in nature or the result of decisions made in the context of land-use and forest management planning and result in specific obligations related to practical management.

Forests also play a vital role in the protection of infrastructure or inhabited areas. Natural hazards such as avalanches or rockfalls are common in mountainous areas. Protective forests can be an efficient means for providing protection against such hazards in those areas. To maintain or even increase these protective functions, specific forest management schemes were developed which often differ considerably from non-protective forests.

Status

Protective forests – soil, water and other ecosystem functions

25 countries provided information on protective forests in 2020, specifically in relation to the prevention of soil erosion, preservation of water resources and maintenance of other ecosystem functions. 23 countries declared designated areas for these protective purposes. European countries reported a total of over 37.6 million ha (in EU-28 21.7 million ha), or just over 32.1% of the forest area in those countries (Table 5.1-1).

Table 5.1-1: Forest area designated for the protection of soil, water and other ecosystem functions, by region, 2020

Region	Protective forests - soil, water and other ecosystem functions	
	1 000 ha	% of forest area
North Europe	506	5.8
Central-West Europe	907	9.6
Central-East Europe	13 727	30.7
South-West Europe	13 018	46.3
South-East Europe	9 453	36.0
EU-28	21 684	30.5
Europe	37 610	32.1

Note: Data coverage as % of total regional forest area: NE 12%, C-WE 24%, C-EE 100%, S-WE 89%, S-EE 64%, EU-28 44%, Europe 52%.

The reported share of protective forests for soil and water and other ecosystem functions ranged from 0 to 100% in individual countries. 24% (11 countries) of European countries reported that over 20% of their forests are considered protective while 9% (four countries) indicated a share exceeding 40%. The share of protective forest area is highest in Georgia (100%), followed by Italy (87%) and the Republic of Moldova (57%). The largest area of protective forests was reported in Central-East Europe (Table 5.1-1), while

the least was reported in North Europe, reflecting also different prevailing terrain conditions. However, this is because most countries in Northern Europe do not distinguish between forest designated for the protection of soil, water and ecosystem functions and those primarily designated for the protection of infrastructure and managed natural resources, reporting a single undifferentiated statistic (Figure 5.1-1). If this undifferentiated area is taken into account, Central-West Europe is the region with the smallest reported area of designated protective forest. However, for this comparison, data were provided by countries representing only 14% of the forest area of this region.

Explanatory information provided by the countries suggests that several are reluctant to define a proportion of national forest area as specifically designated for environmental protection, possibly because this could imply that the remaining areas fail to provide the associated services. The guidelines for data providers require a legal basis or designated management plans that ensure a long-term commitment to protective functions for soil and water and other ecosystem functions, but these are often implemented in conjunction with other functions (e.g. production, recreation). In general, however, only about half the countries provided explanatory information for the 2020 assessment so it is not possible to identify criteria used for their designation with confidence. Identification of such protective forests seems to be largely based on surveys (e.g. mapping of forest functions/services), physical characteristics (e.g. slope, or soil susceptibility to erosion) or designations of some kind, some defined in legislation. Information for assessing their area is often based on analysis of management plans or national forest inventory information, with extrapolation implicated across monitoring periods.

Some countries commented that, while forests fulfil protective functions, their primary aim is "multiple uses", hence they do not qualify for reporting. Another identified that because the soil and/or water protection is a declared basic function of the country's forests, all should be included in the area reported. This highlights the fact that there is considerable disparity in interpretation and that national forestry policy, legislation and data assessment procedures all play a part in reporting on this indicator.

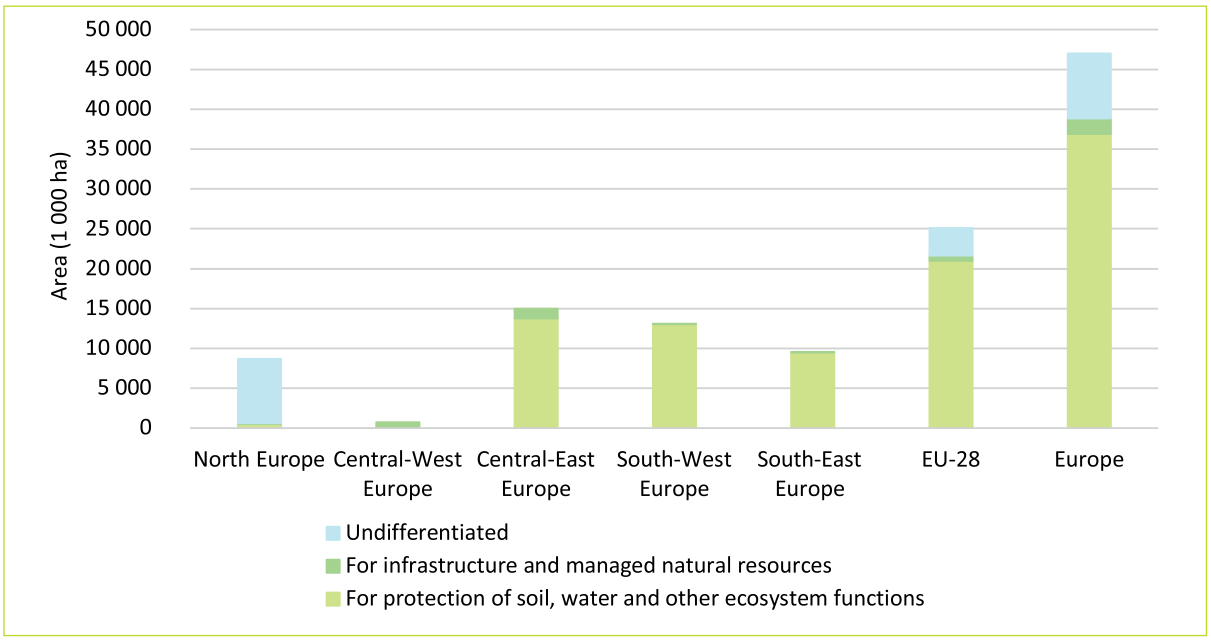


Figure 5.1-1: Area of protective forests, by region, 2020

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 14%, C-EE 100%, S-WE 89%, S-EE 64% EU-28 72%, Europe 77%.

Protective forests – infrastructure and managed natural resources

Data provided on protective forests for infrastructure and managed natural resources are rather fragmentary. On the one hand, few countries stated that the data available does not allow for clear separation from the soil, water and other ecosystem functions. On the other hand, data are sometimes not available for allocation of forest areas with confidence. The above-mentioned difficulties led to the situation that

only 20 countries reported figures on the forest in this category for 2020. Out of those 20 countries, 12 reported that they have designated protective forests for infrastructure and managed natural resources. The remaining stated that there are no such forests in their countries. When considering both forest and other wooded land (FOWL), data coverage does not change notably for Europe, nor for most regions. It does, however, increase considerably for Central-West Europe. The increase can be explained, as Austria reports only for FOWL but not for forest individually. Based on available data, about 2% of Europe's forests have been designated as having protective functions for infrastructure and managed natural resources. In Central-West Europe, the share of the respective forest area is 9.9%, visibly higher and certainly influenced by the large share of such protective forest in Switzerland. When looking at FOWL in Europe about 2.6% is allocated to protective forests for infrastructure and managed natural resources (Table 5.1-2). Through the inclusion of the Austrian data, the share of reported FOWL area increases by 5% in Central-West Europe up to 14.8%, which is about three-fold higher than in any other European region. Most of Europe's FOWL area designated for the protection of infrastructure and managed natural resources is reported by just three countries alone. Switzerland (41.2%) is the country with the highest share, followed by Austria (19.2%), and the Czech Republic (10.7%) (Figure 5.1-2).

Table 5.1-2: Forest and other wooded land (FOWL) area designated for the protection of infrastructure and managed natural resources, by region, 2020

Region	Protective FOWL - infrastructure and managed natural resources	
	1 000 ha	% of FOWL area
North Europe	82	1.0
Central-West Europe	1 326	14.8
Central-East Europe	1 043	4.8
South-West Europe	0	0.0
South-East Europe	22	0.1
EU-28	1 141	2.3
Europe	2 474	2.6

Note: Data coverage as % of total regional FOWL area: NE 11%, C-WE 22%, C-EE 48%, S-WE 63%, S-EE 56%, EU-28 27%, Europe 37%.

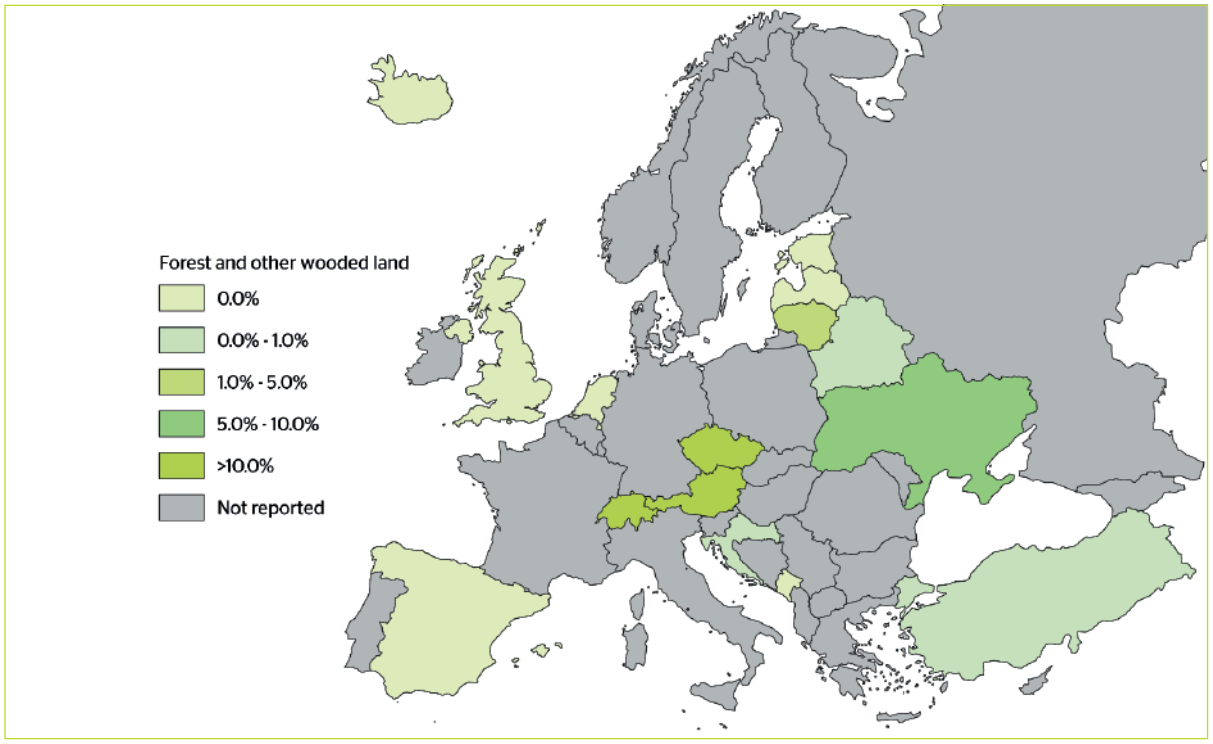


Figure 5.1-2: Share of FOWL area for the protection of infrastructure and managed natural resources, by country, 2020

Trends

Protective forests – soil, water and other ecosystem functions

Only 23 countries, providing series from 1990 to 2020, are included in the analysis of trends. Figure 5.1-3 shows that, in general, the area of forest managed for the protection of soil, water and other ecosystem functions has been increasing since 1990. This indicates that designation of forests for protection of soil, water and ecosystem functions is on increase. However, the relevance of protective functions differs among countries and is often determined by terrain and soil conditions in forests.

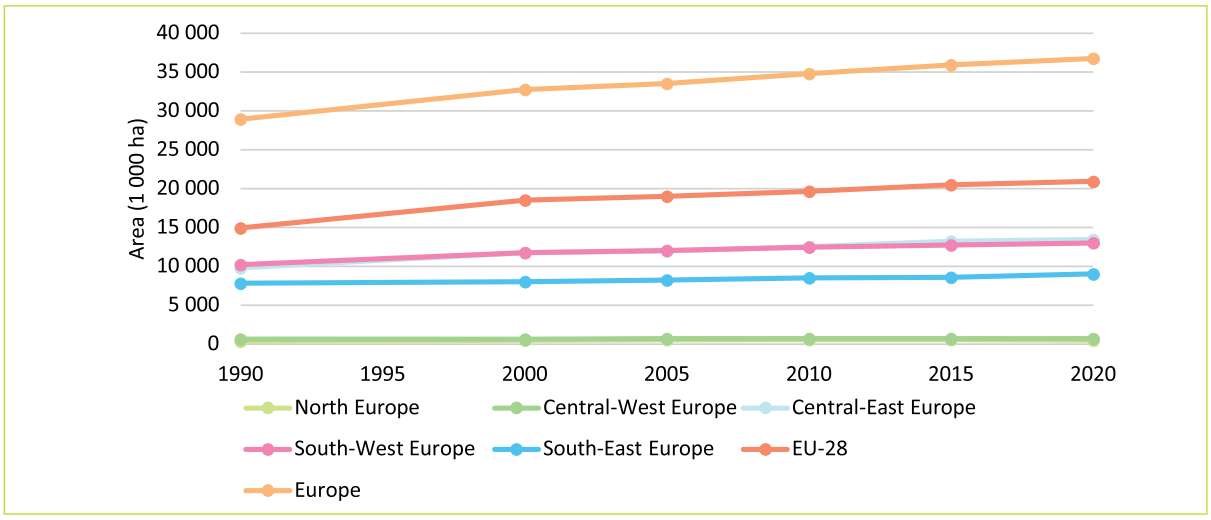


Figure 5.1-3: Trends in the area of protective forests for soil, water and other ecosystem functions, by region, 1990-2020

Note: The trend lines for C-EE and S-WE overlap.
Data coverage as % of total regional forest area NE 12%, C-WE 18%, C-EE 94%, S-WE 89%, S-EE 59%, EU-28 41%, Europe 48%.

Protective forests – infrastructure and managed natural resources

The interpretation of trends has to be approached with caution, as data availability is very limited. To increase the data coverage, the period considered for trends was shortened to 2000-2020 and focused on FOWL. The trends in Table 5.1-3 rely on data from 13 countries, five of these indicating zero area of protective FOWL. The European protective FOWL steadily increased over the last 20 years, while the reported increase from 2015 to 2020 was higher than in previous reporting periods. The large increase in protective FOWL can be attributed to Austria (Central-West Europe), where reported designated area doubled in 2020. Apart from Central-West Europe, no larger changes are reported in the other regions.

Table 5.1-3: Trends in the area of FOWL designated for the protection of infrastructure and managed natural resources, by region, 2000-2020

Region	Protective FOWL area				
	2000	2005	2010	2015	2020
	1 000 ha				
North Europe	71	74	76	78	82
Central-West Europe	718	834	932	939	1 326
Central-East Europe	952	1 057	1 003	1 021	1 043
South-West Europe	0	0	0	0	0
South-East Europe	21	21	21	22	22
EU-28	414	602	730	749	1 141
Europe	1 761	1 987	2 032	2 060	2 474

Note: Data coverage as % of total regional FOWL area: NE 11%, C-WE 21%, C-EE 48%, S-WE 63%, S-EE 54%, EU-28 27%, Europe 36%.

Indicator C.5: Policies, institutions and instruments to maintain and appropriately enhance the protective functions in forest management

Key findings

Most of the reporting countries have **policy objectives** on the maintenance and appropriate enhancement of the protective functions in forest management. A few **quantitative targets** reported for the policy objectives focus mainly on qualitative improvement of the protective functions of forests designated for protecting soil, water, other ecosystem functions, infrastructure and managed natural resources against natural hazards. **Institutional measures** taken to achieve the objectives comprise primarily relevant collaboration and coordination with all concerned stakeholders and the implementation of specified management necessities. Legal, financial and communication **policy tools** include the designations by legal acts, safeguarding financial resources specifically for managing protective forests and information activities. **Achievements** over the past five years comprise increasing designations of protective forest areas, restoration and afforestation activities and the implementation of relevant legislation, strategies and action plan to secure the protective functions. The major **challenges** and **obstacles** to achieving the policy objectives are mainly in reduced funding and staff to enhance the functionality of protective forests, pollutants originating from other sectors as well as ageing of forests which cannot sufficiently fulfil appropriate protective functions.

Most of the reporting countries have policy objectives related to the maintenance and appropriate enhancement of the protective functions in forest management.

The majority of reporting countries (26 of 30) have informed about national policy objectives with regard to Criterion 5. The maintenance and enhancement or improvement of forest protective functions is a major goal of forest policy in 15 countries from all over Europe. Nine countries have particular policy objectives on the protection of water resources - drinking water, strengthening of water storage and retention functions or for the tree vitality in the context of water protective functions. Seven countries mentioned additionally soil protection aspects as the main policy objective, with particular attention being paid to the mitigation and prevention of soil erosion, desertification, physical impacts and to the maintenance of filtration capacities. A few countries also highlighted the importance of forests in mountainous areas for the protection of human life and infrastructure (settlements, railways, roads etc.). Further policy objectives focus on the role of afforestation on unstocked, protective forest areas and on improved particular management to enhance and maintain the protective functions of those forests.

A few quantitative targets reported for the policy objectives focus mainly on qualitative improvement of the protective functions.

References to the following quantitative targets were reported by three countries (see Table C.5-1).

Institutional measures taken to achieve these objectives comprise primarily relevant collaboration and coordination with all stakeholders and the implementation of specified management necessities.

Institutional measures taken to achieve the policy objectives were reported by 22 countries. Five countries reported focusing on respective collaboration and coordination with other sectors, related departments and local municipalities to maintain and enhance the protective functions.

Six countries reported on the implementation of specified management necessities, including restrictions for clear-cutting systems in the protective forests. The following institutional measures were mentioned by a few countries only:

- creation of framework conditions for the sustainable provision of the qualitatively and quantitatively adequate water supply from protective forest areas,
- strengthening of risk governance approaches and their implementation in protective forests,
- pre-emption rights of state and municipalities in trading with protective forests,
- elaboration of criteria for protective forest designation,
- monitoring of protective forest areas.

Table C.5-1: Country-specific targets on the maintenance and appropriate enhancement of the protective functions in forest management

Country	Target	Specification
Austria	Raising the share of protective forest areas where no measures for improvement are needed	from 41% to 45% until 2020
Austria	Reducing the percentage of protective forest areas where measures for improvement are urgently needed	from 24% to 20% by 2020
Austria	The utilisation of the subsidies available for protective forest management	100%
Poland	Increasing the volume of retained water in forests in lowland areas	up to 2.1 mil m^3
Poland	Increasing the volume of retained water in forests in mountainous areas	up to 0.4 mil m^3
Switzerland	Reduction in the area of critical protective forests	25% by 2040
Switzerland	Improvement of the protective function	3% of the total protective forest area annually

Legal, financial and communication policy tools were applied by 24 countries to reach the objectives. They include the designations by legal acts, safeguarding financial resources specifically for managing protective forests and multiple information activities.

Legal: In 13 countries from all regions, protective functions of forests are properly designated by legal documents, most often Forest Acts, but for instance also in Flood Risk Management Acts.

Financial: Safeguarded public financial resources for the management of protective forests and the improvement of their protective functions were reported by nine countries. Subsidies for private forest owners for relevant management activities were reported by two countries. Rural development programme funds for management activities in protective forests were reported by four South European countries. In a Central-East European country, protective forests are not subject to property tax.

Communication: Information activities highlighting protective forest management requirements or its importance for the maintenance of soil and water protective functions were reported by eight countries. They comprise workshops and conferences on protective forests, information platforms, cooperation with local municipalities, communication of scientific research and awareness-raising of society and target audiences outside of the forest sector regarding the importance of forest management in protective forests to maintain their protective functions.

Achievements over the past five years comprise increasing designations of protective forest areas, restoration and afforestation activities and the implementation of relevant legislation, strategies and action plans to secure the protective functions.

18 countries reported on achievements to maintain and appropriately enhance the protective functions in forest management. This includes that the designated area of protective forests has been increasing in the past five years in four Eastern European countries. Successful forest restoration and re-establishment of stands on degraded protective forest areas was reported by four countries. Implementation of relevant EU legislation, national strategies and action plan to secure protective functions was particularly reported by five countries.

The major challenges and obstacles to achieving the policy objectives include mainly on reduced funding and staff to enhance the functionality of protective forest, reduction of pollution originating in other sectors as well as ageing forest stocks which cannot sufficiently fulfil appropriate protective functions.

Challenges and obstacles in the area of Criterion 5 were reported by 22 countries. They comprise the following topics ranked according to the occurrence in the national reports:

- enhancement of the functionality of protective forests as an efficient and low-cost method to protect soil, groundwater and settlement areas and infrastructure while facing at the same time reducing resource availability in terms of funding and staff,
- nitrogen and other depositions from other sectors contaminating forest soils and groundwater reservoirs,
- the ageing of forests, coupled with the lack of sufficient natural regeneration, the lack of uneven-aged stand structure, reduced stability and vitality of the trees and the high maintenance and harvest costs in mountain forests,
- lack of supportive scientific evidence,
- insufficient communication with public, media and politicians,
- increased soil degradation due to global warming and climate change,
- due to extreme site conditions, high shares of protective forests are not suitable for timber supply,
- adjustment of game management to the requirements of protection efficiency,
- long-term negative effects after events as avalanches and mudslides.

Criterion 6

Criterion 6: Maintenance of other Socioeconomic Functions and Conditions

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Authors of chapters on indicators: **Gerhard Weiss, Ivana Zivojinovic (6.1), Miroslav Kovalčík (6.2, 6.3), Davide Pettenella (6.4), Andrea Camia, Nicolas Robert (6.5), Michael Köhl (6.6), Andreas Kleinschmit (6.7, 6.8), Enrico Marchi (6.9), Rastislav Raši (6.10), Stefanie Linser (C.6)**

Reviewer: **Marc Hanewinkel**

Data sources: **National reports on the pan-European indicators for SFM (6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.10, C.1), EUROSTAT (6.5), UNECE/FAO Timber database, 2019 (6.7, 6.8, 6.9)**

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.

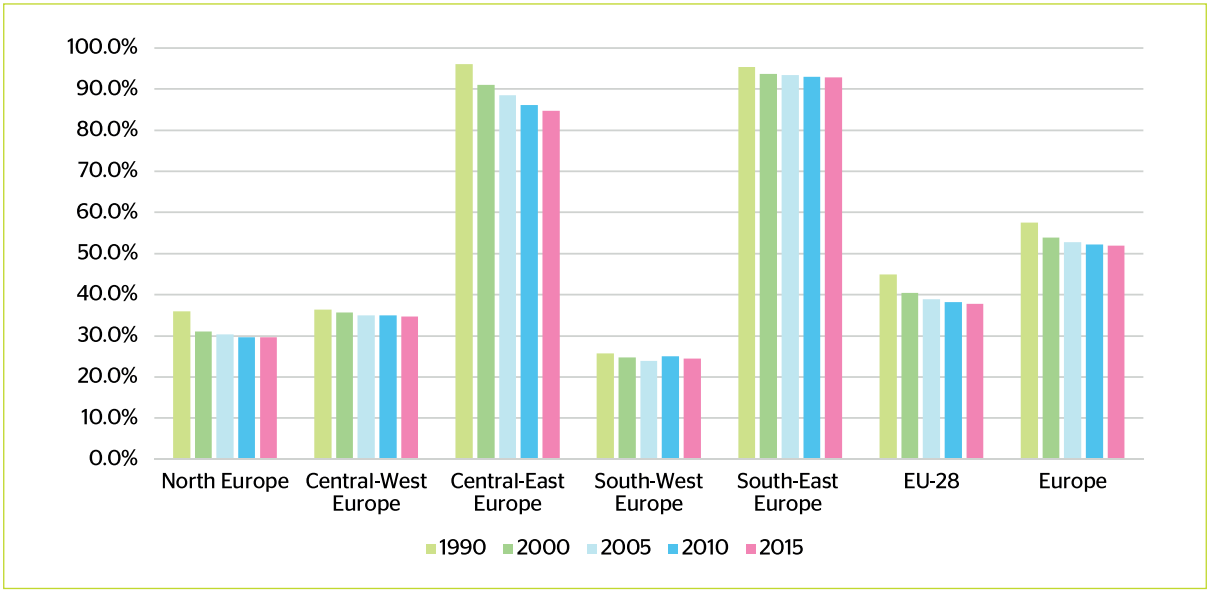


Figure 6.1-1: Trends in the share of public forest area, by region, 1990-2015

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 forestry[16], 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 GDP[19], 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 117.4 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 -740 million).

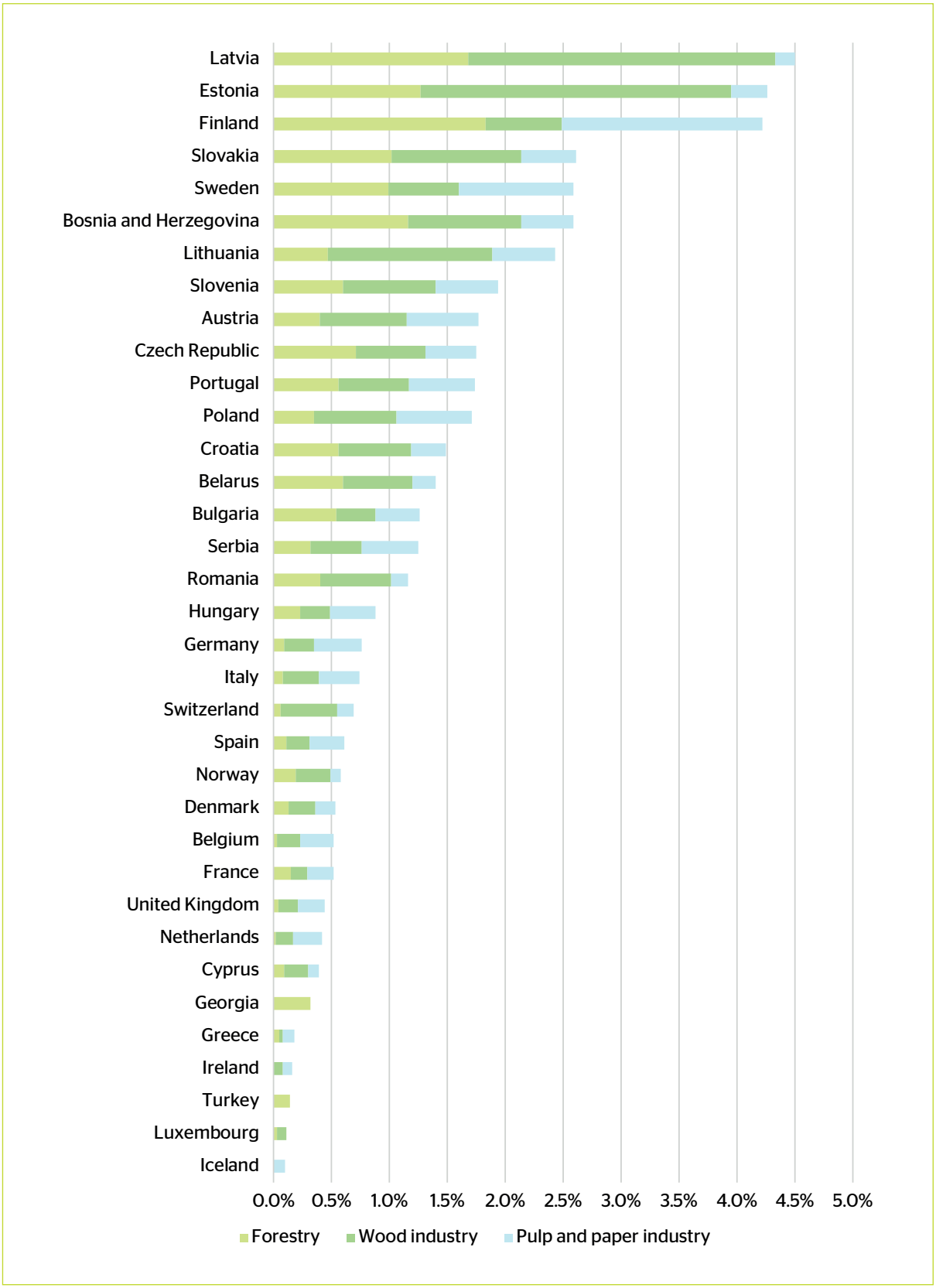


Figure 6.2-1: Contribution of the forest sector to gross domestic product, by country, 2015

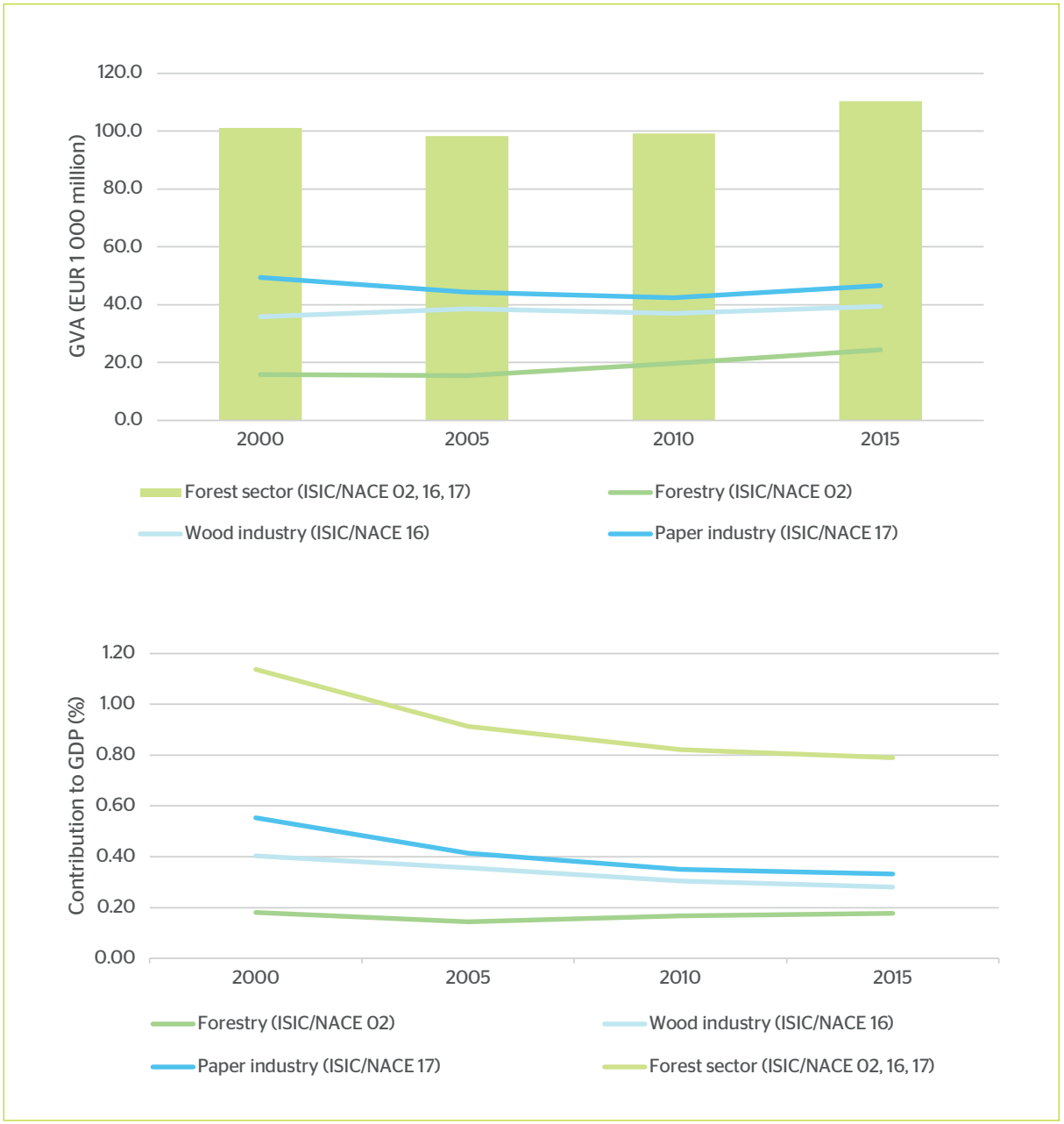


Figure 6.2-2: Trends in the forest sector and subsectors gross value added and relative contribution to gross domestic product in Europe, 2000-2015

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

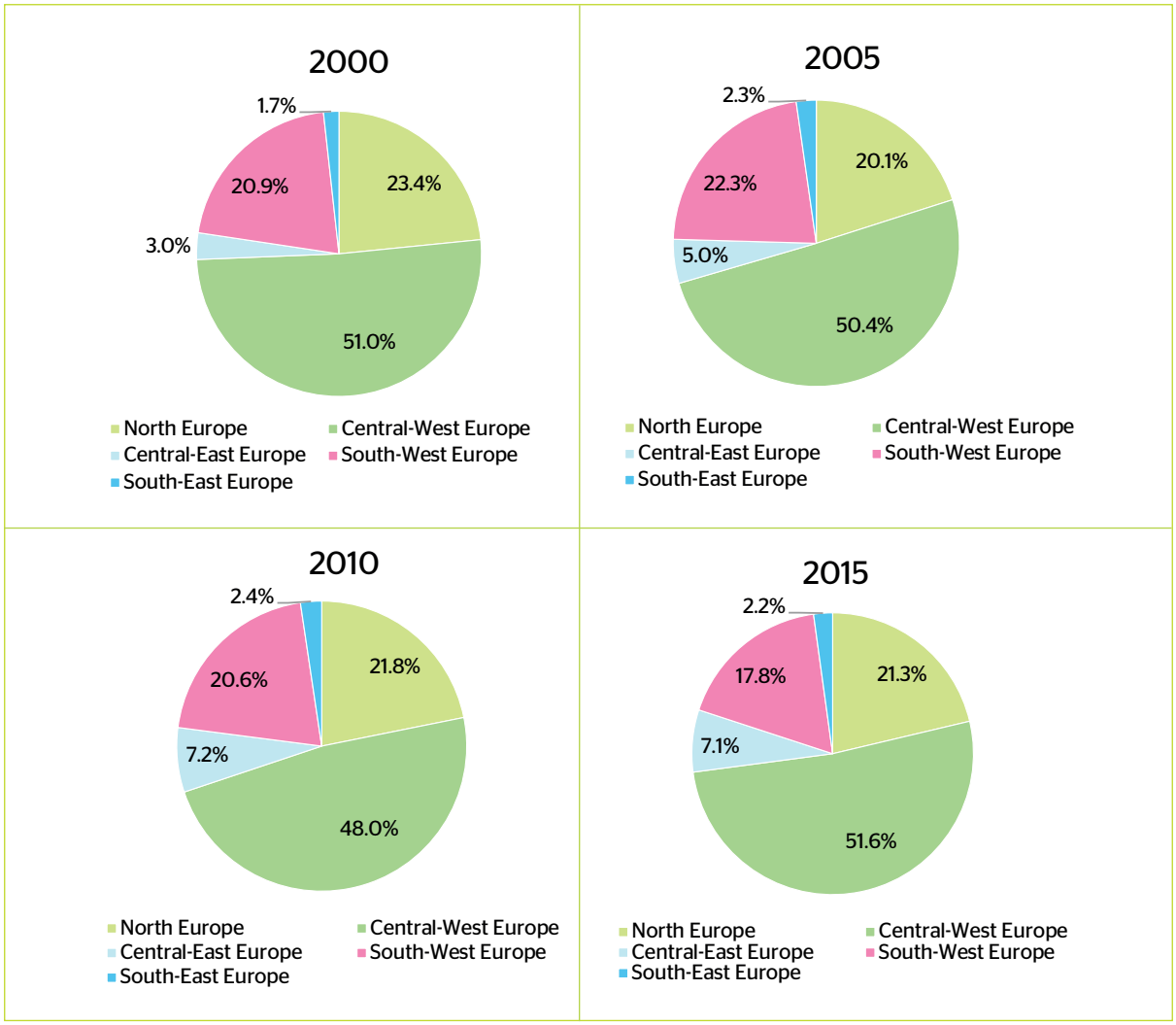


Figure 6.2-3: Trends in the regional distribution of the forest sector's gross value added, 2000-2015

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 level[23].

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%.

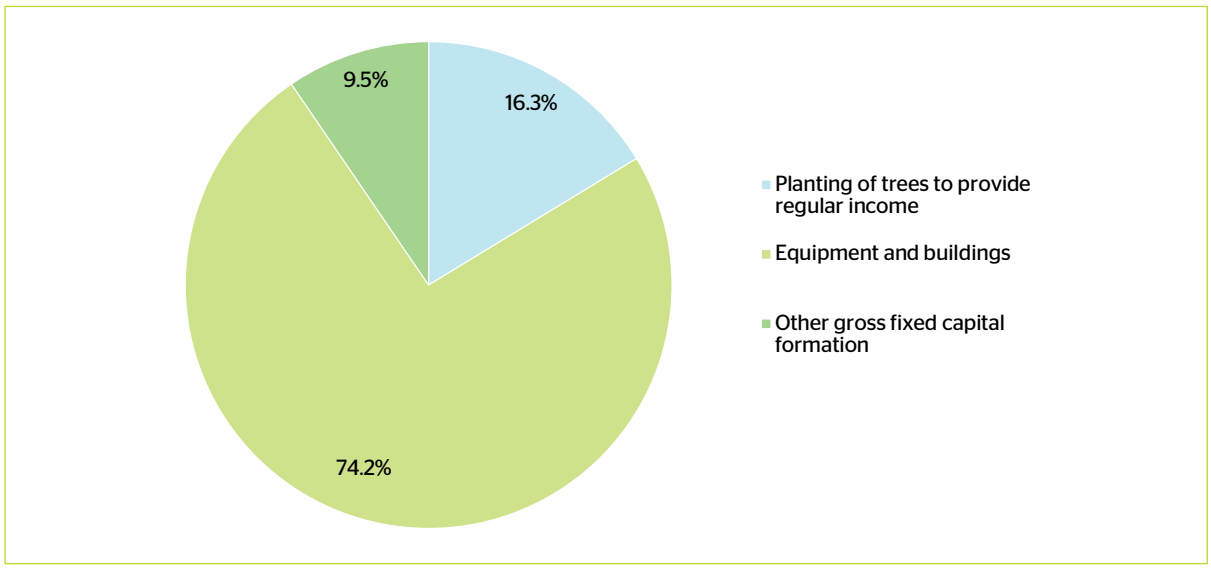


Figure 6.4-1: Distribution of gross fixed capital formation, 2015

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%.

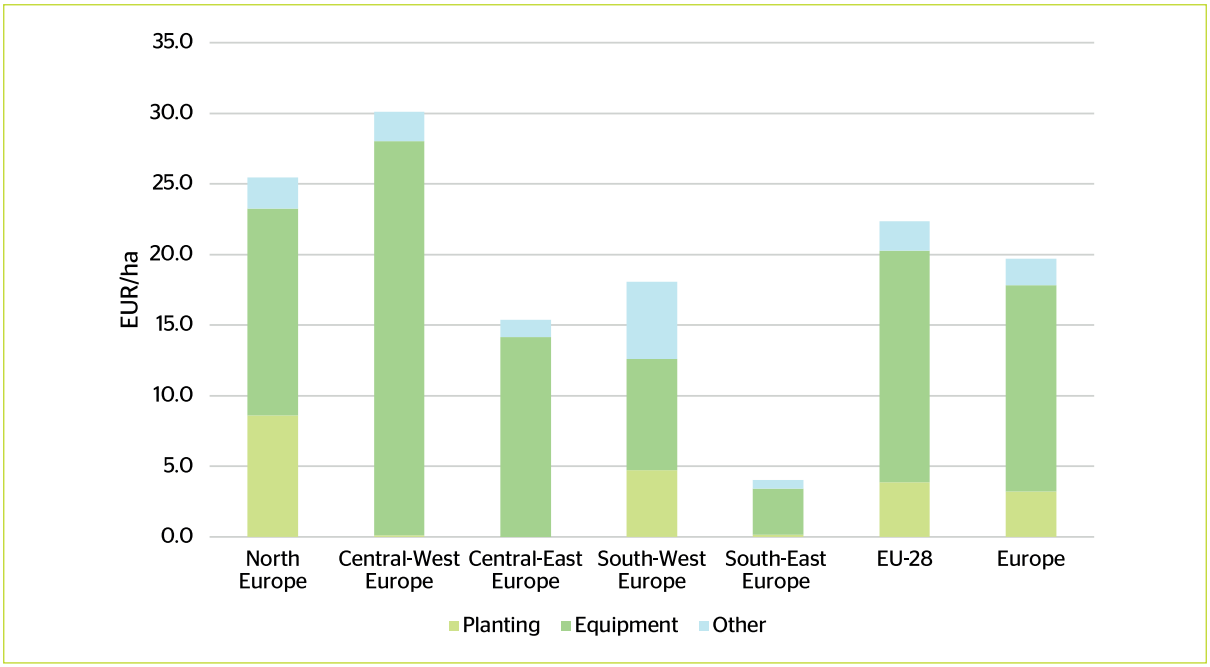


Figure 6.4-2: Structure of gross fixed capital formation per hectare of forest, by region, 2015

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.

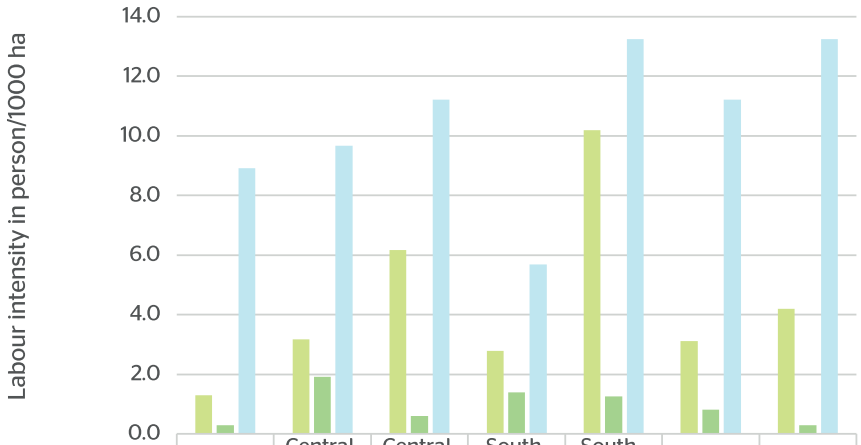
The forest sector workforce is still dominated by men (more than 69% in forestry, 80% in wood manufacturing, and 70% in paper industries, respectively). Recent changes in the working activity due to mechanisation and the use of new technologies (including computer-based machinery and robotics), have 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 12[24] 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.



	North Europe	Central-West Europe	Central-East Europe	South-West Europe	South-East Europe	EU-28	Europe
Person/ 1 000 ha	1.3	3.2	6.2	2.8	10.2	3.1	4.2
Country with the lowest intensity of labour	0.3	1.9	0.6	1.4	1.3	0.8	0.3
Country with the highest intensity of labour	8.9	9.7	11.2	5.7	13.2	11.2	13.2

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.

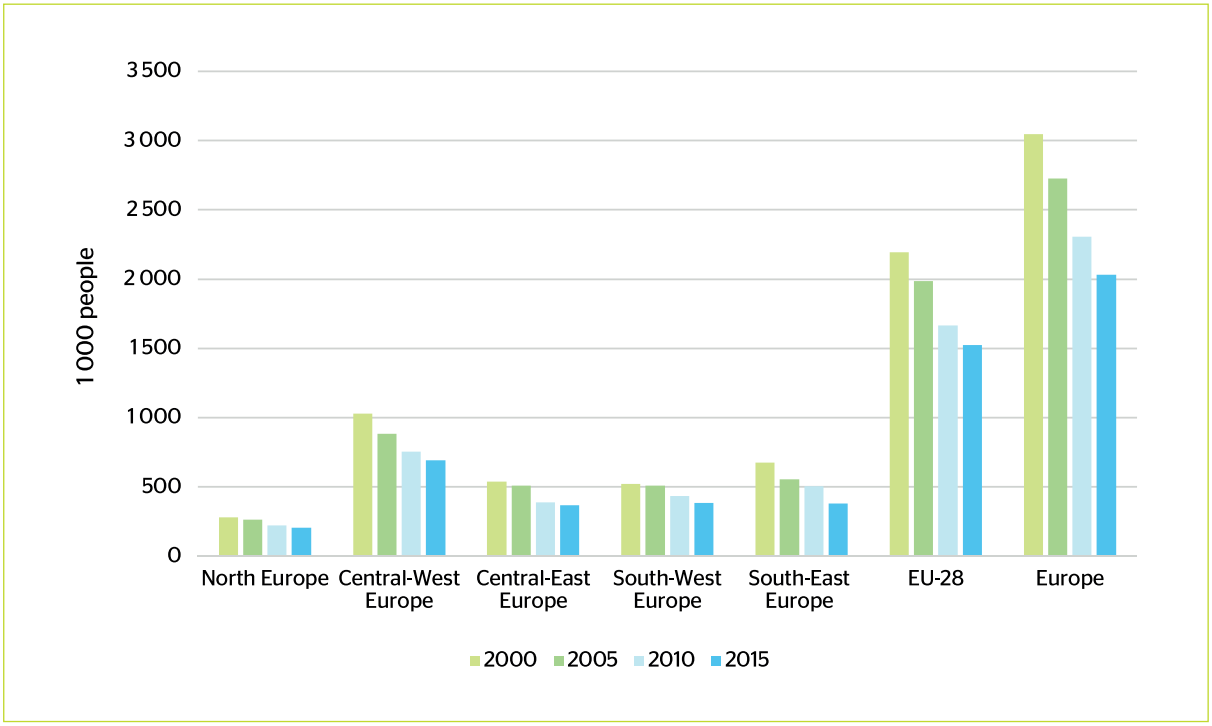


Figure 6.5-2: Trends in total forest sector employment, by region, 2000-2015

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.

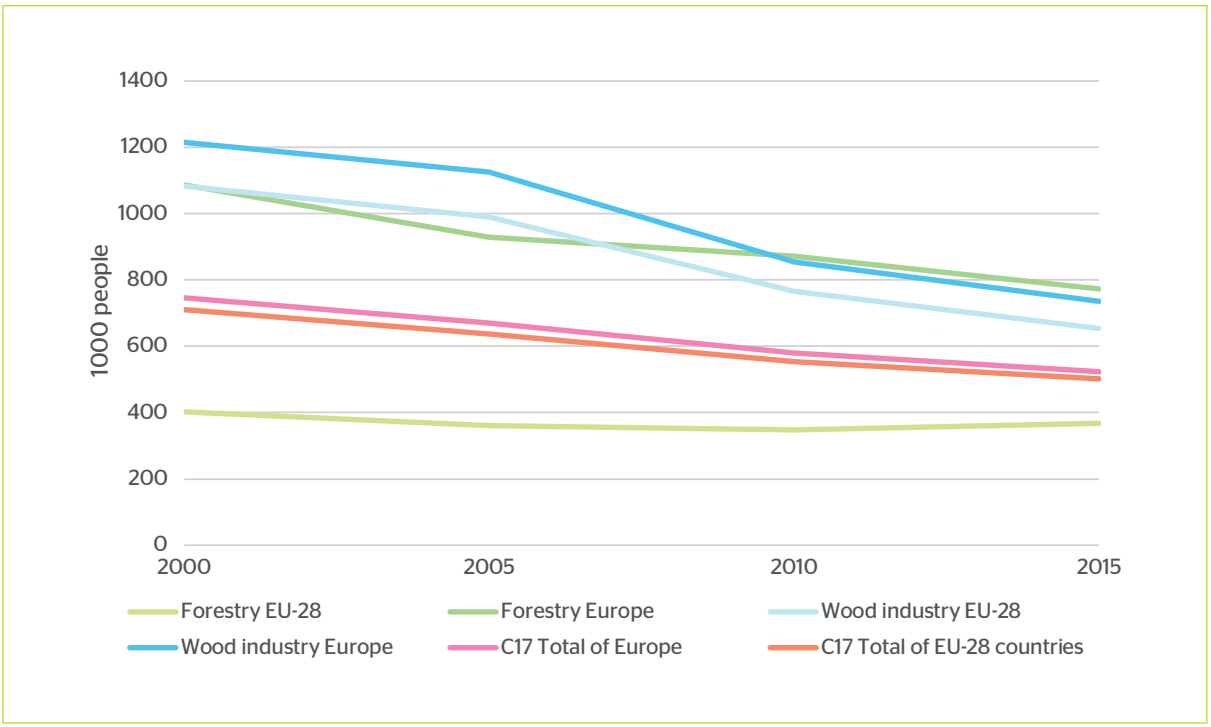


Figure 6.5-3: Trends in employment in forestry (ISIC/NACE 02), wood industry (ISIC/NACE 16) and in paper industry (ISIC/NACE 17), 2000-2015

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 delimbing 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, 23.8 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 m^3 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 m^3). The lowest rates of non-fatal and fatal accidents per 1 000 m^3 harvested timber are found in North Europe (Figure 6.6-2; Figure 6.6-3). Most non-fatal accidents per 1 000 m^3 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 m^3 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.

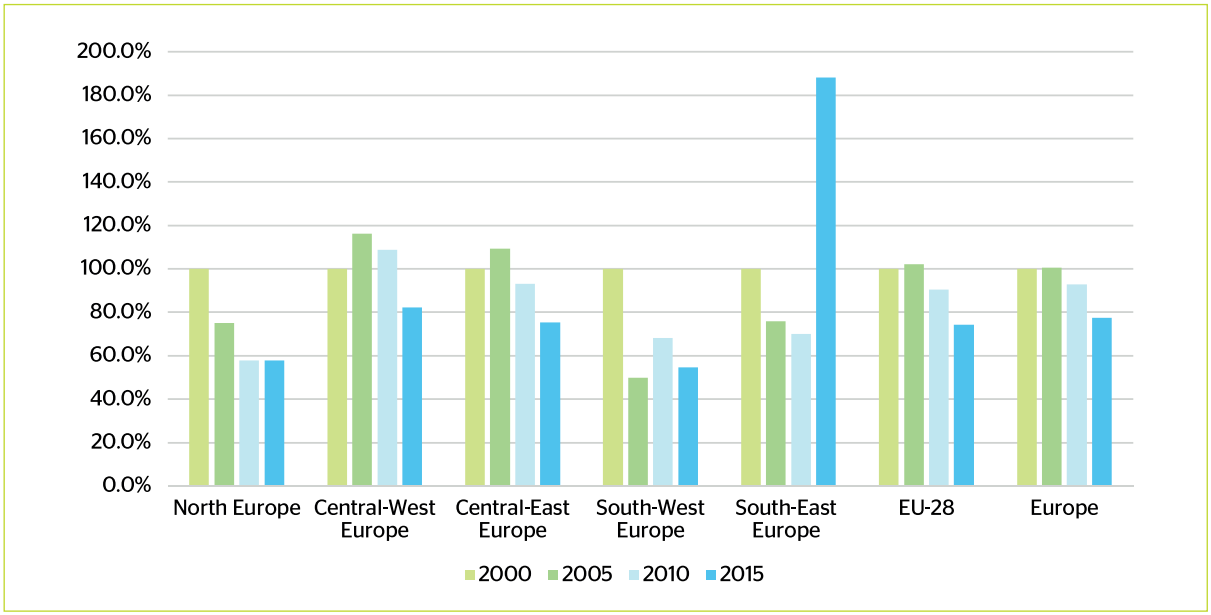


Figure 6.6-1: Trends in fatal accidents expressed as a percentage of the reference year 2000 (100%), by region, 2000-2015

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%.

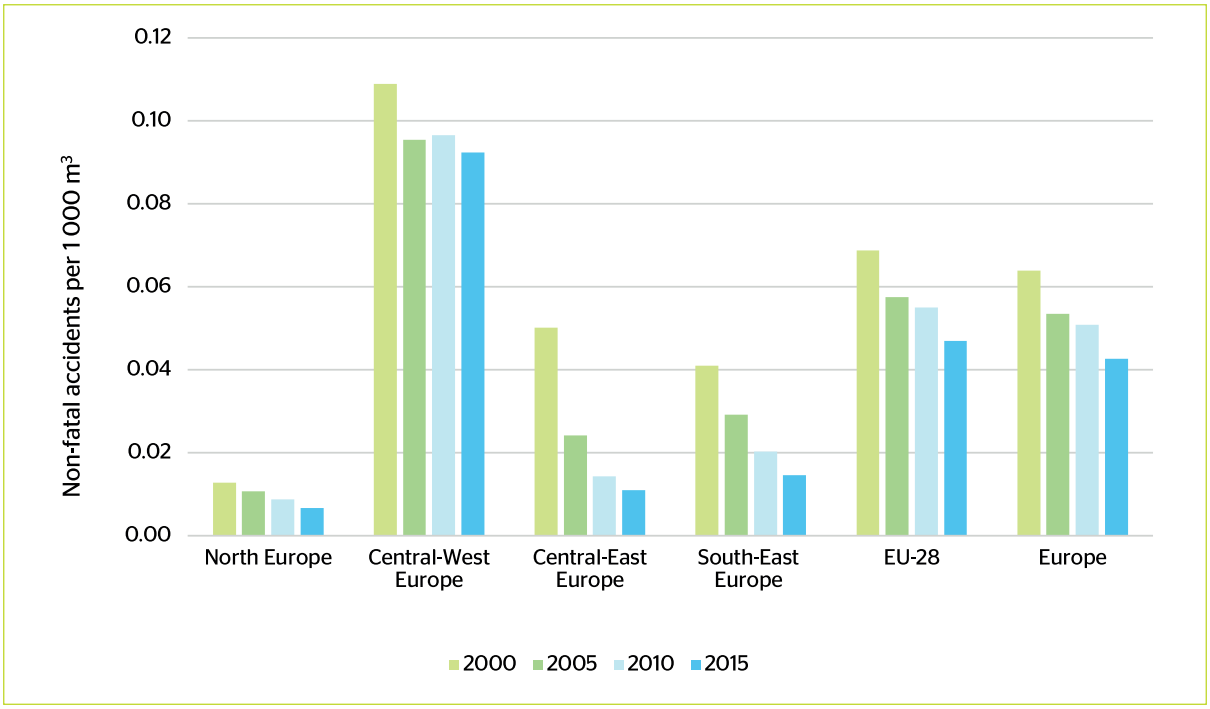


Figure 6.6-2: Trends in non-fatal accidents per 1 000 m³ fellings, by region, 2000-2015

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%.

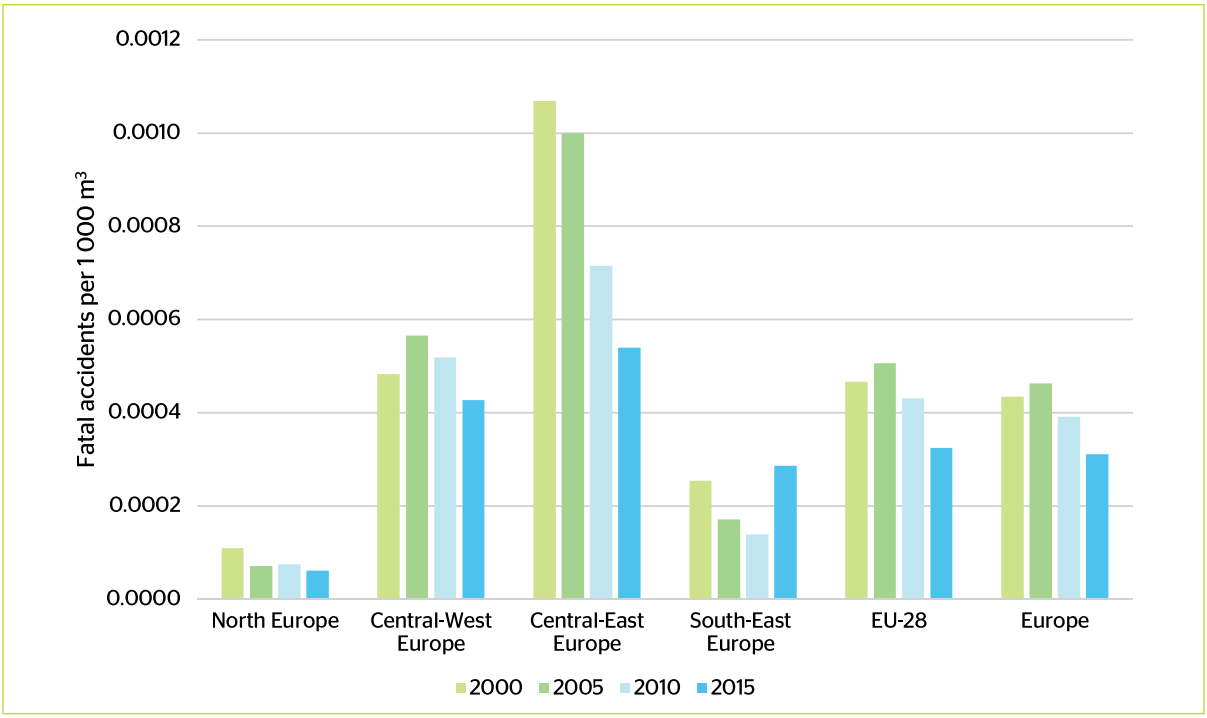


Figure 6.6-3: Trends in fatal accidents per 1 000 m³ fellings, by region, 2000-2015

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%.

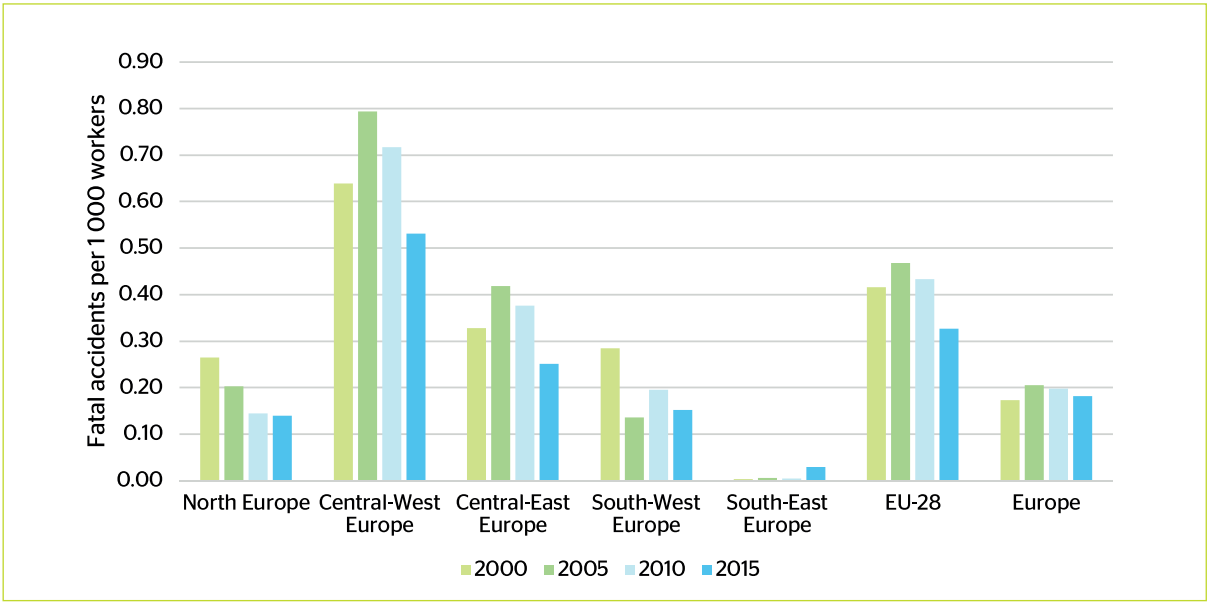


Figure 6.6-5: Fatal accidents per 1 000 workers, by region, 2000-2015

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 m^3 of wood is consumed per capita a year, ranging from 0.7 m^3 in South-East Europe to 2.6 m^3 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 m^3 RWE per 1 000 inhabitants in South-East Europe to 2 574 m^3 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 Targets[25] 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.

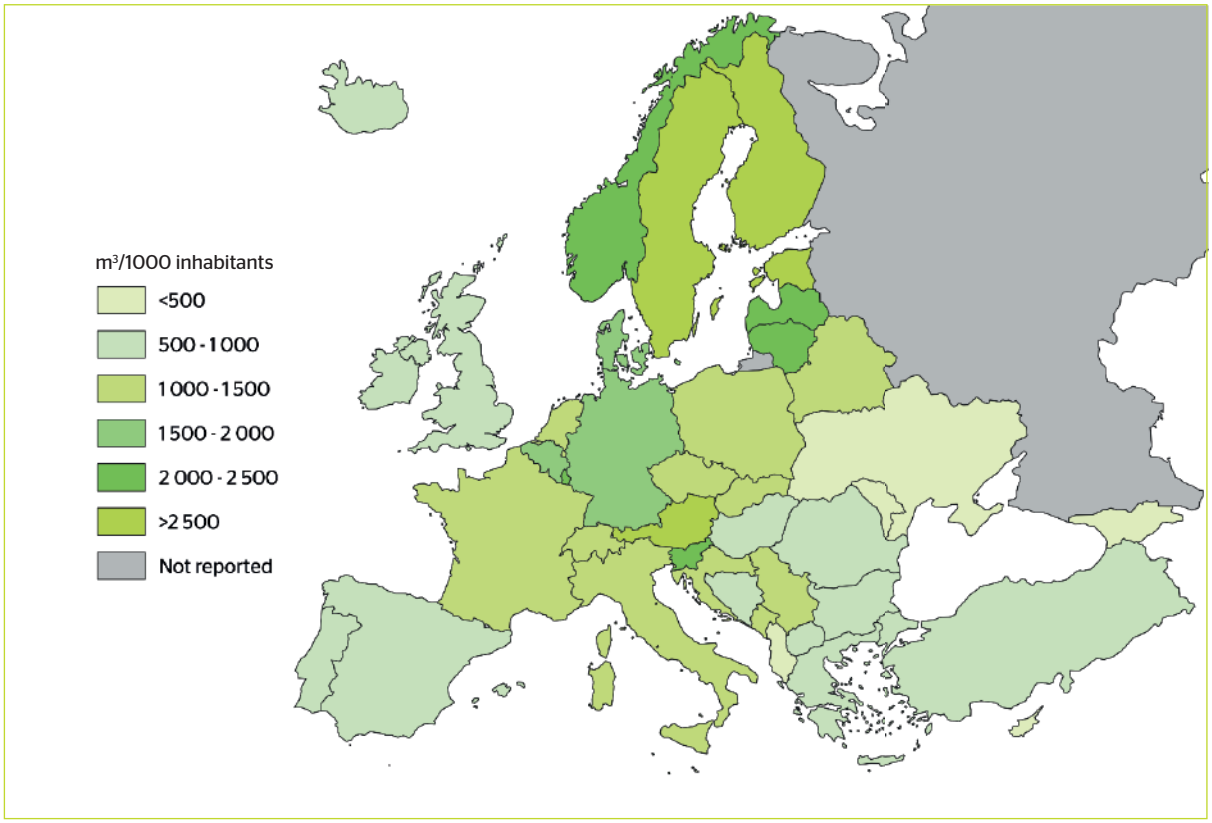


Figure 6.7-1: Wood consumption per 1 000 inhabitants, by country, 2015

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.

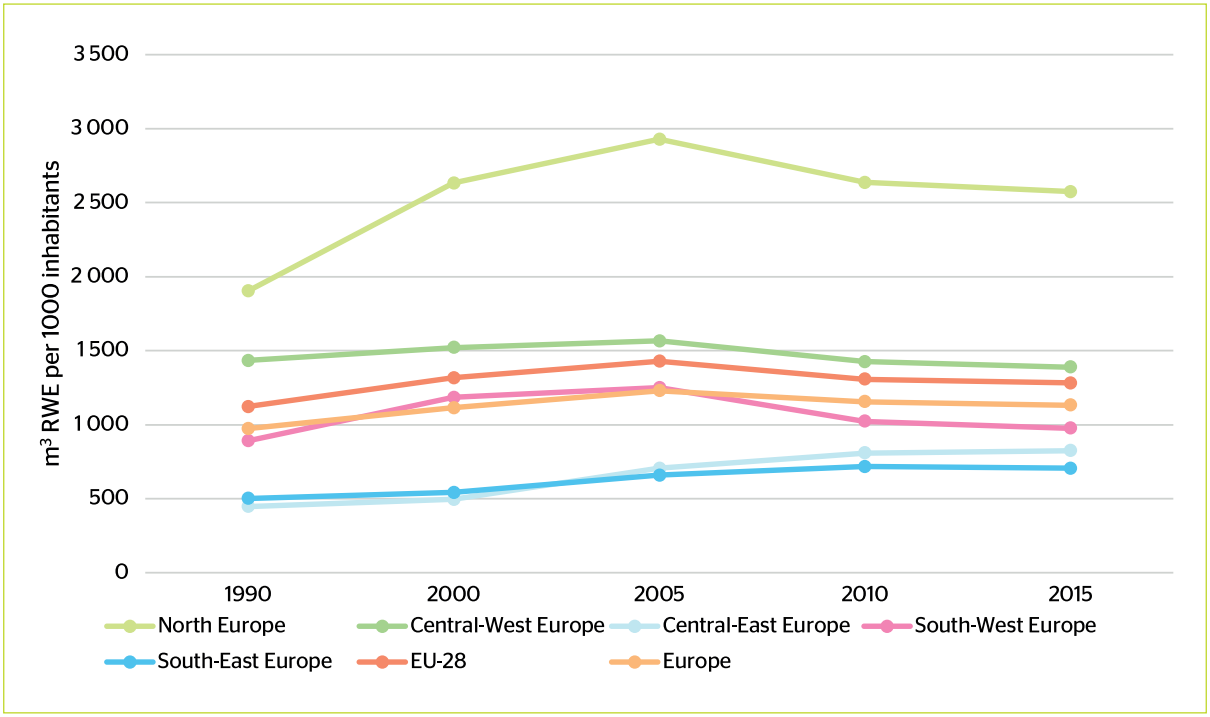


Figure 6.7-2: Trends in wood consumption, by region, 1990-2015

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 m^3 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 m^3 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 m^3 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 easternEuropean 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 m³)				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 m³)				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.

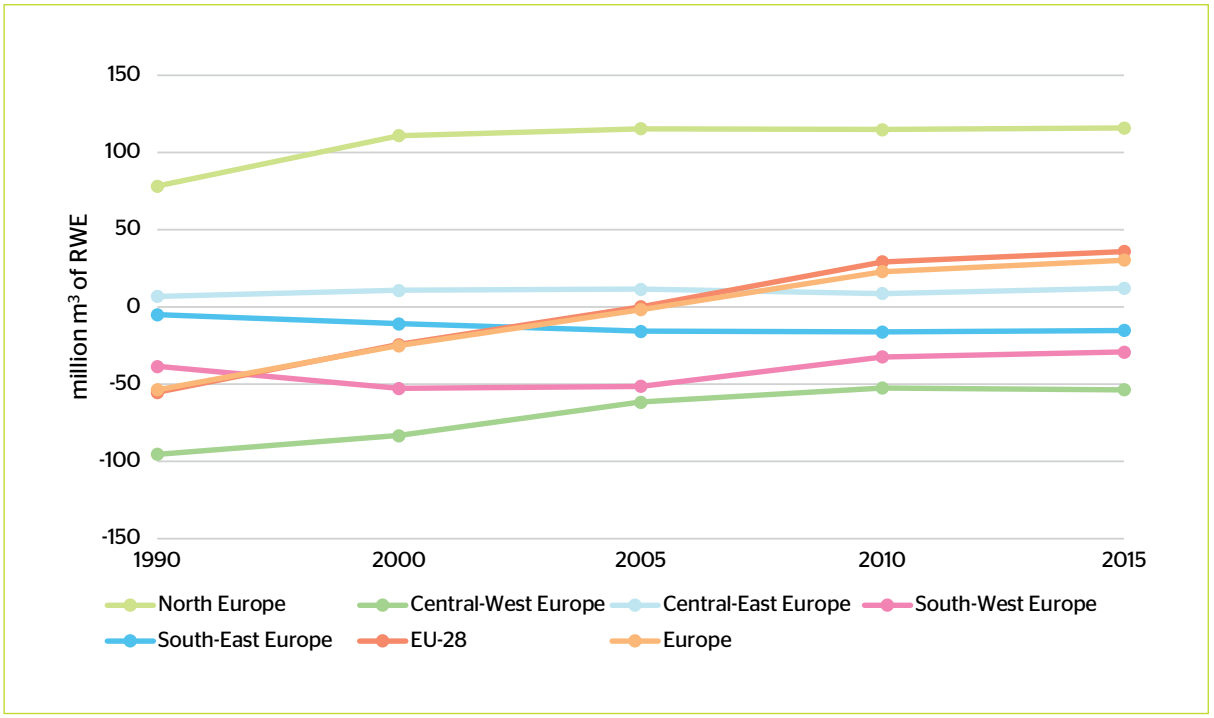


Figure 6.8-1: Trends in net trade of primary wood and paper products in volume, by region, 1990-2015

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.

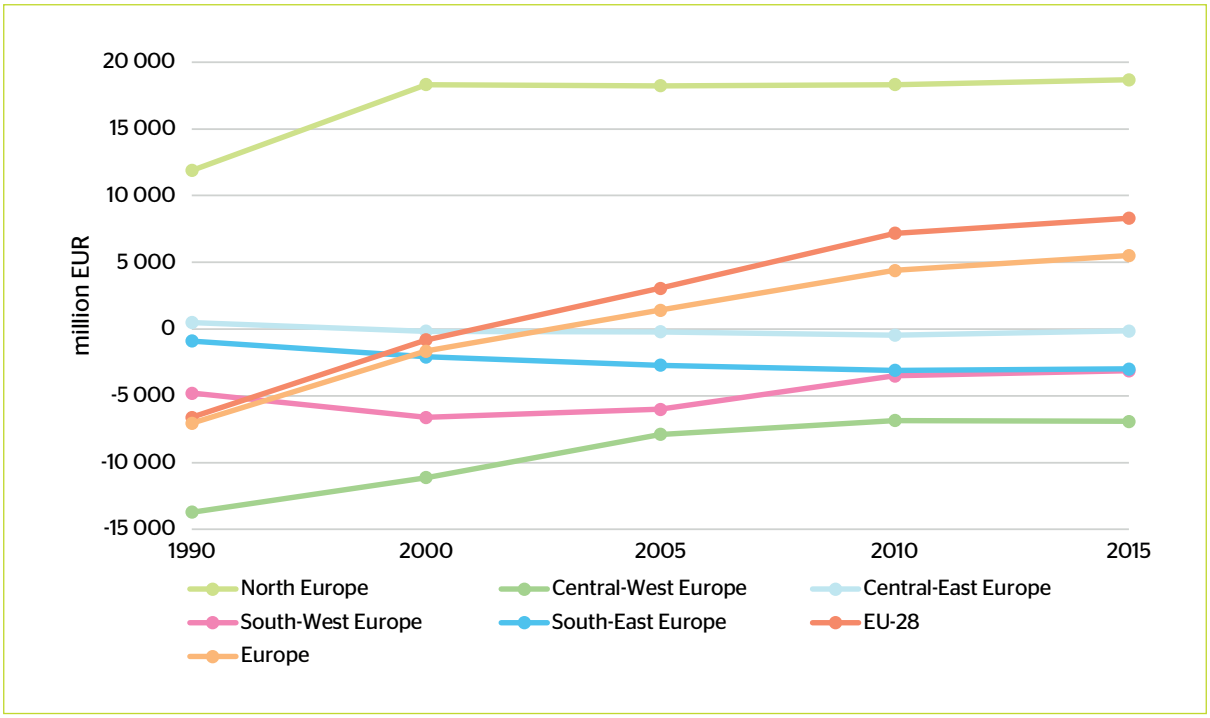


Figure 6.8-2: Trends in net trade of primary wood and paper products in value, by region, 1990-2015

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.

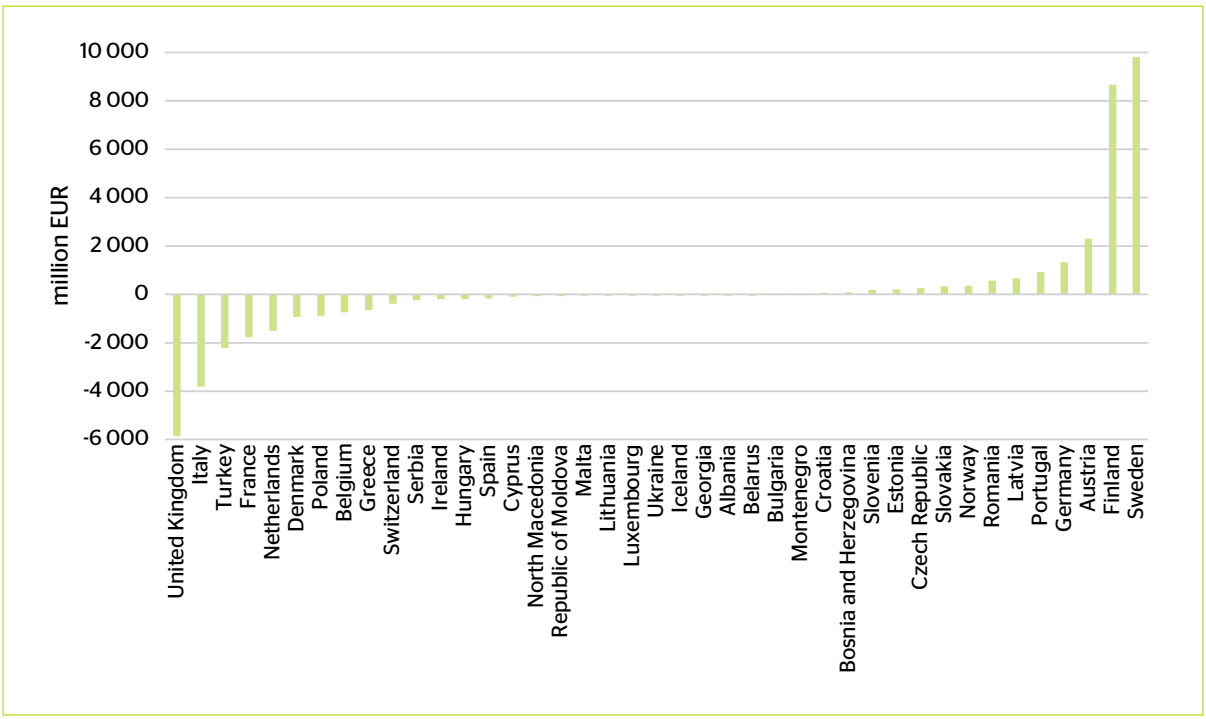


Figure 6.8-3: Net trade of primary wood and paper products, by country, 2015

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 generall, 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 2015[26], 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%.

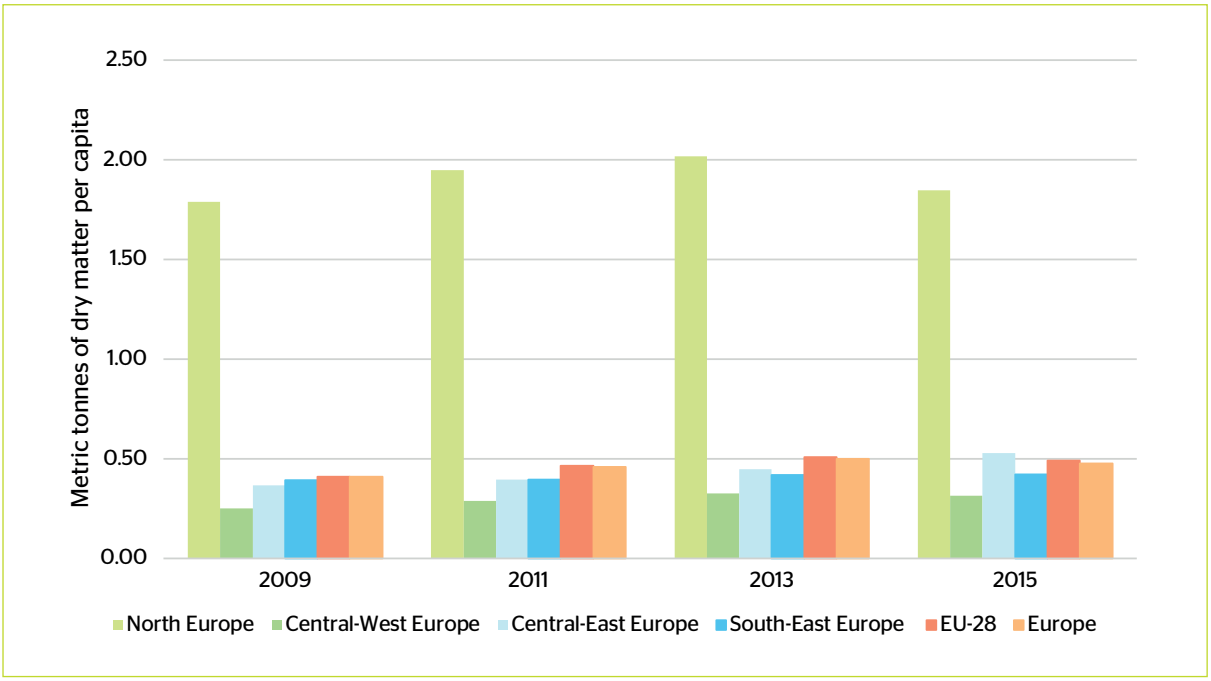


Figure 6.9-1: Trend in annual wood energy consumption, by region, 2009-2015

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%.

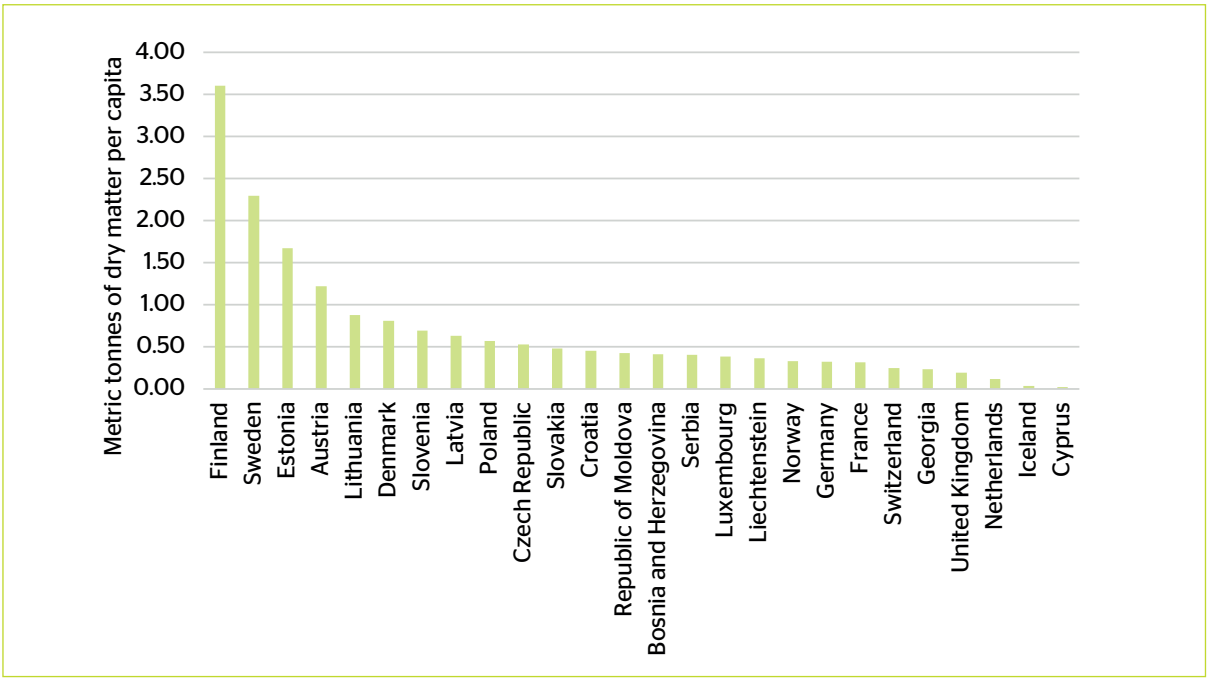


Figure 6.9-2: Annual wood energy consumption, by country, 2015

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.

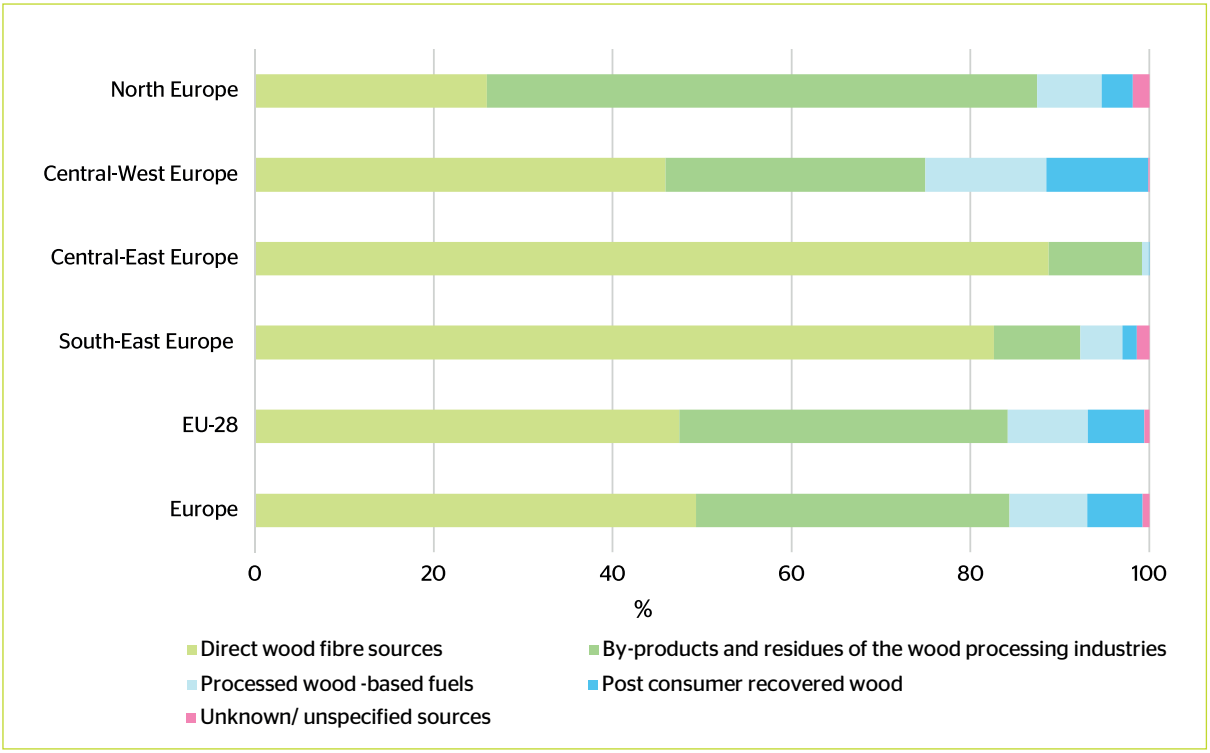


Figure 6.9-3: Shares of wood fibre sources used for energy production, by region, 2015

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

In North Europe, the production of energy from wood represents about 19% of total energy production, i.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.

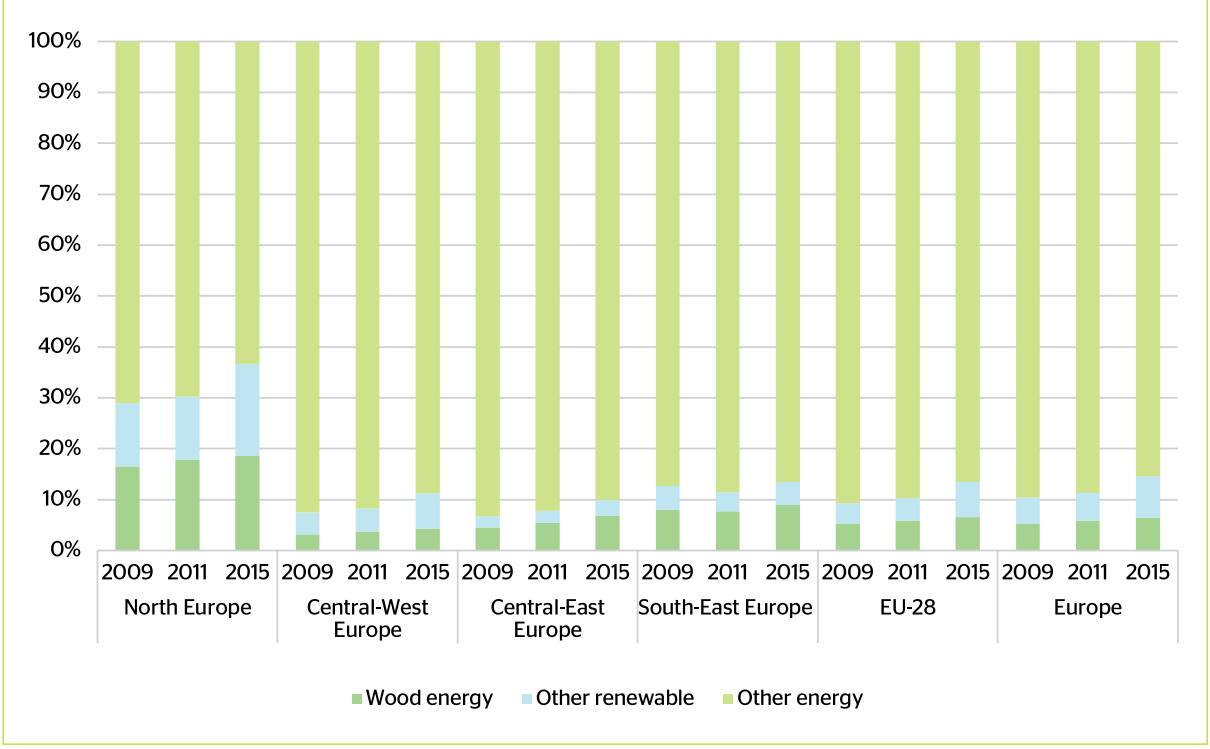


Figure 6.9-4: Trends in wood energy as a share of total energy consumption, by region, 2009-2015

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, 7.1% 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 ones[27].

[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.

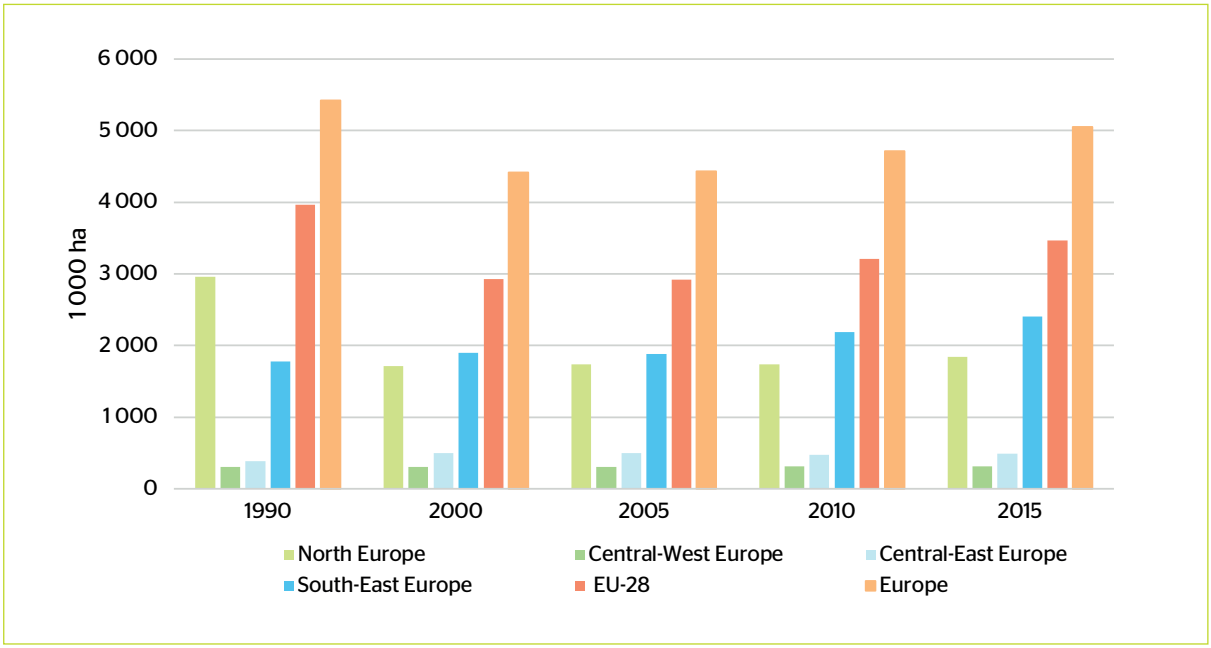


Figure 6.10-1: Trends in area primarily designated or managed for public recreation, by region, 1990-2015

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 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.

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Forest Policy and Governance

Forest Policy and Governance

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Reviewer: **Gerhard Weiss**

Data sources: **National reports on the pan-European indicators for SFM (1, 2, 3, 4, 5)**

The forest policy framework sets overall legislative, administrative, stimulation, communication and other conditions for forest management. It is an essential component of sustainable forest management, considering the environmental and socio-economic conditions at international, national and sub-national level.

Key messages

- National forest programmes serve as a framework for adaptation of forest legislation, cross-sectoral discourse platforms and exchange mechanisms.
- Research, inventory and forest management planning usually have specific independent structures, under the responsibility of a ministry.
- Restrictions on on institutional budgets and staffing reduce capacities for adaptation and further development of stimulating policy tools.
- National forest laws are in force in all 31 reporting countries.
- Climate-change and biodiversity-related measures dominate in the implementation of international commitments related to forests.
- Almost all countries reported the use of grants and subsidies for specific measures, and more than half also reported tax measures.
- The current national forest inventory, monitoring and assessment systems are considered sufficient to fulfil information and communication needs by 18 of the 30 reporting countries.

Indicator 1: National Forest Programmes or equivalent

Key findings

NFPs are a well-established concept for implementing SFM across FOREST EUROPE signatories. They serve as the framework for adaptation of forest laws, discourse platforms, and exchange mechanisms, and provide – together with operational instruments such as C&I – structure to national and/or subnational SFM initiatives. FOREST EUROPE's definitions and guidelines serve as a major input to NFPs activities. There is a variety of ways to approach: NFPs are mainly used to develop strategic documents that relate to forests and give recommendatory or even compulsory guidance to forest policy. Funding for such activities may vary from targeted, bulk allocation of forests funds, to external sources, while long-term funding might still be challenging. In general, NFP development appears to be dynamic as they are required to undergo evaluation, to adapt to emerging needs and to be responsive to cross-sectoral challenges. 14 countries show such changes in order to respond to new experiences with NFPs, new demands for forest stakeholder interaction or as adapted instrument national forest governance.

Introduction

National Forest Programmes (NFPs) have been demonstrated as instruments for supporting forest policy and governance since FOREST EUROPE Vienna Resolution 1 in 2003. NFPs are key processes designed to provide guidance, cooperation and modalities for policy planning, implementation, monitoring and evaluation at national and/or subnational level, and a participatory forum for forest stakeholders. The information on the status of NFPs is based on 31 national responses to the enquiry on qualitative indicators.

Status

NFPs have a high level of acceptance as a major forest policy tool in the reporting countries.

NFPs are one of the instruments with the highest implementation rate as shown by earlier reports. The recent enquiry demonstrates that 27 out of 31 countries reporting have a NFP in place, while in two it is under development, and in one in preparation in the course of new forest law. Generally, a high level of acceptance for NFPs as a major forest policy tool can be stated. It can also be shown that in the majority of countries (21), the ministries responsible for forestry constitute the main formal decision-making body for NFPs. Alternative ways for facilitating NFP processes embrace in some countries high-level approaches such as the parliament (1) or the government (2) being directly responsible, multi-ministry councils or similar (3), or broader bodies with members also from outside ministries (3). In this respect, the funding situation for NFP processes is diverse: in 12 countries there are directly allocated funds for NFP implementation, while in others NFP is part of the bulk allocation of forest funds of the administration, or external funding sources (of combined with public funding), with no regional patterns to be observed. This relates both to the conduct of the process itself, and the consequent implementation measures as defined in NFPs. In contrast to the last SoEF report in 2015, funding problems for NFPs were not stressed in the survey, although five countries did not provide further information, so maintaining a continuous NFP process might still be a challenge for some countries.

In a majority of reporting countries, NFPs are directly linked to national/sub-national strategic instruments that address forests in a prospective way (e.g. a national strategy, white paper, forest policy programme). Further, in a majority of countries NFPs appear to be recommendatory instruments (19), while in 12 countries they have a compulsory nature. Examining the reference and inclusion of FOREST EUROPE in the main NFP-related policy documents there is a gradient of impacts. FOREST EUROPE's definition of SFM and the criteria and indicators for SFM find broad resonance in NFPs. The influence of other FOREST EUROPE instruments, such as the guidelines for NFPs, Classification of Protected and Protective Forests and Other Wooded Land, or the Pan-European Operational Level Guidelines for SFM, on NFPs is limited. The Pan-European Guidelines for Afforestation and Reforestation receive an only limited reference. To provide further context, the results of the enquiry showed that a majority of countries (23) reported on other relevant overarching sectoral or non-sectoral policy instruments that encourage SFM implementation beyond NFPs. NFPs will have to be coordinated with instruments such as those relevant to agriculture, climate change and LULUCF, Natura 2000, bioeconomy or forest sector reform plans.

Finally, as NFPs have a history of about 15 years now, countries were asked about the evaluation of existing NFP processes. 17 countries reported a periodic, pre-specified evaluation on the implementation of NFPs, others have irregular non-specified procedures.

Evaluation efforts include scientific analyses, stakeholder surveys, expert groups and advisory boards to review NFPs processes, operational plans and implementation actions, and the definition of follow-up processes of NFP activities.

Trends

Many countries reported changes in their NFPs to adapt to new development.

Considering the long experience of countries with NFP processes, 14 countries reported significant changes since 2014. This may relate to the reshaping of expiring NFPs, new forest-related laws, strategies, or cross-sectoral initiatives.

More specifically, changes were reported on:

- the set-up of NFP processes by creating broader, cross-sectoral panels,
- the explicit inclusion of emerging developments such as Natura 2000 or climate change,
- the reshaping of national forestry goals and objectives and adaptation of NFPs respectively,
- the adoption of new forest laws and their impact on NFPs consequently,
- the revision of long-term strategic forest programmes and plans,
- the revision of NFPs after evaluating earlier efforts,
- new administrative set-ups and bodies governing NFP processes,
- new action plans for implementing NFPs and related SFM measures,
- a broadening of topics beyond forestry boundaries, e.g. wellbeing, environment, and linking to overarching agendas,
- the preparation for launching new NFPs.

Multiple added values of NFPs

NFPs appear as a well-established concept among the FOREST EUROPE signatory countries. The enquiry results revealed that in most responding countries NFPs are at a mature state, and few are under construction. Based on the results, several reasons for investment in NFP processes can be identified:

- NFPs give shape and guidance to forest policy processes and implementation,
- NFPs provide a common framework for action and process structure with a baseline reference from the FOREST EUROPE process, and a suite of tools such as C&I for SFM,
- NFPs provide a platform for stakeholder participation, exchange, collaboration, facilitate a new modus operandi for discussion and decision-making, but it is important to not handle it as a sheer top-down instrument,
- NFPs, in principle, have the potential to bring new topics on the political agenda, and define priorities for implementation and action,
- NFPs create opportunities for new partnerships and coalitions beyond traditional pathways,
- NFPs support a structured approach on forest-related information and shaped forest inventories a major information and monitoring tools as a prerequisite for informed decision-making,
- NFPs may capitalise existing knowledge on forests and bring it to the political sphere.

Finally, a continuous NFP process requires adequate financial and human resources, strong political commitment over longer periods, and a substantial commitment by administration and stakeholders. Currently, NFPs seem to have a high standing as a forest policy instrument of choice and should also prove their ability in moderating and conflict resolution amongst emerging cross-sectoral challenges that affect forests but go beyond traditional responsibilities and claims to receive their multi-sectoral recognition. Also, communication with audiences outside the forestry sector, who are not familiar with forest-related topics, will require intensified attention and recognition in the further design of NFPs.

Indicator 2: Institutional frameworks

Key findings

All 31 reporting countries confirmed that an institutional framework for forestry is in place although its organisational and administrative set-up differs among countries. Administration of forest policy and support for private forest management are generally the responsibility of national ministries or subnational ministries in countries with regional or federal structures. Management of public forests is mainly carried out by publicly-owned forest enterprises or companies. Research, inventory and forest management planning usually have specific independent structures, under the authority of a ministry. 22 countries reported 131 thousand public forest-related staff, most of whom are engaged in the management of public forests. As regards trends over the past five years, half of the reporting countries mentioned administrative reorganisations and restrictions on budgets and staffing. Increasingly, forest-related research focuses on emerging issues, including climate change adaptation and risk prevention, social aspects and bioeconomy. Education and training continue to be of a high priority.

Introduction

The forestry institutional framework in a country includes the responsibilities and competencies of different public and private bodies at various levels, including the administrative set-up of forest policy and its implementation,the organisation of public forest management and forest-related research and education. The information in this section has been drawn exclusively from national responses to the enquiry on qualitative indicators, describing the framework in place and identifying major changes in the last five years.

Status

National and sub-national ministries have a leading role in forest policy formation and implementation.

Forest policy making and implementation are executed by national ministries in most countries. According to state political systems, this role may be devolved to sub-national or regional level bodies or to separate governmental agencies. Also, legislative supervision and enforcement are usually concentrated at the central government level, on rare occasions at the sub-national level or separate governmental bodies. Support for private forest management is administered in roughly equal shares by national ministries, sub-national ministries or other governmental or non-governmental bodies. The management of public forests is conducted by publicly-owned forest enterprises or companies, acting at different levels of administration - national, sub-national, regional, communal/municipal. Forest management planning is mainly done by other bodies than national ministries, namely by state forest enterprises, state forest services or private companies, sometimes also in their collaboration. Forest inventories are conducted by specialised institutions, state forest services or enterprises, or research organisations as well as by private companies, under the oversight of more political bodies at the national or regional level. Forest-related research is often performed by national or sub-national public forest research institutions, universities and academies of sciences or in private organisations (Figure 2-1).

The majority of public forest-related staff are in agencies responsible for the management of publicly owned forests.

20 countries, accounting for about 55% of Europe's forest area reported on total public forest-related staff and indicated that 105 thousand employees are working in the public forest sector (full-time equivalent, FTE). In contrast to the data presented under indicator 6.5, only those employed in the public forest sector are listed here, not those employed in the private forest sector. Moreover, many of the "public forest-related staff" may be included in other sectors of standard employment classifications (e.g. ISIC or NACE), notably the government, administration, research and education. The number of public forest-related staff, and the ratio between staff and forest area, differ significantly among countries and is related to various factors such as national forestry policy and administrative structure, area of forests and ownership structure. The staff of the agencies responsible for the management of public forests comprise 63% of the total public staff. 10% of public forest-related staff work in public forest administration, and 6% in public forest research, education and training institutions and other specialised agencies. On average, there were 99 forest administration staff and 57 public forest research staff for a million hectares of total forest area in the 20 and 16 reporting countries respectively. The overall average for 20 reporting countries was 1 235 public forest management staff for a million ha of public forests.

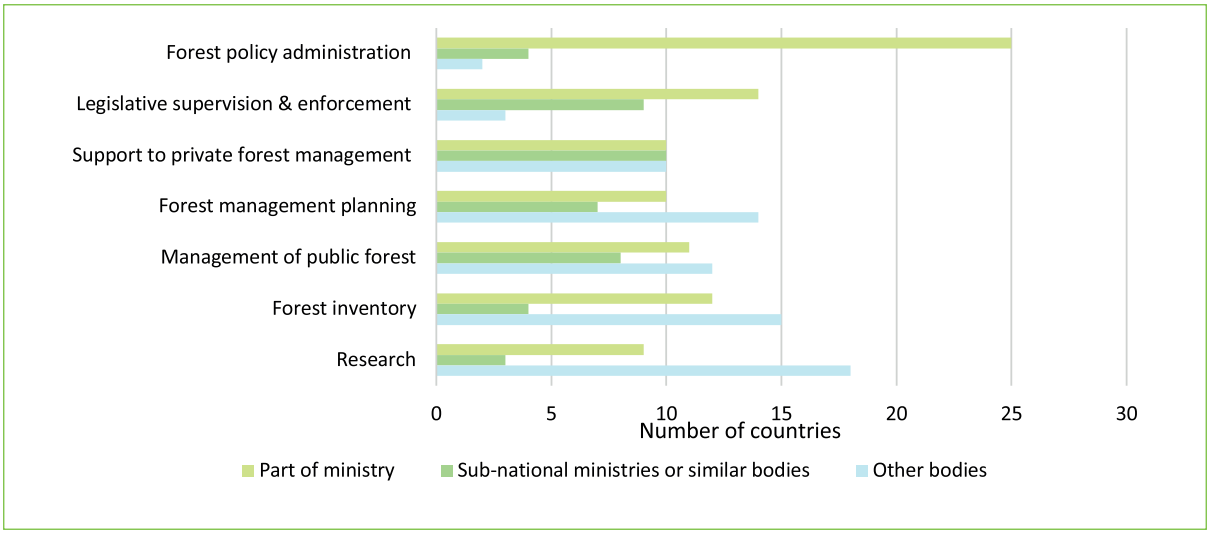


Figure 2-1: Institutional responsibility arrangements for main roles of government organisations, 2018

Table 2-1: Public forest-related staff in 2017

Total staff involvement	Units		Data coverage as % of total regional public forest area
Forest administration	(1 000 FTE)	13	57
Management of public forests	(1 000 FTE)	83	65
Public forest research, education and training institutions	(1 000 FTE)	7	58
Other public forest-related workers	(1 000 FTE)	25	50
Policy administration and research staff	(FTE/million ha)	151	58
Staff managing public forests	(FTE/million ha)	1 235	65

Note: Figures on total staff in subcategories include total staff as reported by countries, some of whom only reported some of the subcategories. For that reason, the subcategories do not add up to reported total staff and data coverage varies among subcategories.

Forest related research attracts increasing interest in some countries and focuses on adaptation to climate change, on social aspects and on bioeconomy.

Of the 18 countries which replied on this topic, several pointed to an increasing interest in forest-related research, resulting in increased funding defined in specific research strategies and programmes, conducted at forest research stations or universities. Particular issues in focus are climate change adaptation and related risk prevention, social aspects of forests, bioeconomy and related aspects of the supply of wood as renewable material and energy source.

Targeted forest education and training is offered in a broad framework.

Highly qualified human resources provide an important basis for sustainable forest management and the maintenance of all forest functions. Therefore, the importance of forest-related education is highlighted in many national forest programmes or strategies. In addition to academic forest, education (undergraduate and graduate) and postgraduate training for forest managers, a wide variety of education and technical or other professional on-the-job training are offered for forest owners, forest workers, forest guards/rangers as well as administrative and managerial staff, including training on occupational safety and health. Forest-related issues are also part of new school curricula on sustainable development for students in several countries, as well as public awareness-raising campaigns.

Exchange with other sectors strengthens capacities in the forestry sector.

Exchange and access to data and information from experts and scientists in other related institutions and sectors like biodiversity, nature protection, torrent and avalanche control, tourism or bioeconomy are seen as essential to capacity building in many countries.

Trends

Many countries report on administrative reorganisations and staff reductions, a few mention major institutional changes over the last five years.

Of the 31 reporting countries, half indicated that there had been no significant changes in the public and private institutional framework, while the other half reported many changes. These include:

- in North Europe, three countries reported on new or merged forest-related public agencies and changed responsibilities of respective agencies and ministries concerning forest law administration, forest policy, national forest programmes, statistical services and research. State forest enterprises were also merged and restructured,
- in Central-West Europe, four countries reported on reductions of staff in administration and research. Others reported a strong focus on climate change, forest protection and education as well as new government and forest enterprise arrangements and responsibilities,
- three Central-East European countries also reported significant reductions of staff, as well as government reorganisations to cover all forest-related fields of activity such as forest policy, forest management, supervision and also forest law enforcement and trade, including enforcement of the EU Timber Regulation,
- in South-West Europe, two countries reported on a revised forest administration to increase efficiency at regional and local levels. Regional forest policies were incorporated in recently elaborated national forest-related goals and targets,
- three countries in South-East Europe also reported on considerable reductions in staff and restructuring of administration, management and research units. In one country, the concession-based model of state forest management was replaced by a state forest company founded in 2016.

Indicator 3: Legal/regulatory framework: National (and/or sub-national) and international commitments

Key findings

National forest laws are in force in all 31 reporting countries, mostly through their national parliaments. About one-third of all countries have made significant changes in their forest laws between 2015 and 2020. This also includes amendments of forest laws in order to reflect national and international commitments. Many policy instruments refer to FOREST EUROPE commitments. In particular, those countries, which incorporated a definition for sustainable forest management (SFM) into their legal and regulatory frameworks, also refer to the implementation of criteria and indicators for SFM. All reporting countries are party to major forest-related international agreements and aim at their implementation. Climatic change and biodiversity related measures dominate the implementation of international commitments into existing forest laws.

Introduction

Legal and regulatory policy instruments related to forestry provide the legislative framework for forest management. Also policy instruments of nature protection, hunting or wildlife management are closely related to forestry and their mutual alignment and consistency is essential. FOREST EUROPE has been instrumental in defining SFM and the related pan-European criteria and indicators and laid the foundations for a comprehensive consideration of SFM in national legislation. In addition to national policy instruments, international agreements provide guidance also for forest-related activities.

Status

Forest laws are in force in all countries, amendments often reflect international commitments.

Out of 31 countries, 27 reported that the national parliament has enacted their forest legislation. Principal acts are often complemented by administrative decrees or regulations and in five countries forest-related matters are also laid down in their constitution. In principle, this does not make a difference in the implementation of forest legislation. In some countries with federal political systems, forest authority is shared between national and sub-national levels. Some reporting countries have delegated powers to devolved administrations or regional governments.

All reporting countries have forest laws in place. Two thirds of countries reported that their recent forest laws were enacted more than 10 years ago. Vast majority (about 80%) of countries, however, have amended existing laws not more than 5 years ago.

Many policy instruments refer to FOREST EUROPE commitments.

Countries do refer to commitments made in the FOREST EUROPE process in their legal or regulatory acts. For instance, the SFM definition was referred to in two thirds of countries.

The FOREST EUROPE Criteria and Indicators (C&I) for SFM were fully referred to in the legal and regulatory acts in about half of countries in all parts of Europe. Countries referring to the C&Is also made reference to the SFM definition (Annex Table 59). Pan-European Operational Level Guidelines for SFM (PEOLGs) are only marginally mentioned, e.g. in national strategic documents or explanatory documentation that accompany legislation. In addition, PEOLGs are frequently found in PEFC certification schemes.

All countries are party to major forest-related agreements in the United Nations.

Many forest-related commitments were made during and after the United Nations Conference on Environment and Development. Among them, are found the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) in those countries experiencing serious drought and/or desertification, and the United Nations Framework Convention on Climate Change (UNFCCC) with its Kyoto Protocol and the Paris Agreement. All respective commitments were signed by the responding FOREST EUROPE signatories. Two regional conventions devised specific forest protocols: the Alpine Convention signed by countries in the Alpine region and the European Union in the 1990s and the Framework Convention on the Protection and Sustainable Development of the Carpathians (Carpathian Convention), signed in 2003 and adopted in 2006. It was signed by all seven countries of the Carpathian region. Several other forest-related commitments were signed by the FOREST EUROPE signatories, such as the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention), the Convention on the Conservation of European Wildlife and Natural Habitats (Bern

Convention), the International Tropical Timber Agreement, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Long-range Transboundary Air Pollution and the Convention on the European Forest Institute. Among the reported non-legally binding commitments are the New York Declaration on Forests and the Amsterdam Declarations (Annex Table 59).

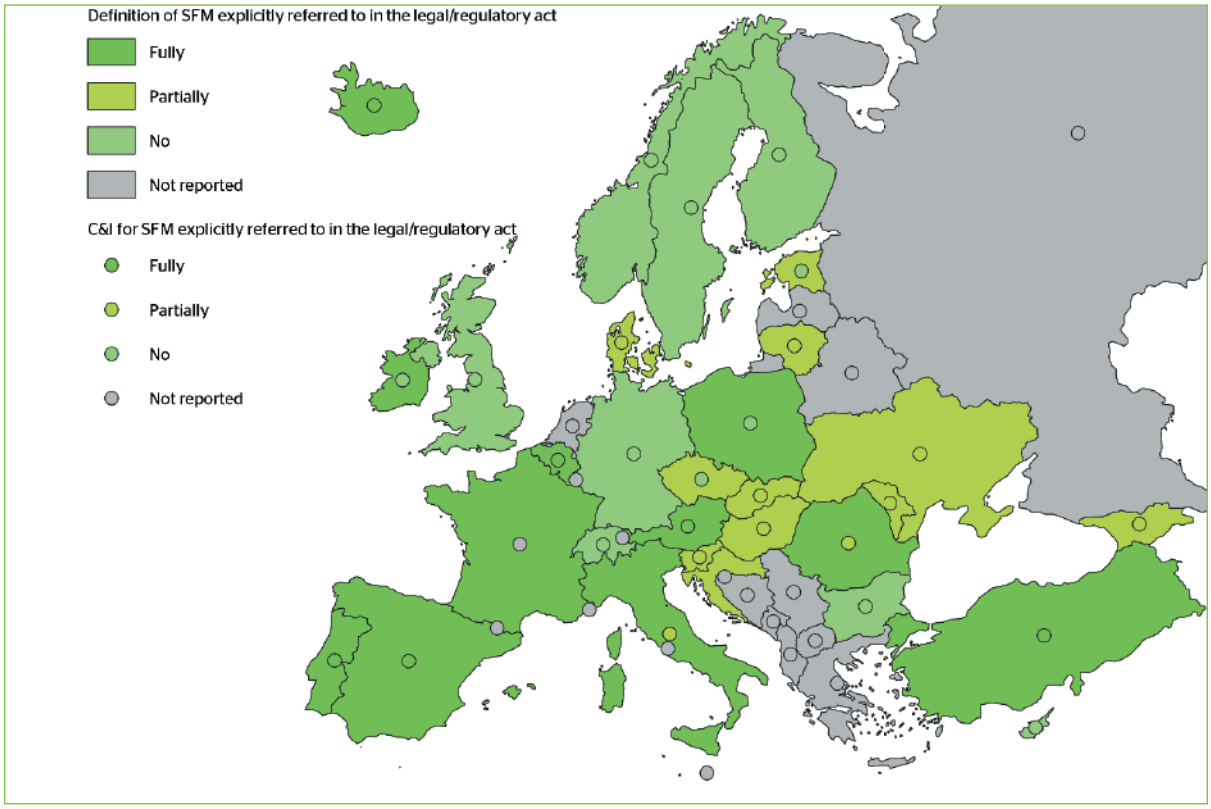


Figure 3-1: Legal and regulatory frameworks referring to the definition of SFM and C&I

Trends

About one-third of European countries made significant changes in their forest laws between 2015 and 2020.

Changes in forest laws have taken place across all European regions as a consequence of the adoption of new forestry legislation or the revision of older forestry legislation, to implement national and international commitments. More specifically the following reasons for legal amendments were provided:

- to limit the administrative burden,
- to assign more responsibility for SFM to forest owners and managers, and put more emphasis on the social services of forests,
- to change the conditions for registration of physical and juridical bodies performing private silvicultural practices,
- to strengthen measures of control for timber harvesting and transportation, including use of of GPS tracking systems,
- to set up a video surveillance system and rights of forest guards for protecting and guarding of forest territories,
- to define sufficient qualification for persons who intend to perform private silvicultural practices,
- to introduce a legal basis for adopting the National Forest Programme, to provide a possibility for its State Forest Holding to support national parks financially and to elaborate simplified forest management plans for private forests,
- to introduce a pre-emption right for the State Forests Holding to acquire private forest properties,
- to develop guidelines of good forest practise for all forests,
- to rinitiate a reform of the State Forest Administration,

- to make land consolidations, an arrangement of land ownership, land associations, and forest sector funding for the provision of non-production benefits and services from forests,
- to improve people's access to forest resources,
- to strengthen law enforcement, stricter sanctions against violations of the law are discussed in this context, including the confiscation of transportation equipment, and the application of criminal law and thus the possibility of imposing multiannual prison sentences,
- to strengthen the public's ability to influence the approval process of forest operations as introduced through Public Consultation and Appeals Processes,
- to introduce financial means for silviculture, because of climate change and forest protection,
- to make minor revisions including the update of definitions, text revisions because of new legislation.

Of all countries about two-third reported changes in their forest laws, while about one-third reported significant changes. In addition, two countries from North and Central-East Europe made reference to the preparation of a new national forestry code.

Finally, EU regulations and legislation related to forests were implemented in the national legislation of EU member states. In particular, the EU Timber Regulation was incorporated into national legislation of member states. EU legislation also led to changes concerning plant health and nature conservation due to the implementation of the Natura 2000 legislation.

Climate change and biodiversity measures dominate in the implementation of international commitments related to forests.

To achieve the adaptation and climate change mitigation goals of the UNFCCC and the Paris Agreement the following measures with implications for forests were taken:

- devising a national climate change strategies and development of national action plans on adaptation to climate change,
- emphasising forest adaptation measures in research and ongoing monitoring,
- evaluation of the adaptation measures taken in forestry,
- providing financial means for increasing the knowledge in forest production among forest owners and others; contribution to global REDD+[28] activities,
- launching of a 'carbon farms' project that aims at enhancing forest carbon sequestration,
- implementation of the EU Regulation 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land-use change and forestry in the 2030 climate and energy framework including the development of a Forest Reference Level (FRL) and National Forest Accounting Plan (NFAP),
- implementation of the New York Declaration on Forests.

Concerning forest biodiversity, the following initiatives were reported:

- development of a new national strategies on biodiversity protection,
- launching of national action plans for biological diversity adjusted to national priorities,
- development of a new biodiversity legislation,
- setting national targets for different forms of protection and agreed levels of retention measures when conducting forest operations to achieve Aichi targets.

[28] Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries

Indicator 4: Financial and economic instruments

Key findings

Governments devote significant resources, of staff and funds, to support sustainable forest management. One approach is through publicly-owned forests, which nearly two-thirds of responding countries reported as being financially self-sufficient or profit-making despite undertaking a number of activities which are not profitable by economic criteria. In other countries, additional financial support from the central public budget is needed for the management of publicly-owned forests in line with policies. Governments use a few economic instruments to help privately-owned forests achieve SFM and goals of specific policies. Almost all countries reported the use of grants and subsidies for specific measures, and more than half also reported tax measures. Several specific objectives for transfer payments were reported, including conservation of forest biodiversity, forest stand improvement, climate change adaptation, protected areas and afforestation. Transfer payments to private forests in support of SFM were reported on average at EUR 25/ha of private forest. Payments for ecosystem services are applied, at the public or private level, in about half of the responding countries. Significant changes reported over the last five years include changes in tax structure, an increase in funding for some countries (notably for ecosystem services and climatic change related measures), while one country reported a significant drop in the available financial support because of the difficult economic situation.

Introduction

Governments use financial and economic instruments to achieve their policy goals, notably the overriding goal in the forest sector, sustainable forest management (SFM). Countries were asked to describe the main instruments in place, and the number of resources used to implement them, and identify significant changes in economic policy related to forests and forestry. 30 countries responded to this part of the enquiry.

Status

In most countries, the management of state-owned forests is financially self-sufficient or profit-making. In some countries, there is financial support from a state budget to meet policy objectives.

Managers of publicly-owned forests aim at multiple objectives, notably the sustainable and efficient management of the forests for which they are responsible but also to contribute to the achievement of broader policy objectives such as biodiversity conservation or landscape protection. Management of publicly-owned forests may not always be economically viable without support from the general public budget. Circumstances vary considerably as regards the potential profitability of forest management and how public finance is organised. 29 countries provided input on financial arrangements related to state-owned forests and their management.

In 18 countries the management of state-owned forests is reported as being financially self-sufficient or profit-making (although the enquiry did not go into details about the accounting principles used, or to what extent the public budget pays for ecosystem services delivered by the state-owned forest enterprise). Additional financial support from a state budget to forest management is provided for nine countries. Two Central-West European countries reported their public forests were both profit-making or financially self-sufficient and received additional public funding (for knowledge programmes, education, professional training and ecotourism).

Grants and subsidies are the most common financial instruments to support privately-owned forests, followed by tax measures.

To promote SFM in privately-owned forests, governments may use regulatory tools, such as forest laws, regulations, or compulsory forest planning and/or provide economic stimulus to perform certain desirable measures. 27 countries reported on the economic instruments they used to support specific operations. Grants/subsidies are the most common financial instruments, reported by 24 countries, among which are all North and Central-West European countries, followed by tax measures (16 countries).

25 countries indicated the specific objectives for which transfer payments were made: conservation of forest biodiversity, forest stand improvement, climate change adaptation, establishment or maintenance of protected areas and afforestation. Compensation measures for management restrictions or for the provision of ecosystem services[29] were mentioned by five countries.

[29] Strictly speaking, compensation measures are not exactly the same thing as payment for ecosystem services, described below, although there is considerable overlap.

Table 4-1: Objectives of transfer payments, by region

Objective	North Europe	Central-West Europe	Central-East Europe	South-West Europe	South-East Europe	Total
	Number of countries					
Conservation of forest biodiversity	5	8	4	2	3	22
Forest stand improvement	5	7	3	2	3	20
Climate change adaptation	2	7	3	2	2	16
Establishment or maintenance of protected areas	4	7	1	2	2	16
Afforestation	3	6	3	2	2	16
Reforestation	3	6	2	2	2	15
Forest inventory and/or planning	2	7	2	2	1	14
Protection of soil and water	1	5	3	2	1	12
Recreation	1	5	2	1	1	10
Other	2	2	1	1	1	7

Note: Based on data provided by 24 countries in total.

Public expenditure on SFM amounts to nearly EUR 5 thousand million in 10 reporting countries: transfer payments are EUR 25/ha of private forest.

21 countries, accounting together for 64% of Europe's forest area, provided at least some data on public expenditure on sustainable forest management (Table 4-2). They were requested, for the first time at the pan-European level, to provide data on operational expenditure[30], on transfer payments to private forest owners[31], the cost of forest administration (excluding the cost of managing publicly owned forests but including public administration, forest research, education and training) and on total public expenditure[32].

The 10 countries which reported total public expenditure (accounting for nearly 30% of European forests) reported that it was nearly EUR 5 thousand million around 2017. "Operational expenditure" was reported at EUR 6.7 thousand million (13 countries, 49% of forest area), "transfer payments for private forest owners" at EUR 2.1 thousand million (19 countries, 37% of forest area, but 79% of the area of the private forest), and administration, research, education and training at EUR 0.4 thousand million (11 countries, 25% of forest area).

Transfer payments to private forest owners were reported at EUR 25/ha of private forest and administration (with research, education and training) at EUR 7/ha. There are significant differences between country groups in these ratios. For instance, average transfer payments range from less than EUR 2/ha of private forest in South-East Europe to nearly EUR 60/ha in Central-West and South-West Europe.

Payment for Ecosystem Services schemes are operational in 16 countries.

Payment for Ecosystem Services (PES) is a method of providing support to forest owners in achieving public policy objectives. 29 countries responded to the request for information on PES. Of these, 13 do not apply PES in their countries. However, PES schemes are applied at the public level in ten countries. PES schemes at the private level are applied in six countries.

Trends

Funding has increased in five countries but dropped significantly in one, and the tax structure has changed in ten countries.

Ten countries reported significant changes in economic policy during the past five years. Four of them focused on new tax schemes: in two countries new taxes for the forest owners were introduced, while in two others taxation of forest owners were reduced or simplified to facilitate an improved ownership structure in the long term, with active forest owners. In five countries, the funding has augmented considerably, including for the provision of ecosystem services and measures in the field of climate change. In one country, financial support for forestry dropped significantly because of the difficult economic situation.

[30] Expenditure by public and private domestic or external sources of finance for operational forest activities. Note: The figures on operational expenditure are not comparable between countries.
[31] All government expenditures on direct financial incentives paid to non-government and private-sector institutions, enterprises, communities or individuals.
[32] Some countries reported total public expenditure as equal to one of the sub-components of total public expenditure, which would imply that the missing sub-components were zero, although this appears unlikely.

Table 4-2: Ratios of public expenditure to the forest area, by region, around 2017

Region	The ratio of total public expenditure (reported) to the total forest area	The ratio of transfer payments to the area of private forest	The ratio of administration costs to the total forest area
	EUR/ha forest	EUR/ha private forest	EUR/ha forest
North Europe	56.8	5.7	4.3
Central-West Europe	103.4	58.8	34.8
Central-East Europe	13.2	16.7	2.0
South-West Europe	97.2	59.3	6.6
South-East Europe	9.6	1.5	0.5
Europe	71.6	24.9	7.1

Note: Data coverage as % of total regional forest area and total regional private forest area, accordingly:
The ratio of total public expenditure (reported) to total forest area: NE 39%; C-WE 11%; C-EE 4%; S-WE 90%; S-EE 12%; Europe 30%;
The ratio of transfer payments to the area of the private forest: NE 96%; C-WE 44%; C-EE 86%; S-WE 86%; S-EE 18%; Europe 79%;
The ratio of administration costs to total forest area: NE 42%; C-WE 11%; C-EE 4%; S-WE 60%; S-EE 3%; Europe 25%;
"Total public expenditure (reported)" includes only those countries, which specifically reported total expenditure, i.e. not those who reported only some components of the total.

Table 4-3: Financial arrangements related to state-owned forests, by region

Region	Reporting countries	Profit-making/ financially self-sufficient	Additional financial support from the state budget	Other
	Number of countries			
North Europe	7	5	2	
Central-West Europe	8	5[33]	2	1
Central-East Europe	8	5	3	
South-West Europe	2		1	1
South-East Europe	4	3	1	
Europe	29	18	9	2

Table 4-4: Financial instruments used to support private forest management, by region

Financial instrument	North Europe	Central-West Europe	Central-East Europe	South-West Europe	South-East Europe	Total
	Number of countries					
Grants, subsidies	6	8	5	2	3	24
Of which RDPF	4	4	5	2	3	18
Loans	0	0	2	0	1	3
Tax measures	4	5	4	1	2	16
Other	1	2	2	0	2	7

Table 4-5: Payments for ecosystem services, by region

Financial instrument	North Europe	Central-West Europe	Central-East Europe	South-West Europe	South-East Europe	Total
	Number of countries					
At public level	1	4	2	1	2	10
At private level	1	2	2	1	0	6
No such payments	4	2	4	0	3	13

[33] Two countries reported "additional financial support" as well as "financially self-sufficient" management of public forests.

Indicator 5: Information and communication

Key findings

The current national forest inventories, monitoring and assessment schemes are considered sufficient to fulfil information and communication needs by 18 of the 30 reporting signatories, while in others, some gaps were reported or indicated. Almost all of the reporting signatories indicated that there is full or at least partial public access to aggregated forest inventory data and information. A formal governmental forest-related outreach and communication strategy exists in two-thirds of the responding signatories. These strategies are often embedded, for instance, in National Forest Programmes (NFPs). National reports on the status of sustainable forest management (SFM) at national level are at least partly issued in almost all of the responding signatories. Two-thirds of signatories indicated that there are national platforms for stakeholder participation in forest policy development and/or decision-making in their country. The information needs and communication means have changed for many of the reporting signatories since the past years. The demand for reliable and timely forest data and information has increased. For instance, recent forest insect outbreaks, droughts or storms in many European countries have brought forests into the public discussion. Better outreach via social media has increased the visibility of forest monitoring and assessment results.

Introduction

The demand for reliable and up-to-date forest data and information has increased during the past years for policy making, research and development, education and training, advisory and extension services, and for public awareness-raising. Forest monitoring schemes provide data and information on the state of forests and the effectiveness and efficiency of sustainable forest management (SFM) practices. Informational means are essential for informing citizens and the public about forests and for establishing a dialogue on forest focused and related issues and priorities. These systems also contribute to increasing the transparency of forest focused and related policy-making.

Status

18 countries consider forest monitoring as sufficient for their information and communication needs.

Of the 30 reporting signatories, 18 countries consider their current national forest inventory, monitoring and assessment schemes as sufficient, nine countries as partly sufficient and three countries as insufficient for information and communication needs. Reasons mentioned by the reporting signatories for not being sufficient are a recently started first national forest inventory, missing or incomplete statistical forest information for the socio-economic aspects due to limited compatibility of decentralised surveys or still not fully implemented newly developed (e.g. web-based) recording systems. All reporting signatories understand the importance of reliable forest inventory, monitoring and assessment systems' results for e.g. the detection of environmental changes, for monitoring the effectiveness of management measures, education purposes, or as a base for investment measures.

Almost all countries provide public access to forest inventory data and information.

Almost all of the reporting signatories (28 out of 30) indicated that there is full or partial public access to forest inventory data and information at national level (Figure 5-1). Data and information (mostly collected by national forest inventories) are aggregated and published on the national websites in the form of reports, open databases, online-tools and interactive maps. National forest inventory plot data is usually not publicly available but can be obtained on special request in a few countries. The ecological data and information obtained from national forest inventories are in most countries combined with socio economic data from other national sources (e.g. statistical authorities). Forest inventory data and information is used e.g. for scenario modelling on future forest development, estimations on future harvesting volumes, and analyses of impacts of forest-related policies.

Two-thirds of the reporting countries have a formal governmental forest-related outreach and communication strategy.

19 out of 30 responding countries from all European regions stated that at least partly a formal forest-related outreach and communication strategy exists which is available in many cases on government websites. In several of these countries, the communication strategy is part of the NFP or a forest-related strategy.

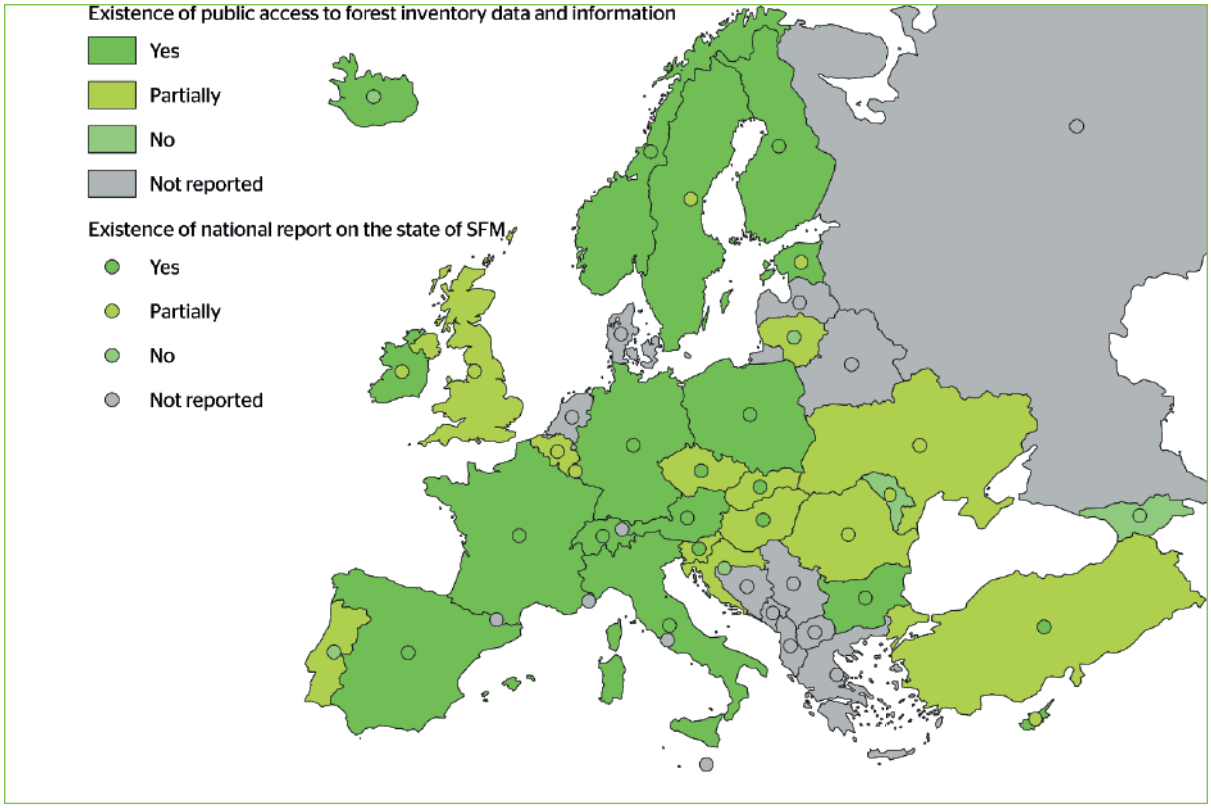


Figure 5-1: Public access to forest inventory data and information, and existence of a national report on the status of sustainable forest management, by country

25 countries issue a national report on the status of SFM.

In 25 out of 30 reporting signatories, a national report on the status of sustainable forest management is issued (Figure 5-1). Countries mentioned that either part or the whole pan-European set of C&I for SFM are used in the national reports. Seven countries reported or further specified that such reports are issued annually, in the other countries the cycle is five or ten years. Data and information are published either in report form (incl. summaries, data and information tables, graphs and conclusions) or only data and information in open databases, online-tools or interactive maps.

Stakeholders participation in forest policy development and/or decision making is strong.

Two-thirds of the responding signatories (19 out of 30 located in all European regions) indicated that there are national platforms for stakeholder participation in forest policy development and/or decision-making (cf. Indicator 1 on NFPs). Stakeholders (e.g. local authorities, forest administrations, research organisations, forest owners, forest industries and forest-related sectors, NGOs, employer organisations, entrepreneurs, youth organisations, leisure-time organisations and associations) are invited by ministries responsible for forest-focused and forest-related issues (or other leading institutions) to participate either in the creation or revision of existing national forest programmes and/or strategies. In some cases, also the public is invited to comment on the drafts of national forest programmes and/or strategies, e.g. via an online survey. One country stated that even if there is no formalised platform for stakeholder participation in forest policy development and/or decision making existing, "participation is one of the main principles for policy development for all sectors".

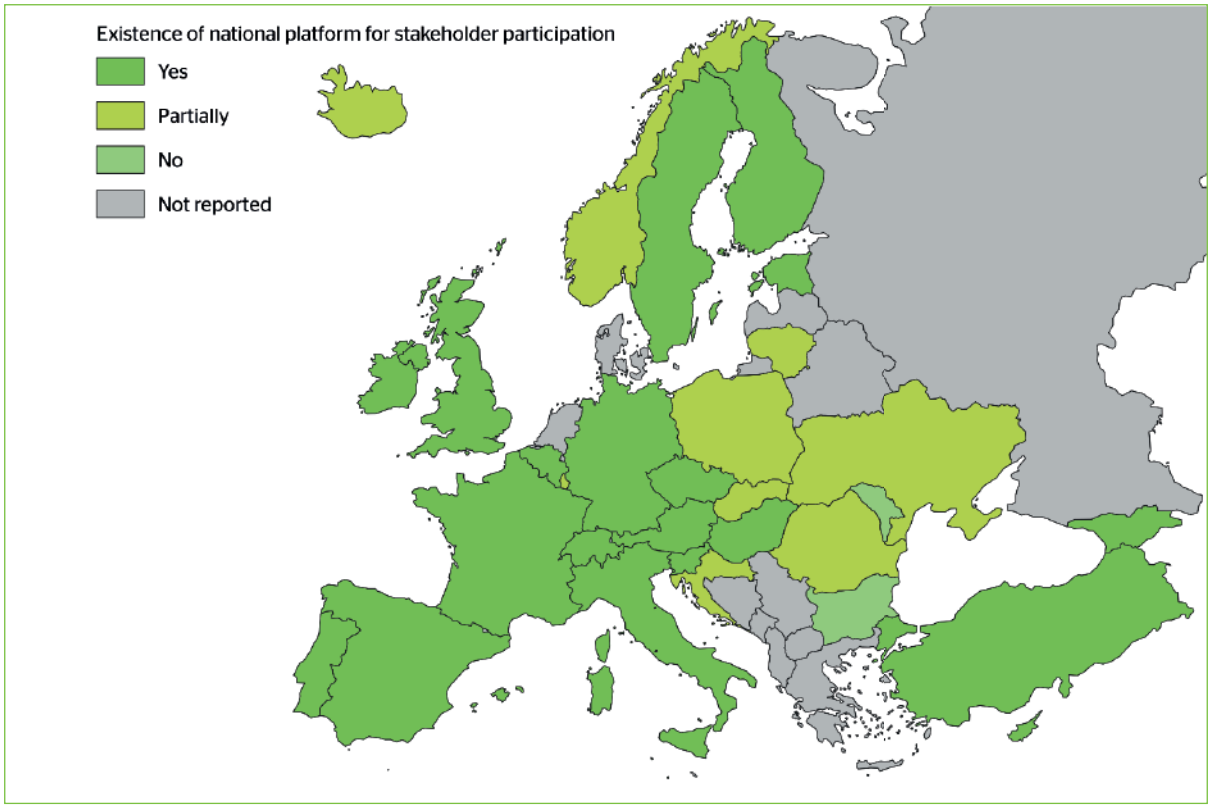


Figure 5-2: National platforms for stakeholder participation in forest policy development and/or decision making, by country

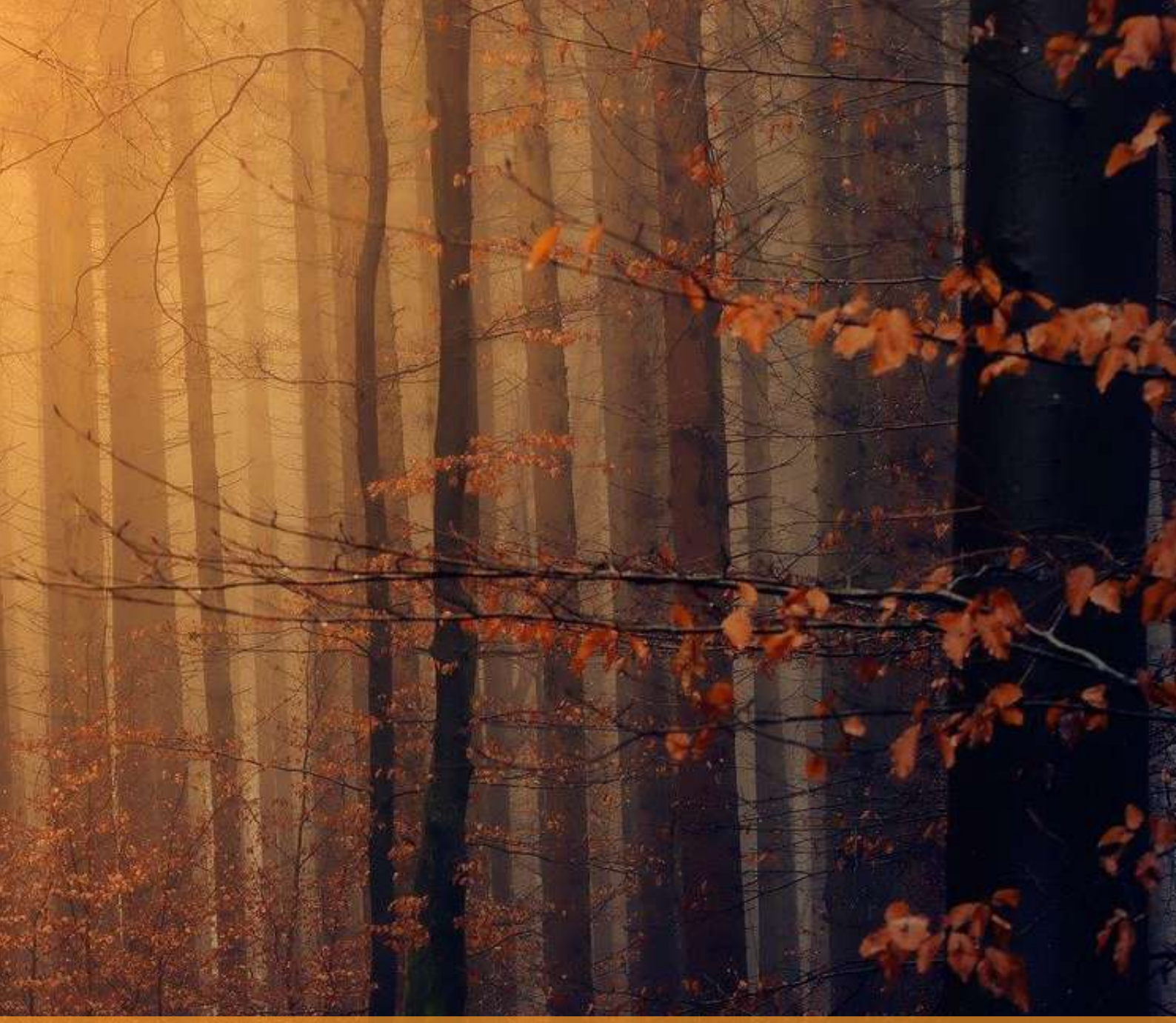
Trends

Developments in informational means over the last five years have focused on tailor-made information and online tools.

In almost half of the responding signatories (14 out of 30 from all European regions) changes in informational means occurred during the last five years. These country-specific trends can be classified into two categories. Firstly, on how data and information are obtained, e.g. new information and data are obtained through completed forest inventories (including new measurement attributes or forest inventory techniques), or better control of forest harvesting activities through novel online tools and GPS devices. Secondly, on how this obtained information is presented, e.g. novel processes for public consultation for the drafting of national forest laws, or tailor-made statistical information and statements for the wood processing and service-providing sectors, or through tailor-made information campaigns (e.g. online) increasing the public awareness of forest ecosystem services. Reporting signatories increasingly focus on an online-presentation of forest data and information, which might allow countries to quickly react to emerging information needs related to forest focused issues.

Forest related communication has focused on improving the outreach of forest-related information.

Almost half of the responding signatories (14 out of 30 from all regions) reported changes in communication over the last five years. These country-specific changes were increased communication on wider aspects of forests and their services, and a better outreach via social media to increase visibility and to respond to the discussion of forest resources and their use. Communication with the public has increased in countries that face forest fire risks, mostly in southern Europe. In conclusion, it can be assumed that the demand for reliable and timely forest data and information has increased during the past years, e.g. for projections of forest development under a changing climate. Recent forest insect outbreaks, droughts or storms in many European countries have brought forests into the public discussion, not only to provide a state-of-the-art picture but also to discuss the actions needed.



Part II
Country profiles on forests and forestry

Coordinating lead author: ***Kit Prins***

Country profiles on forests and forestry

Coordinating lead author/author: **Kit Prins**

Reviewers: **National Correspondents**

Data sources: **National reports on the pan-European indicators for SFM, 2018; updates from National Correspondents, 2019**

Introduction

Previous chapters have presented trends for each of the pan-European indicators, focusing on the pan-European and country group level. However, policy for sustainable forest management is a sovereign national responsibility and the concept of sustainable forest management implies balancing trends for all the dimensions of sustainability for a defined area, like a country. For that reason, it is desirable also to review the status and trends at the national level, bringing together, for each country, information concerning a balanced set of indicators.

This chapter presents the status and trends in FOREST EUROPE signatory countries, based on the pan-European criteria and indicators for sustainable forest management, in a standard format in order to present the situation in an objective and non-judgemental way. It was prepared applying a structured participatory approach and it is based, like the other parts of this study, on the data supplied by countries in response to the quantitative and qualitative enquiries.

Methodology

It was considered practical to use a subset of the pan-European set of indicators to conduct a structured participatory approach and characterise main trends at country level. Hence, a short set of 18 indicators was selected, at the intersection of the pan-European set and the Global Core Set of forest related indicators. All criteria in the pan-European set are included, and data are available for all the selected indicators for most countries. The short set includes both quantitative and qualitative indicators, and thus monitors real trends and the policies and measures put in place by countries to achieve sustainable forest management.

Data were taken from the SoEF 2020 data bank, to generate a one page standard table (available in annexes) for each country, and a short text (half a page, maximum one page) was drafted presenting this information in an objective and non-judgemental way.

The text and table were sent for review to national correspondents (for both the quantitative and qualitative enquiries), who were asked to correct any mistakes or misunderstandings and supply missing information.

A revised text was then prepared, incorporating the comments: the final text was approved by the national correspondents. These texts are presented below. This part only includes texts for countries which explicitly approved the final draft. The process was not completed for a very small number of countries, which are therefore not included here.

Due to the fact that the dialogue process took place after finalisation of the SoEF 2020 data base and simultaneously with the drafting of Part I, the data in Part II may have been updated by the national correspondent and may not be exactly the same as those in other parts of the study. However, any differences are minor and concern essentially inclusion of more recent data and of specialised data not included in the data base. The dialogue took place in 2019, so developments since then are not included.

Albania

The Republic of Albania is situated in south eastern Europe, in the western part of Balkan Peninsula, and has about a third forest cover. Mountains cover nearly 80% of the country. With the collapse of the communist system in Albania, in 1992, the parliament enacted a new law on forests, which focused on the process of forest administration restructuring, privatisation of forest harvesting companies, and restitution of forests and pastures to former owners. A new law Nr 9385 "For forests and forest service" was enacted in 2005. This law on forests has been amended several times, in order to adapt to changes and reflect the new realities, and is still in force. In 2004, the Council of Ministers approved the Strategy for the Development of Forests and Pastures.

There have been three national forest inventories, in 1969, 1985 and 2004. The most recent inventory was conducted with new methods through satellite imagery, but its data remain controversial. Data from a new inventory are expected in 2019. The data in the table are those supplied to SoEF 2020 at an earlier stage, and included in the database. In order to maintain consistency between the different parts of the study, the data presented in the annex table do not take into account the results of the latest national inventories.

In 1985, all forest administrative units were under management plans. However by 2004, only 84 out of 397 administrative units were under a long term management plan.

No forests were certified under third party certification schemes.

Forest ownership has changed drastically in Albania over the last 27 years. Until 1990 all forests were state owned but later the ownership changed as result of privatisation and decentralisation. Now, 81% of the total forest area is owned by municipalities, 16% by the state and 3 % is privately owned.

Forest area has been stable. In 2018, growing stock was 52 m^3/ha. Total growing stock has been falling since 2000. No information was supplied on carbon stock in harvested wood products.

The net annual increment is estimated at about 1.15 million m^3. Fellings are estimated at 2.5 million m^3, almost all of wood fuel, although lower estimates were provided to SoEF 2020. Beside wood, aromatic and medicinal plants (MAPs) from forests are an important source of revenue, providing livelihoods for 75-100 thousand rural people.

18% of forest and other wooded land was protected for conservation of biodiversity (MCPFE classes 1 and 2) in 2018. 19% of forests have designated protection functions (MCPFE class 3). 37 thousand ha of forest were considered "undisturbed by man" in 2018. The total number of employees in forest administration (not including wood processing and pulp and paper, nor forest related employees of the new municipalities) has decreased significantly from 1 726 in 1990 to 1 028 in 2010.

It is estimated that wood accounts for 26% of Albania's primary energy supply.

Austria

Austria is a mountainous country in Central Europe, with nearly 50% forest cover. The basic forest law was passed in 1975. Austria has a national forest programme (NFP), based on a forest dialogue facilitated by the Federal Ministry for Sustainability and Tourism. The NFP was the basis for a forest strategy which was published in 2016. Regular sample-based national forest inventories have been carried out since 1961. 50% of forests are reported to be under a long term forest management plan, 100% of forests under an equivalent instrument. In Austria, these plans are not obligatory, and are not registered. About 80% of Austrian forests are under third party certification schemes, mostly PEFC.

Forest area has been expanding slowly but steadily, and is now 47.3% of total land area. Over the last twenty five years, growing stock and above ground biomass have also expanded steadily. Around 2020, growing stock per hectare will be nearly 300 m^3 o.b., one of the highest averages in Europe. The carbon stock in harvested wood products has also expanded steadily, reaching 65 million tonnes in 2015, about 20% of the carbon stock in above ground biomass.

Many forests are in mountain areas, making the protection function a major priority. Nearly 40% of forest and other wooded land is considered protection forest (MCPFE class 3), 20% for soil, water

and other forest ecosystem functions and 19% to protect infrastructure and managed natural resources. However, the two categories overlap, so the aggregate figures are higher than the reality. About 22% of Austrian forest and other wooded land is conserved for biodiversity (MCPFE Classes 1 and 2). The apparent fall between 2000 and 2010 is due to a reclassification of conservation systems, not to a real reduction in area protected. Nearly 120 thousand ha of forest and other wooded land are considered "undisturbed by man".

In 2010, over a million ha of forest and other wooded land, about 25% of the total, were reported as showing damage, but this figure conceals some double counting (one area with two different types of damage). The largest single source of damage was "wildlife and grazing" which affected over 700 000 ha in 2010.

The production function is also important for Austrian forests: total wood removals have risen from about 15.7 million m^3 in 1990, to 17.6 million m^3 in 2017, with a peak of 21.8 million m^3 in 2008. Fellings have been below net annual increment in all years, with the increase of the fellings/NAI ratio from 58% in 1997 to 87% in 2012. This increase was due, on the one hand, to deliberate measures to increase the timber harvest and, on the other hand, to high storm damage and bark beetle infestations, which resulted in nearly tripling fellings of natural losses between the inventories of 1997 and 2004. Since the 2004 inventory, fellings of natural losses have remained at the higher level.

About 55 thousand people are employed in the forest sector (ISIC/NACE 02, 16 and 17, which include the forest industries as well as forestry itself, but not forest related occupations such as forest research, tourism or environmental management). Employment in wood processing and the pulp and paper industry has been falling, while employment in forestry has been stable, around 11 thousand people, since 2005.

Wood constitutes over 15% of Austria's total primary energy supply.

Belarus

Belarus is a landlocked country in eastern Europe with 43% forest cover. In Belarus, forests are the exclusive property of the state. State administration is carried out by the President of the Republic of Belarus, the Council of Ministers of the Republic of Belarus, the republican state administration body for forestry - the Ministry of Forestry of the Republic of Belarus, local executive and administrative bodies, and other state bodies within their powers in accordance with the law. Forest legislation is based on the Constitution, the Forest Code, acts of the President, as well as other legislative acts.

The Council of Ministers of the Republic of Belarus in order to improve and increase the efficiency of the forestry complex adopted state programs for the development of forestry covering the periods 2007-2011, 2011-2015 and 2016-2020.

State forest accounts/registers are prepared regularly, and are the source of the data for this study.

Almost all Belarus forests are certified by both FSC and PEFC.

Forest area has been expanding steadily, but slowly (just under 0.2%/year in the most recent period). Over the last thirty years, growing stock per hectare has risen by nearly 45%, to exceed 200 m^3/ha. Likewise, above ground biomass stock in Belarus forests has been rising steadily. The carbon stock in harvested wood products is estimated at nearly 6 million tons.

Nearly 16% of Belarus forests are conserved for biodiversity (MCPFE classes 1 and 2), and nearly 17% of forests have a designated protection function (MCPFE Class 3). About 2.3% of forest area is reported with damage, mostly by insects. 135 thousand ha of forest are reported as "undisturbed by man".

Wood removals from the forests of Belarus have risen sharply, reaching 23.8 million m^3 u. b. in 2016, more than double the volume of 2000. The ratio of fellings to net annual increment has therefore increased, reaching 73% in 2015.

Employment in the forest sector has been falling, from 122 thousand people (FTE - full time equivalent) in 2000, to 84 thousand FTE in 2015. Most of the drop has concerned employment in the wood processing industry, with little change either for forestry or for pulp and paper.

Wood accounts for over 5% of primary energy supply in Belarus.

Belgium

Belgium is a country in western Europe, with nearly 23% forest cover. The regional (sub-national) governments (Brussels, Flanders, Wallonia) have full authority and competence with respect to forests and nature policy, so policies and institutions vary within the country. Regional forest inventories take place regularly, based on a continuing data collection. A new long-term vision for the forest of Flanders, based on a process with stakeholder participation, was completed in 2017 and published in 2018. Similar processes are under way in Brussels and Wallonia. 47% of forests in Flanders and Brussels are under a management plan. Forest management plans are compulsory in Brussels but only partially in Flanders and Wallonia. 47% of the forests in Belgium are certified under third party certification schemes.

Forest area has been stable for many years within the margins of statistical reliability, while growing stock and above ground biomass have been increasing. Growing stock per hectare is expected to reach 262 m^3/ha in 2020. There is nearly one million tons of carbon in harvested wood products in Belgium.

Just over 6% of the forest area of Belgium showed damage.

7.7% of Belgian forests are designated for conservation of biodiversity (MCPFE Classes 1 and 2). Nearly a quarter of forests in Belgium are designated as having protection functions (MCPFE Class 3). There are no forests undisturbed by man in Belgium

Total wood removals since 2010 have fluctuated around 4 million m^3 u.b. (under bark). In 2010, fellings on forest available for wood supply were recorded as around 3.9 million m^3 o.b. (over bark), well below reported net annual increment of 4.6 million m^3 o.b. However, data before and after 2010 are not strictly comparable because of methodology changes in Flanders.

About 31 000 people (FTE - full time equivalent) are employed in the forest sector in Belgium, mostly in wood processing and pulp and paper industries. This total fell by nearly 20% between 2010 and 2015.

In 2009, wood accounted for 1% of total primary energy supply. Data are not available for other years.

Bosnia and Herzegovina

Bosnia and Herzegovina is a country in the Balkan Peninsula with forest cover over 50%. No information was supplied on forest laws, NFP, management plans or third party certification. Information for policy making and international reporting is supplied by the national statistical agency.

Forest area has been quite stable, and now stands at 54.9% of total land area, including a variety of land uses included as other wooded land. Growing stock however has been rising steadily, reaching 230 m^3 o.b./ha on public forests. The same data for above ground biomass have been reported since 2000, so no trend is visible. No information was supplied on the carbon stock in harvested wood products.

In 2000, it was reported that 1.2% of the forest showed damage (no data for wildlife or human-induced damage). Data were not supplied for subsequent years.

4.0% of forest and other wooded land is protected for conservation of biodiversity (MCPFE classes 1 and 2). No information was supplied on forests with designated protective functions.

Removals are reported to be around 4 million m^3 u.b. On public forests, fellings are 42.7% of net annual increment.

11.9 thousand people (full time equivalent i.e. 1 800 working hours per year) were employed in forestry (excluding wood processing and paper) in 2017.

The share of wood in total primary energy supply has been rising, from 3.5% in 2011, to 8.8% in 2015.

Bulgaria

Bulgaria is a mountainous country in the Balkan Peninsula, with nearly 36% forest cover. The Forest Law was promulgated in 2011 and recently amended. The data used in this study are based on a forest inventory with a 10-year cycle. Within the cycle, data on area and harvest are reported annually and all other data are actualised every fifth year.

The National Strategy for the Development of the Forest Sector in the Republic of Bulgaria 2013-2020 was based on a process under the Ministry of Agriculture and Food with the participation of stakeholders.

All forests in Bulgaria are subject to a management plan. Nearly 34% of forests are certified under third party certification schemes, essentially FSC.

Forest area has been growing steadily, as has growing stock per hectare, which now stands at nearly 200 m^3/ha, about 60% more than in 1990. Above ground biomass stock has also been growing at rates of more than 1% a year. No information is available on carbon stock in harvested wood products.

In 2015 the proportion of forest area with damage, mostly by abiotic agents, was 3.8%.

Over 18% of forest and other wooded land in Bulgaria is protected for conservation of biodiversity (MCPFE Classes 1 and 2), and this share has risen markedly since 1990. Nearly 11% of forest and other wooded land is designated protection forest (MCPFE Class 3). The area of forest reported as "undisturbed by man" was 704 thousand ha in 2015.

Wood removals are reported at 6.2 million m^3 for 2017 and their quantity depends on a number of factors in the different years. Fellings are 60% of net annual increment.

About 54 thousand people (FTE - full time equivalent) are employed in the forest sector of Bulgaria, more than half of these in forestry itself.

In 2011, 5% of Bulgaria's primary energy supply came from wood. Data are not available for other years.

Croatia

The Republic of Croatia is situated in the south-eastern part of Europe, surrounded by the Alps in the west, the Sava and Drava rivers in the north and east and the Adriatic Sea in the south, with about a third forest cover. Sustainable forest management in Croatia has a tradition of more than 250 years and is regulated by several laws and other legal acts. The latest Forest Law was passed in 2018. Forests and other wooded land in Croatia are managed in line with the Forest Management Plans, adopted for the period of 10 years, which are compulsory and registered with an official body (Ministry of Agriculture). Currently, the Master Forest Management Plan for the period 2016-2025 is in force. 93% of forests are certified under third party certification schemes, all FSC. Information for policy making and international reporting is based on a stand inventory.

Forest area has expanded slightly and now stands at 34.7% of total land area. Growing stock and above ground biomass have been increasing faster than forest area: average growing stock is now 220 m^3 o.b./ha. No information was supplied on carbon stock in harvested wood products.

3.5% of forest and other wooded land showed damage, mostly due to abiotic causes, although this percentage fluctuates quite strongly.

16.3% of forest and other wooded land are protected for the conservation of biodiversity (MCPFE classes 1 and 2), and this share has been rising. 12.5% of forest and other wooded land are designated protection forests (MCPFE class 3). Nearly 7 thousand ha of forest are considered undisturbed by man.

Wood removals have been rising steadily, to 5.7 million m^3 in 2017. The share of woodfuel has been rising and reached 47% in 2017. Fellings were 71% of net annual increment on forest available for wood supply.

Over 36 thousand people are employed in the forest sector in Croatia. Employment in forestry itself has been rising.

In 2015, 11% of Croatia's primary energy supply was derived from wood.

Cyprus

Cyprus is an island country in the eastern Mediterranean, with nearly a fifth forest cover. The new Forest Law was enacted in 2012. There is a platform for stakeholder participation in forest policy making, the Forest Consultation Board, but no formal NFP process. A new forest policy statement was published in 2013. Forest management plans are obligatory and registered with an official body. No forests in Cyprus are under third party certification schemes. No information was supplied for SoEF 2020 on the national forest assessment process.

Forest area has been stable since 2000 and stands at 18.7% of total land area. Growing stock and above ground biomass have both been increasing. In 2015, growing stock was on average 64 m^3 o.b./ha, 40% more than in 1990. No information was supplied on carbon stock in harvested wood products.

1.4% of forest and other wooded land was reported as with damage in 2010, chiefly because of insects/diseases and fire.

In 2010, 6.8% of forest and other wooded land were protected for conservation of biodiversity (MCPFE classes 1 and 2). No forests are specifically designated as protection forests (MCPFE class 3). 13 thousand ha of forest are considered undisturbed by man.

In 2016, wood removals were 16 thousand m u.b., almost all woodfuel. Fellings are reported to have fallen over the 30 year period, from 51 to 9 thousand m^3 o.b. The ratio of fellings to net annual increment also fell, from 110% in 1990 to 23% in 2015.

In 2010, about 4 thousand people were employed in the forest sector, of which over 60% in the wood processing industries.

In 2015, wood provided 0.6% of Cyprus' total primary energy supply.

Czechia

Czechia is a mountainous landlocked country in Central Europe, with forest cover of nearly 35%. The current Forest Act was enacted in 1995, and amended most recently in 2019. A National Forest Programme for the period to 2013, was issued in 2008 and, despite its name, is still under implementation. A forest monitoring system is in place, and a report on the state of sustainable forest management in Czechia has been issued.

All forests in Czechia are under a management plan, which is compulsory. Seventy per cent of the forests are certified, mostly by PEFC.

Forest area has expanded very slightly, but growing stock has increased, reaching 295 m^3/ha in 2020. Likewise, above ground biomass has also been increasing, by 0.5% a year in the most recent period. There are 42 million tons of carbon in harvested wood products in the country.

Up to 2015, between 1% and 2% of the forest area had damage. The main cause has been insects and disease, followed by abiotic factors. Since 2015 however, there has been a significant increase in forest damage, from drought, insects and other factors. According to the most recent information, in 2018, 4% of the forest in Czechia was damaged.

Over 29% of forests are protected for conservation of biodiversity (MCPFE Classes 1 and 2), while over 10% have designated protection functions (MCPFE Class 3). Nearly ten thousand hectares of forest are considered "undisturbed by man".

Wood removals have been rising steadily, reaching 19.4 million m^3 in 2017. The ratio of fellings to net annual increment has therefore risen, reaching 84% in 2015. However, a significant part of the fellings (varying from 20% to 65% according to the years) consists of fellings of natural losses. If fellings of natural losses are deducted from the fellings data, the ratio is much lower, about 45% in 2015 for forests available for wood supply.

Employment in the forest sector of Czechia fell between 2000 and 2015, from 120 thousand people (FTE - full time equivalent) to 80 thousand people. Over half of the employment is in the wood processing industries.

The share of wood in total primary energy supply has been rising, and reached 6.4% in 2015.

Denmark

Denmark is a Nordic country, with about 15% forest cover. The current Forest Act was enacted by Parliament in 2004, and amended most recently in 2019. In 2018, a new National Forest Programme was published, replacing the former NFP of 2002. The new NFP sets out long term goals for an increasing forest cover as well as share of forest primarily managed for biodiversity purposes. It covers all Forest Europe SFM criteria and sets out a number of strategic orientation lines for each, as well as concrete implementing actions. It is not known what area of forest is under a management plan or equivalent, as these plans are not compulsory in Denmark and are not registered. Nearly 30 % of Danish forests are under third party certification schemes, FSC or PEFC or both.

The forest area has been growing in Denmark for decades, at an average rate of 0.6% per year. Growing stock per hectare is also rising; it was 211 m^3/ha in 2015 and was last recorded at 216 m^3/ha in 2018. There are about 41 million tonnes of carbon stored in living biomass in Danish forests. In addition, 29 million tonnes are stored in harvested wood products, of which 83% is imported.

In 2015, just over 5% of the forest area showed damage, from biotic (insects, disease, wildlife) and abiotic (wind) causes, but there are marked year-on-year fluctuations, especially for damage from abiotic causes.

Over 20% of Danish forest is reported as protected for the conservation of biodiversity (MCPFE Classes 1 and 2) with a significant increase between 2000 and 2010. No forest has been designated as protection forest (MCPFE class 3) in Denmark, which is not a mountainous country. About 5% of the forest area is considered undisturbed by man (without visible intervention). In 2016, biodiversity protection was enhanced through a political decision to designate more forest, in particular state forest, primarily for biodiversity protection purposes. Grant schemes for afforestation since 2016 have been primarily designed to pursue water protection purposes. Of late, increased focus on afforestation as a means to climate change mitigation and on biodiversity protection in existing forests is noted.

Danish removals have been rising steadily since 2001, reaching 3.6 million m^3 u.b. in 2017. Fellings are now about 67% of net annual increment.

About 23 thousand people work in the forest sector in Denmark. Over the last 30 years, employment in wood processing and the pulp and paper sector has been falling steadily, while employment in forestry grew slightly until around 2010 and has been rather stable since.

The share of wood in total primary energy supply has been rising steadily, and reached about 15 % in 2016, primarily driven by imports of pellets. National production of chipped wood has also increased.

Estonia

Estonia is a country on the Baltic Sea with nearly 54% forest cover. The Forest Act was approved in 2006 by Parliament. There is a Forest Policy (adopted in 1997). Estonian Forestry Development plans have been compiled for 2001-2010 and 2011-2020. The process to develop a forest strategy to 2030 was launched in 2019. The first large-scale stand-wise forest inventory for Estonia was started 100 years ago. Now there is a continuous sample-plot based national forest inventory, with methodological revisions at five year intervals, which provides most of the data for policy makers and international reporting. Almost all forests which are actively managed are covered with a forest management plan or equivalent. Nearly 66% of Estonian forests are under third party certification, of both FSC and PEFC. Indeed most public forests and 100 thousand ha of private forests are certified by both systems.

The forest area has been expanding steadily since the 1950s, and the growing stock has also been growing, reaching 203 m^3/ha in 2020. Above ground biomass stock has also been increasing at about 0.8%/year. The carbon stock in harvested wood products is estimated at 9 million tons of carbon. Only 0.4% of forest area was reported with damage in 2015, but this understates the reality as damage is not reported if stand parameters allow felling or if there is no economic interest to use the damaged forest.

The share of forest protected for conservation of biodiversity (MCPFE Classes 1 and 2) reached nearly 23% in 2015. The area designated as protection forest (MCPFE Class 3) is nearly 6% of the forest area. 52 thousand ha are reported as undisturbed by man.

Removals were low after the recovery of independence, but rapidly reached 9 million m^3 u.b. in 2000, even 10.5 million m^3 u.b. in 2001. Since then they have fluctuated according to market conditions and nearly reached 10 million m^3 u.b. in 2016. The ratio of fellings to net annual increment in the most recent period is 83%.

Employment in the forest sector was 27 thousand people in 2016, of which about two thirds in the wood processing industries.

In 2015, nearly 20% of Estonian primary energy supply came from wood.

Finland

Finland is a Nordic country, with nearly 74% forest cover. It has a regularly revised, national level, NFP, as well as regional ones. The Forest Act was enacted by Parliament, at national level, in 1996 and was amended most recently in 2014. There is a continuous national forest inventory in place.

All Finnish forests are covered under the equivalent of a management plan. This is an official website that provides access to forest data of private forest properties, with silvicultural recommendations that are not compulsory. Nearly 90% of Finnish forests are under third party certification schemes, mostly PEFC, although some forests are certified under both FSC and PEFC.

There has been little change in forest area in recent years, although growing stock has steadily increased, reaching 109 m^3/ha in 2015. The carbon stock in above ground biomass has also been growing at around 1% a year. The estimated carbon stock in harvested wood products is 97 million tons.

Over 18% of forest and other wooded land in Finland is protected for biodiversity (MCPFE Classes 1 and 2), while just over 1% is designated as protection forest (MCPFE Class 3). Just over 200 thousand ha of forest are considered undisturbed by man.

Finland is a major player on international forest products markets. Total industrial roundwood removals have risen to over 63 million m^3 o.b. in 2017 (72 million m^3 o.b. if removals of energy (stem) wood are included). In 2013-2017, fellings were on average 80% of net annual increment on forest available for wood supply.

64 thousand people were employed in the forest sector in Finland, about half of the number in 1990.

Since 1990, the share of wood in total primary energy consumption has risen from 25% to 29% in 2015, of which 70 % comes from industry side streams.

France

France is a country in western Europe, with 31% forest cover. The formal authority for forests is the Forest Code, first promulgated in 1827, and continuously revised since, and Loi d'avenir pour l'alimentation, l'agriculture et la forêt (Law for the future of food, agriculture and forests) enacted in 2016. There is a national forest programme process: a new NFP has been prepared for the period 2016-2026. There has been a continuous national forest inventory process since 1958. 45% of French forests are subject to a management plan or equivalent instrument, which is compulsory for certain categories of forest. 47% of French forests are under third party certification schemes, mostly PEFC.

Over the last quarter century, the area of forest has grown steadily and is now at 31.5% of land area. Growing stock has also expanded, and is now at 177 m^3/ha. Above ground biomass increased at 1.4%/year between 2010 and 2020. No information was supplied on carbon in harvested wood products.

It is reported that 0.2% of the forest shows damage, but this figure does not include damage by wildlife.

37% of French forests are reported as protected for conservation of biodiversity (MCPFE Classes 1 and 2), while nearly 7% are designated as protective forests (MCPFE Class 3). All forests in France are considered "semi-natural".

Over recent decades, French removals have fluctuated between 50 and 65 million m^3 u.b. In 2015, on forest available for wood supply, fellings were 60% of net annual increment.

In 2015, 172 thousand people were employed in the forest sector, a third less than in 1990. Less than a fifth of these work in forestry itself.

About 4% of French total primary energy supply is from wood.

Georgia

Georgia is a mountainous country in the south Caucasus, with over 40% forest cover. There is a national forest programme process, which is the tool for implementation of the national Forestry Concept. A new National Forest Code has been drawn up, and handed to Parliament for approval, which is expected in 2019. However, there has been no systematic forest inventory since 1990. The first national forest inventory is expected for 2020.

About 13% of forests in Georgia are under a management plan or equivalent instrument. No forests in Georgia are under third party certification schemes, but preparations are in hand, including the development of a national set of criteria and indicators of sustainable forest management.

Given the lack of objective information, it is difficult to determine the direction of change in Georgia's forest area, or its growing stock. Growing stock is estimated at 161 m^3/ha. No change in above ground biomass has been reported in recent years.

Just under one percent of the forest area is reported as showing damage in 2015, mostly due to insects and disease. Removals are recorded at 0.6 million m^3, but the information provided here does not take into consideration wood which has been extracted without authorisation, which is assumed to exceed the legally harvested amount. Data are not available on the balance between fellings and increment.

All forests in Georgia are designated protective forests, and nearly 10% are protected for conservation of biodiversity. About half a million hectares are considered undisturbed by man.

1.7 thousand people are reported as employed in forestry in Georgia in 2015. No data are available on employment in the wood processing or pulp and paper industries.

No information is available on the share of total primary energy supply from wood, although it is known that wood is an essential source of energy in many rural areas.

Germany

Germany is a country in west Europe, with nearly 33% forest cover. There is a national level NFP, which has led to the Forest Strategy 2020 and the Charter for Wood 2.0. Forest policy is mostly implemented at the sub-national level (Bundesländer), in the framework of the Federal Forest Law (Bundeswaldgesetz). There are regular national forest inventories. 66% of forests are under a management plan which is obligatory for all forest enterprises over 100 ha, and is registered with an official body. 78% of German forests are under a third party certification scheme, mostly PEFC.

Forest area in Germany has expanded slowly and is now 32.7% of total land area. Growing stock and above ground biomass have been growing at a faster rate than forest area. The most recent national forest inventory in 2012 showed a growing stock of on average 321 m^3/ha. The carbon stock in harvested wood products is estimated to be 283 million tons. Between 1.2% and 1.4% of forest area is reported to be damaged, although this figure does not include human induced damage (e.g. from forest operations), for which data are not available. All forests in Germany are considered "semi-natural".

Over 80% of German forests are reported as being protected for conservation of biodiversity (MCPFE Classes 1 and 2), because of the formal obligation to manage in a multi-functional way. In 2010, over 40% of forests were reported as having designated protection functions (MCPFE Class 3).

Removals from German forests fluctuate in a range between 35 and 55 million m^3 u.b. with the exception of peaks (and subsequent troughs) due to major storms. The ratio between fellings and net annual increment is between 75% and 81%.

Just over 250 thousand people are employed in the German forest sector, more than 40% fewer than in 1990. About 35 thousand people are employed in forestry itself.

Wood accounts for over 4% of total primary energy supply in Germany.

Greece

Greece is a country in the eastern Mediterranean, with nearly a third of forest cover.

All Greek forests and forested areas are protected by the Greek Constitution. Law No. 998/1979 protects and enhances the country's forest resources while harmonizing its multiple functions with the basic needs of the social life of citizens and the demands of modern civilization.

Provisions for sustainable forest management are included in Law 3208/2003, which stresses the principles of sustainability, conservation of biodiversity and multiple uses of forest lands. Forests and forested areas are sustainably managed by Forest Services, through the application of "Forest Management Plans" (FMPs). The technical specifications of FMPs were revised in 2018. For the period 2009-2018, 39.5% of forests and forested areas are sustainably managed though the application of FMPs.

Issues concerning timber are governed by Regulations 2173/2005 and 1024/2008 (FLEGT Regulation and its implementation), which establish a voluntary licensing scheme for forest law enforcement, governance and trade in the European Community. Greece, as an EU member state, is implementing the EU Timber Regulation (No 995/2010) on illegal logging.

The Technical Requirements for the Development of Plans for the Fire Protection of Forests and Forest Ecosystems have been revised and an Action Plan for the prevention of forest fires has been adopted. On average, between 2010 and 2018, 0.3% of the forest area was damaged by fire annually.

The Hellenic Ministry of Environment and Energy has signed an agreement with the Institute of Mediterranean and Forest Ecosystems for the implementation of a programme concerning the development of the Greek National System for the Certification of the sustainable management of the forests and their wood products. However at present, no forests are certified under FSC and/or PEFC.

In 2018, a National Forest Strategy (NFS) was adopted. The NFS defines the principles and guidelines of forest policy for the period 2018-2038, identifies specific objectives of this policy as well as the necessary resources and the means of its implementation.

A national forest inventory was carried out in 1992. Forest maps have already been completed for 54% of the country's territory. The rest is under way and expected to cover the whole country by the end of 2020.

Forest area has expanded considerably since 1990 and stands at 30.3% of total land area. The main reason for this increase is the adoption and implementation of forestry measures in agriculture. Growing stock and above ground biomass have risen at about the same rate. Growing stock per hectare has remained stable at 47 m^3 o.b./ha.

Wood removals, of which three quarters are woodfuel, have been trending slowly downwards, from around 2.5 million m^3 u.b. around 1990 to 1.4 million m^3 u.b. in 2016. In 1990, fellings were 81.5% of net annual increment.

23 thousand people were employed in the forest sector in 2015, half the figure of 1990. Half the employment is in the wood processing industries.

Hungary

Hungary is a central European country with nearly 23% forest cover. The second National Forest programme resulted in the National Forest Strategy 2016-2030, approved in 2016. Parliament enacted a Law to regulate forests in 2009. There is a national forest inventory as well as a stand-wise national forest database. All forests are under a management plan, which is compulsory. 11% of forests are under a third party certification scheme, exclusively FSC.

Forest area has been growing slowly, and reached 22.7% of land area in 2020. Growing stock and above ground biomass have also been expanding, faster than forest area. Growing stock average is now 193 m^3/ha. The carbon stock in harvested wood products is 10 million tons.

In 2015, nearly 3% of forest showed damage, much less than during an insect infestation around 2005, when this share reached 19%.

Nearly 43% of forest is protected for conservation of biodiversity (MCPFE classes 1 and 2). This share more than doubled between 2000 and 2010. About 10% of forest is designated protective forest (MCPFE class 3).

No forest undisturbed by man is reported in Hungary.

Wood removals have fluctuated around 5.5 million m^3 u.b. since 2000. Fellings were about 66% of net annual increment in 2015.

Over 57 thousand people were employed in the forest sector in 2015, rather more than in 2010, but less than in earlier years.

Wood supplied directly from the forest accounted for 2.4% of Hungary's primary energy supply in 2015. No information is available on the contribution of other types of wood energy (residues, recycled wood etc.).

Iceland

Iceland is a large island in the North Atlantic which lost almost all its forest cover many centuries ago, but is now carrying out some afforestation. A new Forest Act was passed by the Parliament in May 2019, to replace the 1955 Act. The new Act provides for an NFP process. A national forest inventory covered the period 2005-2017. All forests in Iceland are under a management plan and are officially registered, although these plans are not compulsory. As native forests are not commercial and there are no exports of forest products, third-party certification schemes were not considered necessary.

The forest area is growing steadily, but forests still only account for 0.5% of total land area. Other wooded land accounts for about three times as much area as forest itself. Growing stock and biomass of these young forests is increasing. Growing stock has reached 16 m^3 o.b./ha. No information was supplied on carbon in harvested wood products. In 2010, 1.4% of the forest and other wooded land showed damage from insects, but in other years no damage was recorded.

Over 7% of forest and other wooded land is protected for conservation of biodiversity (MCPFE classes 1 and 2). Over 80% of forest and other wooded land is designated as protective forest. No forests are considered undisturbed by man.

Removals have grown, and are around 4 thousand m^3. Fellings on forest available for wood supply are nearly 13% of net annual increment.

About 120 people are employed in forestry in Iceland.

Wood accounts for 0.1% of Iceland's total primary energy supply.

Ireland

Ireland is a country in western Europe, with forest cover of over 11%. A new Forest Act was passed in 2014, emerging from an NFP process, which generated a forestry strategy for 2014-2020. About 70% of forests are covered by a forest management plan, although these plans are not compulsory, and not officially registered. 56% of forests are under a third party certification scheme. Forests of the State forest agency, Coillte, which accounts for 51% of all forests, are certified by both FSC and PEFC, and account for most of the certified area. There have been three national forest inventories, and data for this study are also based on administration records.

Forest area has been growing steadily, as a result of a long standing policy goal to raise forest cover in Ireland, which now stands at 11.4% of total land area. In fact there has been an unbroken programme of afforestation since 1923. As a result, the forest estate is young with nearly half (45%) of the stocked forest estate less than 20 years of age. The total growing stock volume of Irish forests is estimated to be over 116 million m^3, an increase of over 19 million m^3 on 2012. Growing stock is now 155 m^3/ha. Conifer species represent 71% of the stocked forest area. Above-ground biomass has also been increasing. Carbon stock in harvested wood products is estimated at 7 million tons.

Less than 1% of forests are protected for conservation of biodiversity (MCPFE Classes 1 and 2), and no information is available on the area of protective forests (MCPFE Class 3). No forest undisturbed by man is reported. In 2015, over 7% of forests showed damage, mostly due to wildlife.

Wood removals have been growing steadily, and reached 3.5 million m^3 u.b. in 2017, an increase of 5.6% over 2016. The ratio of fellings to net annual increment on forest available for wood supply has also been increasing, and was 64.5% in 2015.

Just under 9 thousand people were employed in the forest sector in Ireland, 30% less than in 1990.

About 1% of Ireland's primary energy supply comes from wood.

Italy

Italy is a country in southern Europe, with about a third forest cover. Regional authorities have major forest policy responsibilities. The national forest law of 2001 was revised in 2018 to provide a reference base for the definition of regional laws. The national NFP expires in 2019, and is being replaced. The new NFP will have a validity of 20 years. Management plans are used, but are not compulsory for private forest owners. No data were supplied on the area covered by management plans. 9.2% of Italian forests are under a third party certification scheme, mostly PEFC. There is a national forest inventory which provides information for policy making and international reporting.

Forest area has been expanding steadily and now stands at 32.5% of total land area. Growing stock and above ground biomass have been expanding faster than forest area. Average growing stock is now 145 m^3 o.b./ha, compared to 113 m^3 o.b./ha in 1990. No information was supplied on carbon stock in harvested wood products.

Forest damage has only been measured once, by the national forest inventory in 2005, when 21.4% of the forest area was damaged, which appears quite high compared to other countries, but is due to the methodology used, which considered a sample plot "damaged" with just 30% of its area affected. Fire damage fluctuates strongly, from 16 to 82 thousand ha/year.

In 2015, 41.2% of forest and other wooded land was protected for conservation of biodiversity (MCPFE classes 1 and 2). Over 84% of forest and other wooded land are designated as having protective functions (MCPFE class 3). 93 thousand ha of forest are considered undisturbed by man.

Removals are in the range of 6 to 9 million m^3 u.b. (11 million m^3 in 1999). Two thirds of removals are of woodfuel. In 2010, fellings were 39.2% of net annual increment, lower than in previous years.

In 2015, 252 thousand people were employed in the forest sector, nearly 100 thousand less than in 1990. The biggest fall was for employment in the wood processing industries, while employment in forestry itself has been rising since 2000.

In 2009 and 2011, wood accounted for 1.5% of Italy's primary energy supply. Most of this wood energy came directly from the forest.

Latvia

Latvia is a country on the Baltic Sea with nearly 55% forest cover. According to information from 2015, there is NFP as a formal process. The Latvian Forest Policy was adopted in 1998 at national level. No updated information was received on national forest programmes, forest laws, forest management plans or certification for SoEF 2020. There is a national forest inventory for the period 2008-2020.

Forest area has been growing steadily, from 51% forest cover as proportion of total land area in 1990, to 54.9% in 2020. Growing stock and above ground biomass stock have been increasing faster than forest area. Growing stock is 197 m^3 o.b./ha in 2020. The carbon stock in harvested wood products was estimated at 23 million tons in 2015.

About 0.1% of the Latvian forest shows damage, although in 2005, this proportion was 0.6%, because of abiotic damage, notably wind. Over 16% of forest is protected for conservation of biodiversity (MCPFE Classes 1 and 2). In 2020, areas designated as protection forest (MCPFE class 3) accounted for 6.4% of forest area. Nearly 17 thousand ha of forest are reported as being undisturbed by man.

Wood removals rose rapidly in the 1990s, but have now stabilised around 12-13 million m^3 u.b. in most years. In 2015, fellings were nearly 72% of net annual increment.

In Latvia, employment in forestry and the wood processing industries (no data available for pulp and paper) have fluctuated around 40 thousand people, although there was a temporary spike in 2005, to 63 thousand people.

In 2015, wood accounted for 14% of Latvia's primary energy supply.

Liechtenstein

Liechtenstein is a small landlocked country in central Europe, with more than a third forest cover. No information was supplied to SoEF 2020 on forest law, NFPs, forest management plans, certification or forest inventory.

Forest area has been very stable, at 38.9% of total land area. Growing stock and above ground biomass have also been stable. Growing stock now stands, on average at 379 m^3 ha. No information was supplied on carbon stock in harvested wood products (HWP). However, net emissions/removals of carbon in HWP in 2012 were -1.29 kt CO_2 (i.e. a carbon sink of over one thousand tons).

26% of the forest area showed damage in 2010, all from wildlife.

In 2010, 30% of forest and other wooded land was protected for conservation of biodiversity (MCPFE classes 1 and 2), while no information was supplied to SoEF 2020 on protection forests (MCPFE class 3). Just under 2 thousand ha of forest are considered undisturbed by man.

About 8 thousand m^3 of removals were recorded in 2016, rather less than in earlier years when they were around 25 thousand m^3 u.b. In 2010, fellings were 97 % of net annual increment on forest available for wood supply, higher than in earlier years.

No information was supplied to SoEF 2020 on employment in the forest sector.

The share of wood in total primary energy supply was in 2018 30.7 % including imports. Of the wood energy, 72% was produced domestically.

Lithuania

Lithuania is a country on the Baltic Sea with about a third forest cover. A national forest programme has resulted in a National Forest Sector Development Programme for 2012-2020, approved by the Government. The Law on Forest was enacted in 1995, and was most recently amended in 2018. There is both a national forest inventory and a stand-wise inventory. 100 % of Lithuanian forests are under a forest management plan. These plans are obligatory in certain circumstances and registered with an official body. 51% of forests are under third party certification, exclusively by FSC.

Over the last 30 years, forest area has expanded from 31% to 35.1% of total land area. Growing stock and above-ground biomass have expanded faster than forest area. Growing stock per hectare in 2020 was on average 254 m^3. Carbon stock in harvested wood products was about 14 million tons.

Forest damage reached a peak in 2000, and since then has fallen, to only 0.5% of the area of forest and other wooded land in 2020 as area damaged by insects declined, and ash stands decreased. There have been no big storms since 2010.

16% of forests are protected for the conservation of biodiversity (MCPFE classes 1 and 2). About 10% of forests are designated protective forests (MCPFE class 3). About 26 thousand ha of forest are considered undisturbed by man.

Removals fluctuated between 5 and 7 million m^3 according to market conditions. Fellings were 70% of net annual increment in 2015. If this ratio is adjusted to take account of felling of natural losses, it is 64%

Nearly 40 thousand people were employed in the forest sector in 2015, of which more than half were in the wood processing sector.

Due to targeted policy measures to increase use of renewable natural resources for energy production, as well as decline in domestic energy production, the share of wood in primary energy supply has risen sharply, from 7.5% in 2007 to 16.8% in 2015.

Luxembourg

Luxembourg is a landlocked country in central-west Europe, with 36% forest cover. In 2014, the Government started to revise laws and regulations in order to draw up a new Forest Code, which would modernise the legal instruments in the light of recent developments. Consultations have taken place within the frame-work of the national forest programme, including stakeholders of the sector. A draft law was placed

before Parliament in January 2018. There has been a national forest inventory since 2000.

Half the forests of Luxembourg are under a forest management plan: all public forests have one, while small private forest owners have the possibility of filing a simpler planning document. Nearly 47% of the forests are certified under a third party scheme (the state forests are certified under both FSC and PEFC).

Forest area has been stable over the last 30 years and is at 35.7% of total land area. Growing stock has been increasing, and in 2015 was nearly 300 m^3 o.b./ha. Information was not supplied on the carbon stock in harvested wood products.

1.4% of forest area in Luxembourg is protected for conservation of biodiversity, and at least 1.4% is designated as protection forest. No forests are considered undisturbed by man.

No information was supplied on forest damage. In 2014, a local windstorm damaged 200 ha of forest.

Removals are around 500 thousand m^3 o.b due to increased harvest levels of spruce because of severe bark beetle attacks.

In 2010 the ratio between fellings and net annual increment was 60%. It is currently estimated at 65% due to additional felling of bark beetle damaged spruce.

In 2010, about 400 people were employed in the forest sector, mostly in forestry and the wood processing industry. In 2019, about 1 100 people are employed in the forest sector, 400 in the public administration (Administration de la nature et des forêts) and 600 for the private forest sector (silviculture and exploitation) and 100 in sawmills and first transformation). (Data not comparable as based on different methodologies.)

About 2% of Luxembourg's primary energy supply comes from wood.

Malta

Malta is an island in the southern Mediterranean, with very low forest cover. As there are only 350 ha of forest on Malta, and there is no wood supply, it is not surprising that it was not possible to provide much of the information requested. No information was supplied for SoEF 2020 on policies and institutions.

Available information is presented below.

Forest area is stable, and forest cover is 1.1% of total land area. Average growing stock is 231 m^3 o.b./ha.

There are no reported wood removals.

Republic of Moldova

Moldova is a landlocked country in eastern Europe, with over a tenth of forest cover. The Forest Code (Codul silvic) was enacted in 1996, and most recently amended in 2017. There is a national level NFP, which has led to a Strategy for Sustainable Development of the Forest Sector of the Republic of Moldova in 2001. Over 90% of forests are covered by management plans, which are obligatory and registered with an official body. There is no third party forest certification scheme active in Moldova. Data for this study and for policy in general are based on stand inventories and managerial records. The first national forest inventory is under preparation.

The forest area in Moldova has been stable and is now 11.8% of total land area. Above ground biomass has been increasing slightly and growing stock is stable at 120 m^3 o.b./ha. No information was supplied on carbon stock in harvested wood products.

The amount of forest damage recorded varies significantly and was nearly 20% in 2015 (insects and diseases only, no information on abiotic or human induced damage).

About 42% of forests are reported as protected for the conservation of biodiversity (MCPFE classes 1 and 2), and 58% of forests are designated protection forests (MCPFE class 3). No forests are considered undisturbed by man.

Removals of industrial wood have been stable, around 40-90 thousand m^3 u.b., but fuelwood removals show a major increase in 2012, when they quadrupled, to 1.3 million m^3 u.b., perhaps because of a new estimate of fuelwood consumption. Fellings are about 25% of net annual increment on forest available for wood supply.

More than 4 thousand people are employed in forestry (without wood processing and pulp and paper).

In 2015, a fifth of Moldova's primary energy supply (21.6%) came from wood.

The Netherlands

The Netherlands is a country in north-west Europe, with 11% forest cover. National forest inventories are carried out regularly, with the sixth completed in 2014 and the 7th currently running. Since 2017 the protection of forests is covered through the Nature Conservation Act. There is no national forest policy in place, but a new forest strategy is under development. Forest management plans are not obligatory in the Netherlands, but the general assumption is that most of the forest area is covered by some sort of long term management plan. 171 thousand ha (47% of total forest area) of forest is third party certified.

Forest area has been stable, with some fluctuations and at present is 11.0% of total land area. Growing stock has been expanding and now stands at 224 m^3 o.b./ha. Above ground biomass has also been growing, at an average rate of 1.6%/year over the 30 year period. Carbon stock in harvested wood products is estimated at 2 million tons.

No information is available for total damage on forests, although 2.6% of forest area was damaged by insects and diseases in 2015.

Over 65% of forest and other wooded land is protected for conservation of biodiversity (MCPFE Classes 1 and 2), and an estimated 0.5% has protective functions with regard to water (part of MCPFE class 3).

Wood removals are quite stable in the Netherlands. The reported data indicate a sharp increase in wood removals, but this is the consequence of a methodology change for the estimation of the fuelwood consumption by households. In addition, energy wood derived from landscape care wood and municipal waste streams has also been included in the wood removal figure since 2015. For this reason, the reported removals of over 3.1 million m^3 u.b. represents wood derived from forests and outside forests and consists of both roundwood as well as chips, shreds and particles. Roundwood removals (both industrial and fuelwood) account for about 50% of net annual increment.

Employment in the forest sector, at 32.5 thousand people is a third less than in 1990. Employment in the wood processing and pulp/paper sectors has declined, while employment in forestry has remained roughly stable, at around 2 thousand people.

In 2015, wood accounted for 1.3% of the Netherlands' total primary energy supply.

Norway

Norway is a mountainous Nordic country, with about a third forest cover. The main formal authority is the Forestry Act of 2005 which was amended most recently in 2015. There, are several parallel policy relevant processes, which have resulted in a White Paper to Parliament on forest policy in 2017. Taken together these may be considered equivalent to a national forestry programme. Half the Norwegian forests have a management plan, which is not compulsory. Rather they are seen as the forest owner's main tool to satisfy the requirements of the Forest Act. 60.1% of forests (7.38 million ha) are under a third party certification scheme (PEFC), of which 0.45 million ha are double certified FSC/PEFC. There is a regular national forest inventory to provide information for policy making and for international reporting.

Forest area has been very stable, and now stands at 33.4% of total land area. Growing stock and above ground biomass have been expanding: average growing stock is now 101 m^3 o.b./ha.

Information was not supplied on the area of forest with damage.

8.8% of forest and other wooded land is protected for conservation of biodiversity (MCPFE classes 1 and 2). 38% of forest and other wooded land has designated protective functions (MCPFE class 3). 200 thousand ha of forest are considered undisturbed by man.

Wood removals have fluctuated in a range of 10-13 million m^3 u.b. On forest available for wood supply in 2015, fellings were just under 60% of net annual increment.

In 2015, employment in the forest sector was nearly 18 thousand people, more than 40% lower than in 2000. This is mainly due to developments for the pulp and paper sector, which now only employs 2 thousand people. Employment in forestry itself has been stable since 2005.

In 2015, wood accounted for 2.8% of Norway's primary energy supply, rather lower than in 2011 (4.8%). This is due to a reduction in the volume of wood used to heat buildings, as well as the decline of pulp manufacture in Norway as pulping liquors make a significant contribution to renewable energy supply from wood.

Poland

Poland is a country in central Europe, with 31% forest cover. The main national regulations for forestry are the Forestry Act of 1991 and the national forest policy which dates back to 1997. An NFP process started in 2012 and is now under development. There is a national forest inventory, stand wise inventory, management records and remote sensing. 95% of forests are under a management plan or equivalent, which are compulsory and approved by an official body. The area certified under third party certification schemes was about 77% of the forest area in 2014. Many forests are certified to both FSC (6.9 million ha) and PEFC (7.3 million ha) standards.

The forest area has been expanding and now stands at 31.0% of total land area. Growing stock has also been expanding, and is expected to be 288 m^3 o.b./ha in 2020, 70% higher than in 1990 (although part of this increase may be due to improved inventory techniques). Above ground biomass has also been expanding. No information was supplied on carbon stock in harvested wood products.

In 2015, 3.9% of Polish forests showed damage.

37% of forests are protected for conservation of biodiversity (MCPFE classes 1 and 2), and 35% designated as protective forests (MCPFE class 3). There is no forest undisturbed by man.

Removals have been rising for some time and reached 45.3 million m^3 u.b. in 2017, more than double the 1990 level. No information was supplied on the balance between fellings and net annual increment.

Over 300 thousand people are employed in the forest sector in Poland, of which half in wood processing. Employment in forestry itself has been rising, to 75.8 thousand people in 2015.

Wood accounted for 11% of total primary energy supply in 2015, higher than in 2011, when it was 2%.

Portugal

Portugal is a country on the west of the Iberian Peninsula, with about a third forest cover. The main legal frameworks are the Forest Policy Act 1996 and the National Forest Strategy 2015. The national level NFP is a continuous process, and resulted in the National Forest Strategy. Forest management plans are obligatory in public areas and in private areas, if above the threshold defined for each Regional Forest Planning programme. At present, 1.86 million hectares are under management plans, corresponding to 58% of the total forest area. About 15% of forest area is under third party certification. Of this, a considerable amount (more than 40%) is double certified (both FSC and PEFC). The Portuguese national forest inventory process started in 1963: the sixth has just been completed.

Forest area and area of forest available for wood supply were falling slowly but steadily so that in 2015 forest area was 7% less than in 1990. However, the trend has been reversed, and forest area in 2015 was 1.9% higher than in 2010, representing 36% of total land area.

In 2010, 8.9% of forest showed damage, from biotic and abiotic causes and from fire. The area burnt annually varies widely from year to year.

21.8% of forest and other wooded land are protected for conservation of biodiversity (MCPFE classes 1 and 2). 7.7% of forest and other wooded land is designated protective forest (MCPFE class 3). 24 thousand ha of forest is considered undisturbed by man.

Removals were more than 13.5 million m^3 in 2017 (the reported increase over time is mostly due to improved measurement). It is not possible to compare fellings with net annual increment as the latter was not calculated by the last NFI.

In 2017, employment in the forest sector in Portugal was 71.3 thousand people, nearly 29% less than in 2000, largely due to developments for wood processing. Employment in forestry itself rose between 2005 and 2017 at annual rates over 3%, representing more than 8.7 thousand employees in 2017.

In 2017, the production of wood fuel (including wood for charcoal) was 1.05 million m^3, which represented 7.7% of total roundwood production.

Romania

Romania is an eastern European country on the Black Sea, with nearly a third of forest cover. The Forest Code was approved in 2008, with the most recent amendment in 2018. There is a national level NFP process. A national forest inventory, supplemented by stand-wise inventories, provides data for this study and for policy makers. Until 2010, data were estimated on the basis of a stand wise inventory covering forest fund land only, so data for 2015 and after may not be fully comparable with those for earlier years. 81% of forests are under a management plan, which is obligatory for holdings over 10 ha, and is registered with an official body. Nearly 40% of forests are certified under a third party certification scheme, exclusively FSC.

Forest area has expanded steadily, and stands at 30.1% of total land area. Growing stock stands at 340 m^3 o.b./ha. No information was supplied on carbon stock in harvested wood products.

In 2015, 3.5% of Romania's forests showed damage, but in 2010, using a different methodology, this percentage was much higher, 13.5%. Some counties report damage in volume terms, rather than area.

It is reported that in 2005, 7.8% of Romanian forests were protected for conservation of biodiversity (MCPFE classes 1 and 2), but data are not available for other years. Nearly 42% of forests are designated as having protective functions (MCPFE class 3). About 165 thousand ha of forest are considered undisturbed by man.

For many years removals were around 12 million m^3, but after 2010, this increased, to the 15-16 million m^3 range. In 2015, fellings were nearly 44% of net annual increment.

Nearly 33 thousand people are employed in forestry (no data supplied on wood processing or pulp and paper), much lower than in 1990, when they were more than 100 thousand.

In 2011 (data not supplied for other years), over 10% of Romania's primary energy supply came from wood.

Serbia

Serbia is located in the central part of the Balkan Peninsula with nearly a third forest cover. The Law on Forests establishes the manner and conditions of protection, use, progress and management of forestry and forestland and other potentials of forests. The latest changes to the Forest Law were made in 2015. The most recent National Forest Inventory was carried out in 2008 (2006-2008), and the implementation of the next one is currently ongoing. A national forest programme was prepared in 2008, but has not been adopted. 1.1 million ha of forest (42%) are under a forest management plan. In 2017, 43% of the forest area, all the forests managed by public enterprises for management of state owned forests (Srbijasume and Vojvodinasume), were certified, exclusively by FSC. Private forests and forests in national parks are not yet under certification schemes.

Forest area has been growing and stands at 31.1% of total land area. The target, under the national spatial plan is 41.4% of forest cover, but this will require more attentions to silviculture and better utilisations of stand and site potentials regarding wood production.

Growing stock and above ground biomass have been expanding faster than area, so that average growing stock is now 154 m^3 o.b./ha, 50% higher than in 1990. There are no data on carbon stock in harvested wood products.

0.8% of the forest area was damaged, mostly by biotic factors. The share of damage fluctuates widely.

In 2010, 14% of forest and other wooded land was reported as protected for conservation of biodiversity (MCPFE classes 1 and 2), and 5.8% was designated as protection forest (MCPFE class 3). A thousand hectares of forest are considered undisturbed by man.

In 2018, total removals were nearly 8 million m^3 u.b. considerably higher than the 2.9 million m^3 u.b. reported around 2006. This is partly due to research indicating that removals of wood fuel were considerably higher than previously thought. The ratio of fellings to net annual increment on forest available for wood supply in 2018 was nearly 88%. Such a high ratio is a consequence of the rapid growth in demand for wood fuel, especially in the segment

of wood pellets and wood-based panels production. Wood fuel removals have risen faster than those of industrial wood and now account for around 80% of the total.

35 thousand people are employed in the forest sector (including wood processing and pulp and paper as well as forestry). Over the last two years, this number has declined slightly due to labour migration to developed EU countries.

In 2015, wood accounted for 16% of primary energy supply, and has been above 7% since 2007.

Slovakia

Slovakia is a mountainous country in central Europe, with 40% forest cover. The Forest Act, enacted in 2005, was most recently amended in 2018. A national level NFP was approved in 2007, leading to a national action plan for 2014-2020. The information supplied is based on both a regular stand inventory and national forest inventory. All forests in Slovakia are under a management plan, which is compulsory and registered with an official body. 72% of Slovak forests are certified under a third party certification scheme, mostly through PEFC.

Forest area has been roughly stable and is now at 40.1% of total land area. Growing stock has increased significantly over the thirty year period and now stands at 279 m^3/ha over bark (211 m^3 o.b./ha in 1990). Above ground biomass has followed a similar trend. The carbon stock in harvested wood products in Slovakia is 22 million tons.

44.3% of forest and other wooded land is protected for conservation of biodiversity (MCPFE classes 1 and 2). This share has risen by ten percentage points over the thirty year period. 17.3% of forests are designated as protective forests (MCPFE class 3). There are 10.6 thousand ha of forest undisturbed by man.

Removals have increased over the period and are now around 9.5 million m^3 u.b. The ratio of fellings to net annual increment on forest available for wood supply in 2015 was 79%, but this included large amounts of fellings of natural losses (incidental fellings).

Nearly 53 thousand people are employed in the forest sector in Slovakia, mostly in forestry and in wood processing.

The share of wood in total primary energy supply has been rising, from 5% in 2007 to 7.7% in 2015.

Slovenia

Slovenia is a mostly mountainous country in central Europe, with over 60% forest cover. The Forest Act was enacted in 1993 with the latest amendments in 2016. There is a national level NFP, which is the basis for operational programmes. Data supplied for this study, and used as a basis for policy making, derive from a national forest inventory process and a number of other sources. All Slovenian forests are under a management plan, which is compulsory and registered with an official body. 23% of forests are certified under third party certification schemes (PEFC and FSC, with double certification on state forests).

Forest cover expanded steadily until 2010, and is now, together with other wooded land, 62.8% of total land area. Growing stock and above ground biomass expanded faster than area. Growing stock is now 335 m^3 o.b./ha. No information was supplied on carbon stock in harvested wood products.

In 2015, 0.4% of forest and other wooded land had damage. The main cause was abiotic factors, followed by insects.

22% of forest and other wooded land is protected for the conservation of biodiversity (MCPFE classes 1 and 2), while 24% of forest is designated for its protective functions. 33.6 thousand ha of forest are considered undisturbed by man.

Removals were around 2 million m^3 u.b. in the 1990s but have risen to over 5 million m^3 around 2015. Until 2010, fellings were around 35% of net annual increment on forest available for wood supply but this ratio rose to over 60% in 2015. However, since 2010 about a third of fellings have been of natural losses (already deducted from gross annual increment to calculate net annual increment). In the years after 2014, more than two thirds of fellings were

connected to ice sleet, wind throw and bark beetle attacks.

Over 15 thousand people are employed in the forest sector of Slovenia, of which about half in the wood processing industries. Employment in both wood processing and paper industries has been falling, while employment in forestry itself has remained stable at just over 2 thousand people.

Wood's share of total primary energy supply in Slovenia has risen steadily, from 3.3% in 2007 to 10.5% in 2015.

Spain

Spain is a country in the Iberian Peninsula, where forest and other wooded land together account for more than half the land area. Many of the policy responsibilities for forestry are at the subnational level. The Forestry Law of 2003 was modified in 2006 and 2015. A NFP process has resulted in a Spanish Forestry Plan 2002-2032. National Forest Inventory, combined with cartographic and other statistical information provides the necessary basis for policy making and for international reporting. 32% of Spanish forests are under a management plan or equivalent document. These are compulsory for certain forests, notably protected and protective forests, and are registered with an official body. 13% of forests are under a third party certification scheme, mostly PEFC.

Spain's forest area has been expanding steadily and now stands at 37.1% of total land area. In addition, nearly 19% of land area is covered by other wooded land. Growing stock has also been increasing and now stands at 60 m^3 o.b./ha on average. Above ground biomass has also been expanding, at a rate of 0.5%/year between 2010 and 2020. No information was supplied on carbon stock in harvested wood products.

No information was supplied on forest damage, except for forest fires, which in 2015 damaged 0.4% of the area of forest and other wooded land. Fire damage fluctuates considerably from year to year according to changing weather conditions, with an average of more than 100 000 ha per year in the decade from 2006 to 2015.

In 2015, 23% of forest and other wooded land were protected for conservation of biodiversity (MCPFE Classes 1 and 2). 23.8% of forest and other wooded land were designated as protective forest (MCPFE class 3). No forest is considered undisturbed by man.

Removals fluctuate in the range between 14 and 17.5 million m^3 u.b. Fellings on forest available for wood supply were 55.5% of net annual increment.

Over 130 thousand people are employed in the forest sector, of which 26 thousand in forestry itself. Employment in the wood processing industries grew strongly between 1990 and 2005, but then dropped to about half the peak level.

No information was supplied on the share of primary energy supply from wood.

Sweden

Sweden is a Nordic country with more than two thirds forest cover. National forest legislation has been applied for more than 100 years. The latest Forestry Act was enacted in 1979, and the most recent major amendments were carried out in 2014. A NFP process was established in 2014 and the government launched the National Forest Programme in May 2018. 98% of forests are under a management plan or equivalent, although these plans are not compulsory and are not registered with an official body. 63% of forests are under third party certification, both FSC and PEFC. Nearly 9 million ha, out of the total certified of about 17 million ha, are certified by both bodies. A continuous national forest inventory, supplemented as necessary by ad hoc studies, provides information for policy makers and international reporting.

Sweden's forest area has been constant since 2000 and is 68.7% of total land area. Growing stock on forest available for wood supply, and above ground biomass have been rising. Growing stock per hectare on forest available for wood supply is 139 m^3 o.b./ha. Carbon stock in harvested wood products is 156 million tons.

In 2015, 9.4% of the forest area showed damage, which fluctuates quite strongly with storms, insect infestations etc.

7.7% of forest and other wooded land is protected for conservation of biodiversity (MCPFE Classes 1 and 2), while 16.4% of forest is considered protection forest (MCPFE Class 3). 2.2 million ha of Swedish forest is considered undisturbed by man.

Removals have been trending upwards, from around 50 million m^3 u.b. in the 1990s to over 70 million m^3 u.b. around 2015. The ratio of fellings to net annual increment on forest available for wood supply is now around 91%. However about 3-8% of fellings are of natural losses, which are not included in net annual increment. If the ratio is adjusted to take this into account, it is about 87%.

Employment in the forest sector has fallen from 98 thousand people in 1990 to 78 thousand people in 2015. Employment in wood processing and pulp and paper industries has fallen, but employment in forestry itself has increased slightly, and stands at 22 thousand.

Just under 24% of Sweden's primary energy supply comes from wood, of which 20% from the forest and nearly 70% from co-products and residues of the industries.

Switzerland

Switzerland is a mountainous country in central Europe with almost a third forest cover. Forest policy is developed at the national and sub-national (cantonal) level. There is a national level NFP. The Swiss Forest Policy 2020, published 2013, replaces the first Swiss NFP of 2004. The Federal (national) Forest Act was enacted in 1991 and last amended in 2017. 57% of forests are under a management plan or equivalent, which is compulsory although the system varies according to canton, holding size and ownership. 51% of forests are under a third party certification scheme, both FSC and PEFC, and dual certification. A regular national forest inventory provides information meanwhile for policy making and international reporting.

Forest area has been expanding steadily and stands at 32.1% of total land area. Growing stock per hectare is stable at a high level (354 m^3 o.b./ha). Above ground biomass has expanded slightly. Carbon stock in harvested wood products in Switzerland in 2015 was nearly 18 million tons.

In 2015, 0.5% of forest area showed damage, mostly from abiotic causes, although some areas may be double counted (multiple types of damage on the same area).

25% of forest is protected for conservation of biodiversity (MCPFE classes 1 and 2), and 43% of forest and other wooded land is has designated protective functions (MCPFE class 3). 43 thousand ha of forest is considered undisturbed by man.

Removals have fluctuated in the range of 4.5 to 6.5 million m^3, except for 2000, when they reached 10 million m^3 because of storm damage. The ratio of fellings to net annual increment was 80% in 2015, but fellings include significant volumes of natural losses (already accounted for in net annual increment). If the ratio is adjusted for this factor, it is 71%.

Total employment in the forest sector has remained roughly stable and was 59 thousand people in 2015. Between 2000 and 2015, employment in the paper sector about halved but in the forestry sector itself, it tripled, to reach 12 thousand people.

In 2015, wood accounted for 4% of primary energy supply of which more than half direct from the forest and rather less than half from co-products and residues of the industries.

Turkey

Turkey is a country in both Europe and Asia, with nearly a third forest cover. The National Forest Program was completed in 2004. The regulatory framework for forestry is in the Constitution. Since the 1940s, all forests in Turkey have been under a management plan, which is compulsory and is registered with an official body. Over 10% of Turkish forests are under a third party certification scheme, all FSC. The ENVANIS data base collects and processes data from forest management plans as the plans are renewed and is the basis for policy making and international reporting.

Forest cover has been expanding, and now stands at 28.9% of total land area. Growing stock and above ground biomass are also increasing. Average growing stock is now 74 m^3 o.b./ha. The carbon stock in harvested wood products is 28 million tons.

1.6% of Turkish forests showed damage in 2015, mostly due to abiotic agents (storm, wind, snow etc.).

21.1% of forests are protected for conservation of biodiversity (MCPFE classes 1 and 2). 39.7% of forests are designated as protective forest (MCPFE class 3). 39.1 thousand ha of forest are considered undisturbed by man.

Removals fluctuate around 20 million m^3 u.b. Fuelwood now accounts for over 20% of removals, but this share has been falling steadily, from over 60% in the 1980s. Fellings on forest available for wood supply are 38.1% of net annual increment.

In 2015, 286 thousand people were employed in forestry in Turkey.

In 2011, 3.8% of Turkey's primary energy supply was derived from wood, mostly directly from the forest.

Ukraine

Ukraine is a country in eastern Europe with more than a tenth of forest cover. The Forest Code was enacted in 2006, and the latest amendment was in 2018. A target-oriented state program "Forests of Ukraine" was completed in 2015. A new program is being prepared. Most forests are under a management plan, which is compulsory and registered with an official body, although 0.8 million ha has not yet been transferred into ownership and management and has no plan. Forest management plans also cover some non-forest land. 44% of Ukrainian forests are under a third party certification scheme, exclusively FSC. Information for policy makers and international reporting is based on surveys and stand-wise inventory, which is obligatory for preparation of management plans. Ukraine is in the process of launching its first national forest inventory.

Forest cover has been expanding slowly and now stands at 16.7% of total land area. Growing stock and above ground biomass have been expanding faster than area. Average growing stock is now 235 m^3 o.b./ha. No data were supplied on carbon stock in harvested wood products.

0.3% of forest area showed damage in 2015, with roughly equal shares of biotic and abiotic factors and fire. In recent years there has been a trend to an increase in the area of forest damage (0.6 million ha damaged by insects and diseases in 2018).

Just under 15% of forest is protected for conservation of biodiversity (MCPFE classes 1 and 2), and a third of forest and other wooded land is designated protection forest (MCPFE class 3). The area of both protected and protection forests has been increasing. 59 thousand ha of forest are considered undisturbed by man.

Removals from Ukrainian forests have been trending strongly upwards, from around 10 million m^3 in the mid 1990s to around 19 million m^3 u.b. in the late 2010s. The ratio of annual fellings to net annual change in growing stock on forest has risen from 32% in 2000 to 59% in 2015. However, about a third of fellings every year concern natural losses, which have already been accounted for when calculating net change in growing stock. If the ratio is adjusted to take account of this, it falls to 37% in 2015.

About 62 thousand people are employed in forestry in Ukraine and this figure has been quite stable, except for a peak around 2000. No information was supplied on employment in the wood processing and paper industries.

In 2011, 1% of Ukrainian primary energy supply was derived from wood.

United Kingdom

The United Kingdom is a country in North West Europe with about a tenth forest cover. Forestry is a devolved matter and the responsibility of the countries of England, Scotland, Wales and Northern Ireland, within the framework of the UK Forestry Standard, which was updated in 2017. There is specific legislation at the devolved level. The first full cycle of national forest inventory (for Great Britain) has been completed and is the basis for policy making and international reporting. 60% of forests are estimated to have a management plan which is not compulsory, but is registered with an official body. 43% of forest land is under a third party certification scheme: most certified land is certified to both FSC and PEFC.

The forest cover has been expanding for many years, and stands at 13.2% of total land cover. Growing stock and above ground biomass have also been rising. Average growing stock is now 212 m^3 o.b./ha, about 60% more than in 1990. Carbon stock in harvested wood products is estimated at 109 million tonnes.

No information was supplied on damage to forests.

16% of forest is protected for conservation of biodiversity (MCPFE classes 1 and 2). It is estimated that the area protected for biodiversity has remained stable, but its share of the total has fallen as forest area expands. No forest is designated for protection functions (MCPFE Class 3) in the UK, although, of course, some of the forests do have protection functions. No forests are considered undisturbed by man.

As forest area increases and plantations mature, removals have been rising, from around 6 million m^3 u.b. in the 1990s to around 11 million m^3 u.b. in 2017. Fellings are about 63% of net annual increment on forest available for wood supply.

145 thousand people are employed in the forest sector (forestry, wood processing, pulp and paper production). Employment in both the wood processing and paper industries has fallen steeply, but employment in forestry itself has been rising since 2005.

The share of wood in total primary energy supply of the UK has been rising and was 3% in 2015.

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Project leader, coordination and guidance

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Enquiries

Two reporting forms were prepared on quantitative and on qualitative indicators. The update of quantitative reporting forms from previous reporting format was done by Rastislav Raši and Roman Michalak (UNECE). The reporting forms were made available to national correspondents through FAO FRA Platform by Örjan Jonsson (FAO). The reporting form on qualitative indicators was compiled by Stefanie Linser, Kit Prins and Bernard Wolfslehner, in cooperation with LUB (Rastislav Raši, Martin Moravčík, Matej Schwarz). This reporting form was transformed to an electronic reporting format by Elena Čepčeková and Ján Poláčik, and made available to national correspondents through the FAO FRA Platform by Örjan Jonsson (FAO).

Data prefilling, collection and International Data Providers (IDP)

Prefilling of reporting forms with data, according to SOEF 2015 database, were made by Alexander Kretov. Alex McCusker (UNECE) provided data from UNECE database, Michele Bozzano from EUFORGEN database, Alexa Michel from ICP Forests database, Roland Hiederer from JRC LUCAS database. Information from EUROSTAT database was extracted by Rastislav Raši. Peter Vogt (JRC) derived new data for indicator 4.7 from CORINE Land Cover dataset.

Data review, compilation, analysis and verification

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Writing and review of the report

The report was drafted by a team of authors, who dedicated substantial efforts and time to the tasks involved. Stefanie Linser, Michael Köhl and Kit Prins performed the tasks of coordinating lead authors and also contributed to the preparation of introductory parts of the report. Drafting of individual parts on quantitative indicators was supervised by lead authors Kari Korhonen and Göran Ståhl (Criterion 1), Marco Ferretti (Criterion 2), Adrian Lanz, Marco Marchetti and Michael Köhl (Criterion 3), Markus Lier and Andreas Schuck (Criterion 4 and 5), and Roland Olschewski (Criterion 6).

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Finalisation and layout

Zuzana Slatkovská contributed with preliminary formatting of texts and graphics. Language correction was done by David Schofield (Part I) and Mark Sixsmith (Summary for Policy Makers). Igor Viszlai (LUB) and Peter Bennár designed the infographics and layout arrangements were done by Igor Viszlai (LUB) and Ján Zajac.

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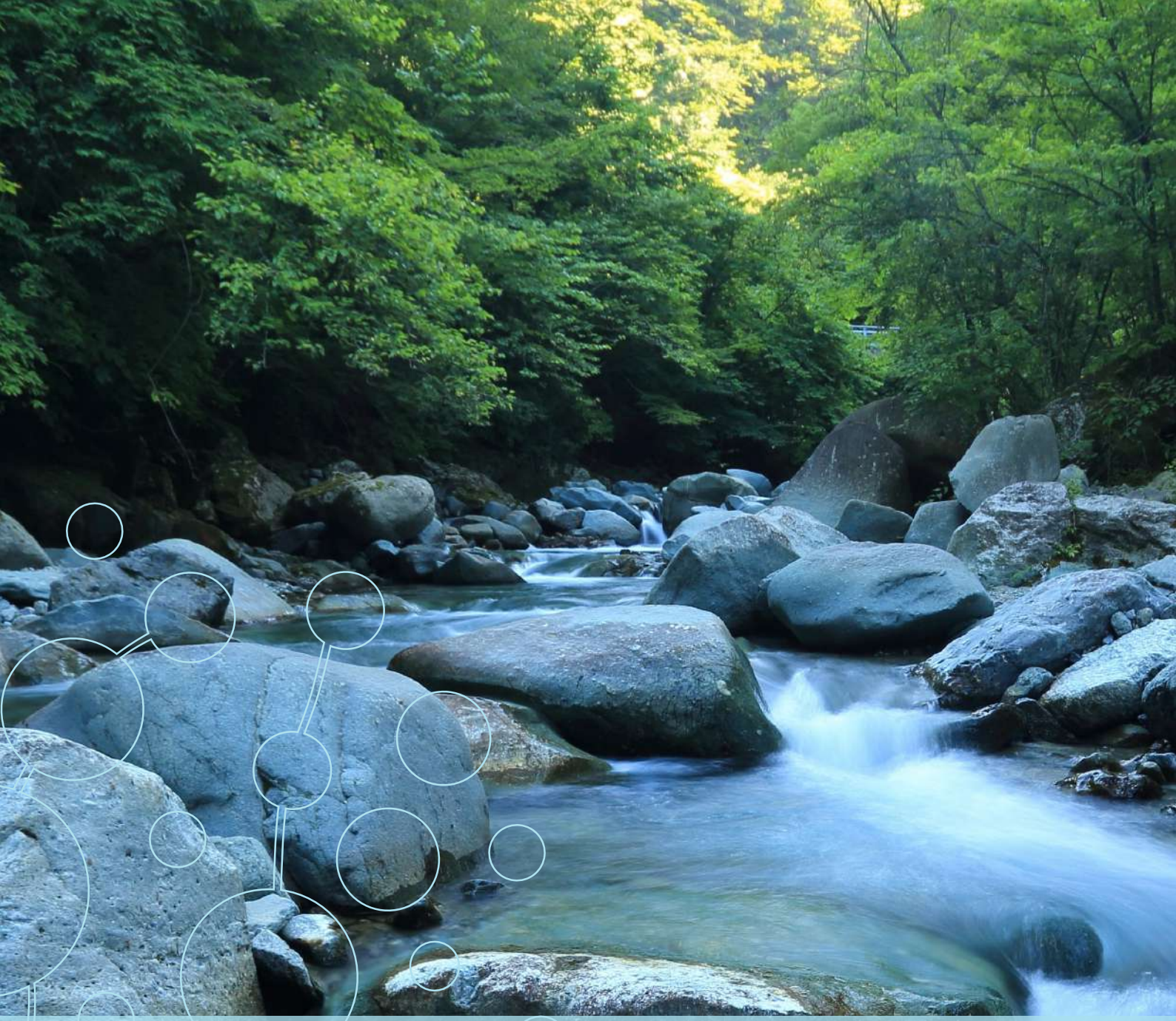
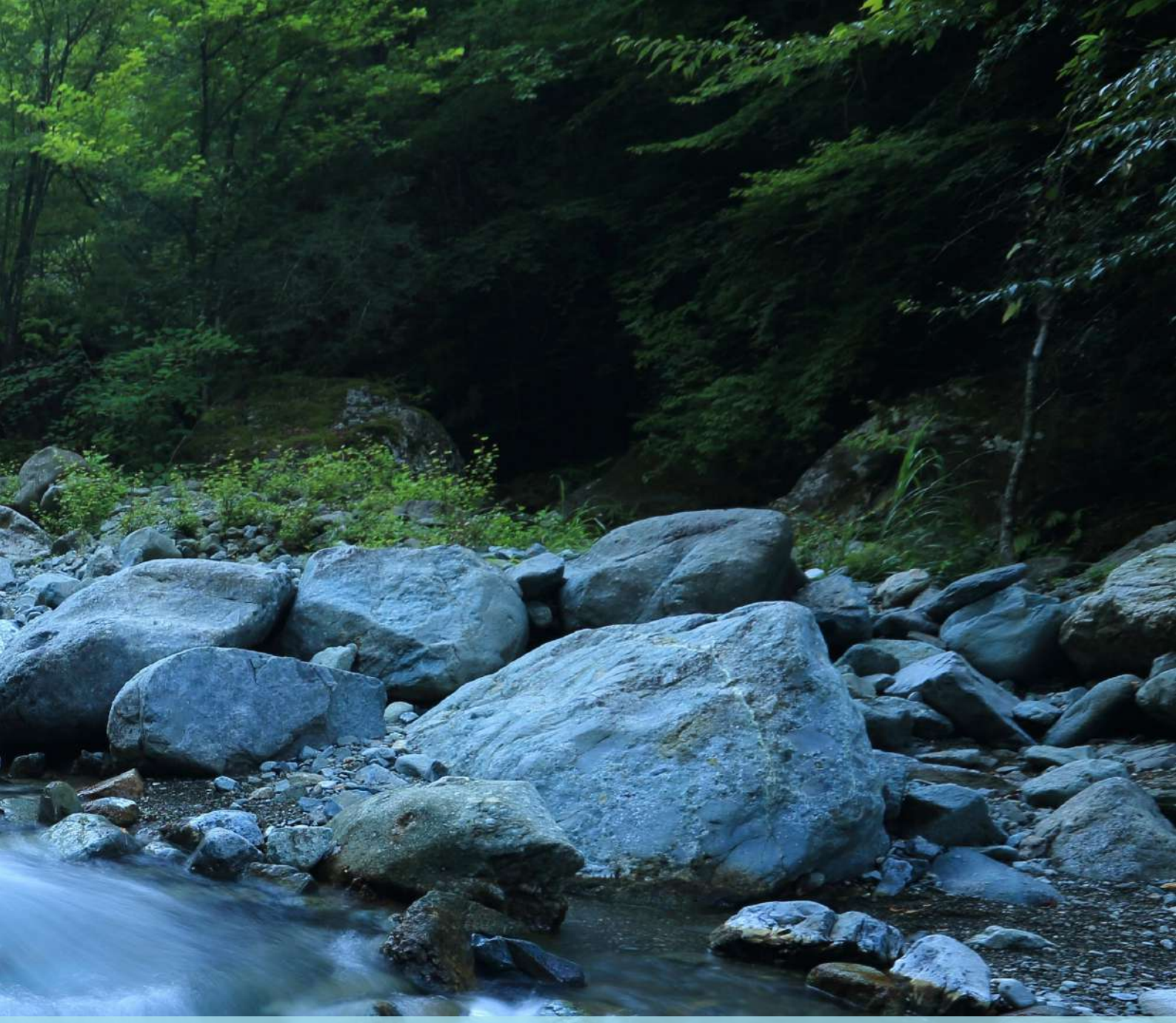
Michal Vančo
Head of Liaison Unit Bratislava

Acronyms and abbreviations

AOT40	accumulated exposure over a threshold value of 40 ppb	**FTE**	full time equivalent
BC	base cations	**GCU**	genetic conservation unit
C&I	criteria and indicators	**GDP**	gross domestic product
C:N	carbon to nitrogen ratio	**GHG**	greenhouse gases
CBD	Convention on Biological Diversity	**GPS**	global positioning system
CEC	cation exchange capacity	**GVA**	gross value added
C-EE	Central-East Europe	**HWP**	harvested wood products
C-WE	Central-West Europe	**ICP Forests**	International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests
DBH	diameter at breast height	**ISCED**	International Standard Classification of Education
EC JRC	Joint Research Centre of the European Commission	**ISIC**	International Standard Industrial Classification of All Economic Activities
EEA	European Environmental Agency	**JWEE**	Joint wood energy enquiry
EU-28	28 countries of the European Union until 31 January 2020	**LUCAS**	Land Use/Cover Area frame statistical Survey
EUFGIS	documentation platform linking national inventories on forest genetic resources in Europe	**LVL**	laminated veneer lumber
EUFORGEN	European Forest Genetic Resources Programme	**NACE**	Statistical Classification of Economic Activities in the European Community
EUTR	EU Timber Regulation	**NAI**	net annual increment (gross annual increment less natural losses)
FAO	Food and Agriculture Organization of the United Nations	**NE**	North Europe
FAWS	forests available for wood supply	**NFAP**	national forest accounting plan
FLEGT	Forest Law Enforcement, Governance and Trade	**NFI**	national forest inventory
FOWL	forest and other wooded land	**NFP**	national forest programme
FRL	forest reference level	**NGO**	non-governmetal organisation
FSC	Forest Stewardship Council	**NWGs**	non-wood goods

o.b.	over-bark	**RDPF**	Rural Development Programme funds
OC	organic carbon	**RWE**	roundwood equivalent
OWL	other wooded land	**S-EE**	South-East Europe
pcs	pieces	**SFM**	sustainable forest management
PECBMS	Pan-European Common Bird Monitoring Scheme	**SoEF**	State of Europe's Forests report
PEFC	Programme for the Endorsement of Forest Certification	**S-WE**	South-West Europe
PEOLG	Pan-European Operational Level Guidelines for SFM	**u.b.**	under-bark
PES	payments for ecosystem services	**UNCCD**	the United Nations Convention to Combat Desertification
pH	logarithmic measure of hydrogen ion concentration in solution	**UNECE**	United Nations Economic Commission for Europe
ppb	parts per thousand million	**UNFCCC**	Under the United Nations Framework Convention on Climate Change
ppm	parts per million	**VOC**	volatile organic compounds
RDP	Rudar Development Programme		





Annexes

Annex 1: Materials and methods

The pan-European Criteria and Indicators for Sustainable Forest Management, the last version of which is in the annex to the Ministerial declaration and endorsed at the seventh Ministerial Conference on the Protection of Forests in Europe in 2015 form the data structure of the State of Europe's Forests (SoEF) 2020 report.

The coincidence of the preparation process of SoEF 2020 report and the Global Forest Resources Assessment (FRA) 2020 led to the close cooperation of FOREST EUROPE Liaison Unit Bratislava with UNECE/FAO Forestry and Timber Section and FAO team for FRA 2020. As a result of this cooperation, the data collection for respective regional and global reports was launched jointly in March 2018, the reporting forms were made available through the joint data collection platrform, a joint workshop was organised for national correspondents (NCs) and the definitions were harmonised where appropriate. In spite of these harmonisation steps, the more detailed structure of information expected for the pan-European reporting led NCs to use a wider range of data sources or not to report some information and thus not all data on overlapping indicators presented in SoEF 2020 and FRA 2020 are exactly the same.

The effort in reduction of reporting burden led to combining data provided directly by NCs through the two questionnaires - on the quantitative and on the qualitative indicators - and through the international processes and initiatives collecting specific data, serving as international data providers (IDPs) for the preparation of SoEF 2020.

SoEF 2020 includes information on individual indicators analyzed at the regional level, as well as in a narrative and tabular format, the information on main trends in forest management in individual countries, structured according to a selected subset of indicators. The information for the country trends was collected within a dialogue process with NCs in 2019 and may contain updated assessments compared to information collected earlier through the questionnaires.

The pan-European reporting is a voluntary process. For various reasons, some countries have not provided all the data requested and some countries have not provided any information for this report. This refers also to the Russian Federation, resulting in presentation of data at the European level without this large transcontinental country.

The structure of the data, reference years and data providers are presented in tables below.

Data providers for reporting on Pan-European Qualitative indicators

No.	Indicator	Data provider
1	National Forest Programmes or equivalent	National
2	Institutional frameworks	National
3	Legal/regulatory framework: National (and/or sub-national) and International commitments	National
4	Financial and economic instruments	National
5	Information and communication	National
C.1	Policies, institutions and instruments to maintain and appropriately enhance forest resources and their contribution to global carbon cycles	National
C.2	Policies, institutions and instruments to maintain forest ecosystems health and vitality	National
C.3	Policies, institutions and instruments to maintain and encourage the productive functions of forests	National
C.4	Policies, institutions and instruments to maintain, conserve and appropriately enhance the biological diversity in forest ecosystems	National
C.5	Policies, institutions and instruments to maintain and appropriately enhance of the protective functions in forest management	National
C.6	Policies, institutions and instruments to maintain other socioeconomic functions and conditions	National

Data providers for reporting on Pan-European Quantitatives indicators (IDP – International Data Provider)

No.	Indicator	1990	2000	2005	2010	2015	2020	Data reference	Data provider
C 1: Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles									
1.1	Forest area	x	x	x	x	x	x	Data for a reporting year	National – pre-filled
1.2	Growing stock	x	x	x	x	x	x	Data for a reporting year	National – pre-filled
1.3	Age structure and/or diameter distribution	x	x	x	x	x		Data for a reporting year	National – pre-filled
1.4	Forest carbon	x	x	x	x	x	x	Data for a reporting year	National – partly pre-filled
C 2: Maintenance of Forest Ecosystem Health and Vitality									
2.1	Deposition and concentration of air pollutants	x	x	x	x	x		Data for a reporting year	ICP Forests – reported through IDP
2.2	Soil condition				x	x		Data for a reporting year	EC-JRC – reported through IDP
2.3	Defoliation	x	x	x	x	x		Data for a reporting year	ICP Forests – reported through IDP
2.4	Forest damage	x	x	x	x	x		Data for a reporting year	National – pre-filled
2.5	Forest land degradation	x	x	x	x	x		Data for a reporting year	National
C 3: Maintenance and Encouragement of Productive Functions of Forests (Wood and Non-Wood)									
3.1	Increment and fellings	x	x	x	x	x		Data for a 5-year period	National – pre-filled
3.2	Roundwood	x	x	x	x	x	x	Annual data for the period 1988-2017	UNECE–JFSQ – partly pre-filled
3.3	Non-wood goods					x		Data for a reporting year	National – pre-filled
3.4	Services					x		Data for a reporting year	National – pre-filled
C 4: Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems									
4.1	Diversity of tree species	x	x	x	x	x		Data for a reporting year	National – pre-filled
4.2	Regeneration	x	x	x	x	x		Data for a reporting year and for a 5-year period	National – pre-filled
4.3	Naturalness	x	x	x	x	x	x	Data for a reporting year	National – partly pre-filled
4.4	Introduced tree species	x	x	x	x	x	x	Data for a reporting year	National – pre-filled
4.5	Deadwood	x	x	x	x	x		Data for a reporting year	National – pre-filled
4.6	Genetic resources	x	x	x	x	x	x	Data for a reporting year	EUFORGEN – reported through IDP
4.7	Forest fragmentation		x	x	x	x		CORINE dataset	JRC – reported through IDP
4.8	Threatened forest species	x	x	x	x	x		Data for a reporting year	National – pre-filled
4.9	Protected forests	x	x	x	x	x	x	Data for a reporting year	National – pre-filled
4.10	Common forest bird species	x	x	x	x	x	x	Annual data for the period 1980-2017	Pan-European Common Bird Monitoring Scheme - IDP
C 5: Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (Notably Soil and Water)									
5.1	Protective forests	x	x	x	x	x	x	Data for a reporting year	National – pre-filled
C 6: Maintenance of other Socioeconomic Functions and Conditions									
6.1	Forest holdings	x	x	x	x	x		Data for a reporting year	National – pre-filled
6.2	Contribution of forest sector to GDP	x	x	x	x	x		Data for a reporting year	National – EUROSTAT pre-filled
6.3	Net revenue	x	x	x	x	x		Data for a reporting year	National – EUROSTAT pre-filled
6.4	Investments in forests and forestry	x	x	x	x	x		Data for a reporting year	National – EUROSTAT pre-filled
6.5	Forest sector workforce	x	x	x	x	x		Data for a 3-year period	National – EUROSTAT pre-filled
6.6	Occupational safety and health	x	x	x	x	x		Data for a 5-year period	National – pre-filled
6.7	Wood consumption	x	x	x	x	x	x	Annual data for 1988-2017 period and data for 5-year periods	UNECE–JFSQ – reported through IDP
6.8	Trade in wood	x	x	x	x	x	x	Annual data 1988-2017 period and data for 5-year periods	UNECE–JFSQ – reported through IDP
6.9	Wood energy			x	x	x	x	Data for 2007, 2009, 2011, 2013, 2015 (JWEE reporting years)	National – UNECE-JWEE pre-filled
6.10	Recreation in forests	x	x	x	x	x		Data for reporting years	National – partly pre-filled

Note: Years marked by „x" are covered by 2020 reporting, the grey fill highlights indicators covered by the national questionnaire.

Annex 2: FOREST EUROPE signatories by region

FOREST EUROPE signatories assigned to country groups in State of Europe´s Forest 2020

Region	Countries
Russian Federation	Russian Federation
North Europe	Denmark
	Estonia
	Finland
	Iceland
	Latvia
	Lithuania
	Norway
	Sweden
Central-West Europe	Austria
	Belgium
	France
	Germany
	Ireland
	Liechtenstein
	Luxembourg
	Netherlands
	Switzerland
	United Kingdom
Central-East Europe	Belarus
	Czech Republic
	Georgia
	Hungary
	Poland
	Republic of Moldova
	Romania
	Slovakia
	Ukraine
South-West Europe	Andorra
	Holy See
	Italy
	Malta
	Monaco
	Portugal
	Spain
South-East Europe	Albania
	Bosnia and Herzegovina
	Bulgaria
	Croatia
	Cyprus
	Greece
	Montenegro
	North Macedonia
	Serbia
	Slovenia
	Turkey

Annex 3: Pan-European quantitative and qualitative indicators for sustainable forest management

Pan-European Qualitative Indicators for Sustainable Forest Management

Criteria	No.	Indicator	Full text
Forest policy and governance	1	National Forest Programmes or equivalent	
	2	Institutional frameworks	
	3	Legal/regulatory framework: National (and/or sub-national) and International commitments	
	4	Financial and economic instruments	
	5	Information and communication	
Criterion 1: Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles	C.1	Policies, institutions and instruments to maintain and appropriately enhance forest resources and their contribution to global carbon cycles	
	1.1	Forest area	Area of forest and other wooded land, classified by forest type and by availability for wood supply, and share of forest and other wooded land in total land area
	1.2	Growing stock	Growing stock on forest and other wooded land, classified by forest type and by availability for wood supply
	1.3	Age structure and/or diameter distribution	Age structure and/or diameter distribution of forest and other wooded land, classified by availability for wood supply
	1.4	Forest carbon	Carbon stock and carbon stock changes in forest biomass, forest soils and in harvested wood products
Criterion 2: Maintenance of forest ecosystem health and vitality	C.2	Policies, institutions and instruments to maintain forest ecosystems health and vitality	
	2.1	Deposition and concentration of air pollutants	Deposition and concentration of air pollutants on forest and other wooded land
	2.2	Soil condition	Chemical soil properties (pH, CEC, C/N, organic C, base saturation) on forest and other wooded land related to soil acidity and eutrophication, classified by main soil types
	2.3	Defoliation	Defoliation of one or more main tree species on forest and other wooded land in each of the defoliation classes
	2.4	Forest damage	Forest and other wooded land with damage, classified by primary damaging agent (abiotic, biotic and human induced)
	2.5	Forest land degradation	Trends in forest land degradation
Criterion 3: Maintenance and encouragement of productive functions of forest (wood and non-wood)	C.3	Policies, institutions and instruments to maintain and encourage the productive functions of forests	
	3.1	Increment and fellings	Balance between net annual increment and annual fellings of wood on forest available for wood supply
	3.2	Roundwood	Quantity and market value of roundwood
	3.3	Non-wood goods	Quantity and market value of non-wood goods from forest and other wooded land
	3.4	Services	Value of marketed services on forest and other wooded land

Criteria	No.	Indicator	Full text
Criterion 4: Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	C.4	Policies, institutions and instruments to maintain, conserve and appropriately enhance the biological diversity in forest ecosystems	
	4.1	Diversity of tree species	Area of forest and other wooded land, classified by number of tree species occurring
	4.2	Regeneration	Total forest area by stand origin and area of annual forest regeneration and expansion
	4.3	Naturalness	Area of forest and other wooded land by class of naturalness
	4.4	Introduced tree species	Area of forest and other wooded land dominated by introduced tree species
	4.5	Deadwood	Volume of standing deadwood and of lying deadwood on forest and other wooded land
	4.6	Genetic resources	Area managed for conservation and utilisation of forest tree genetic resources (in situ and ex situ genetic conservation) and area managed for seed production
	4.7	Forest fragmentation	Area of continuous forest and of patches of forest separated by non-forest lands
	4.8.	Threatened forest species	Number of threatened forest species, classified according to IUCN Red List categories in relation to total number of forest species
	4.9	Protected forests	Area of forest and other wooded land protected to conserve biodiversity, landscapes and specific natural elements, according to MCPFE categories
	4.10	Common forest bird species	Occurrence of common breeding bird species related to forest ecosystems
Criterion 5: Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)	C.5	Policies, institutions and instruments to maintain and appropriately enhance of the protective functions in forest management	
	5.1	Protective forests – soil, water and other ecosystem functions - infrastructure and managed natural resources	Area of forest and other wooded land designated to prevent soil erosion, preserve water resources, maintain other protective functions, protect infrastructure and managed natural resources against natural hazards
Criterion 6: Maintenance of other socio-economic functions and conditions	C.6	Policies, institutions and instruments to maintain other socioeconomic functions and conditions	
	6.1	Forest holdings	Number of forest holdings, classified by ownership categories and size classes
	6.2	Contribution of forest sector to GDP	Contribution of forestry and manufacturing of wood and paper products to gross domestic product
	6.3	Net revenue	Net revenue of forest enterprises
	6.4	Investments in forests and forestry	Total public and private investments in forests and forestry
	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
	6.6	Occupational safety and health	Frequency of occupational accidents and occupational diseases in forestry
	6.7	Wood consumption	Consumption per head of wood and products derived from wood
	6.8	Trade in wood	Imports and exports of wood and products derived from wood
	6.9	Wood energy	Share of wood energy in total primary energy supply, classified by origin of wood
	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

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Nenad	Potočić	Indicator 2.3	Croatian Forests Research Institute
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Rastislav	Raši	Indicators 4.7, 4.10, 6.10, Summary for Policymakers, Introduction, Acknowledgements	National Forest Centre, Slovakia
Nicolas	Robert	Indicator 6.5	European Commission – Joint Research Centre
Marcus	Schaub	Indicator 2.1	Swiss Federal Institute for Forest, Snow and Landscape Research
Andreas	Schmitz	Indicator 2.1	Thünen Institute of Forest Ecosystems, Germany
Andreas	Schuck	Indicators 2.4, 4.2, 4.4	European Forest Institute
Matej	Schwarz	Indicators 4.8, 4.10	National Forest Centre, Slovakia
Volkmar	Timermann	Indicator 2.3	Norwegian Institute of Bioeconomy
Jo	Van Brusselen	Indicator 4.1	European Forest Institute
Arne	Verstraeten	Indicator 2.1	Research Institute for Nature and Forest, Belgium
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Annexes to Part I

Annex 8: Data tables – Part I (status and trends by indicators for SFM)

List of output tables

Table 1: Basic data on countries, 2020

Country	Land area (1 000 ha)	Forest & OWL			Population				GDP (2017)		
		Area 1 000 ha	% of land area	Forest & OWL per capita (ha)	Total (2018) (1 000)	Density (people per km²)	Rural (2017) (1 000)	Density rural (people per km²)	GDP total (1 000 million EUR)	Per capita (euro)	Real growth rate (%)
Albania	2 740	1 237	45.2	0.43	2 882.7	105.2	1 167.1	42.6	11.6	3 949	3.8
Andorra	47	16	34.0	0.21	77.0	164	9.1	19.4	2.7	34 744	1.7
Austria	8 252	4 029	48.8	0.45	8 891.4	108	3 686.7	44.7	369.9	42 345	2.6
Belarus	20 298	9 397	46.3	0.99	9 452.6	47	2 076.9	10.2	48.3	5 103	2.4
Belgium	3 028	722	23.8	0.06	11 482.2	379	232.1	7.7	439.1	38 415	1.7
Bosnia and Herzegovina	5 120	2 813	54.9	0.85	3 323.9	65	1 828.0	35.7	16.1	4 598	3.0
Bulgaria	10 856	3 917	36.1	0.56	7 051.6	65	1 792.4	16.5	51.7	7 293	3.8
Croatia	5 596	2 557	45.7	0.62	4 156.4	74	1 787.3	31.9	49.0	11 693	2.9
Cyprus	924	386	41.8	0.32	1 189.3	129	391.2	42.3	19.6	22 886	4.2
Czech Republic	7 721	2 677	34.7	0.25	10 665.7	138	2 789.0	36.1	191.5	18 037	4.3
Denmark	4 199	665	15.8	0.12	5 752.1	137	705.8	16.8	292.7	51 055	2.3
Estonia	4 347	2 533	58.3	1.91	1 322.9	30	412.1	9.5	23.0	17 564	4.9
Finland	30 391	23 155	76.2	4.19	5 522.6	18	808.3	2.7	223.8	40 528	2.8
France	54 756	18 096	33.0	0.28	64 990.5	119	13 300.3	24.3	2 291.7	34 089	2.2
Georgia	6 949	2 829	40.7	0.71	4 002.9	58	1 557.2	22.4	13.5	3 439	4.8
Germany	34 886	11 419	32.7	0.14	83 124.4	238	18 801.9	53.9	3 277.3	39 912	2.2
Greece	12 890	6 539	50.7	0.62	10 522.2	82	2 287.9	17.7	180.2	16 149	1.5
Holy See	0	-	-	-	0.8	2 003	-	-	-	-	-
Hungary	9 053	2 253	24.9	0.23	9 707.5	107	2 832.4	31.3	124.0	12 757	4.1
Iceland	10 025	201	2.0	0.60	336.7	3	21.4	0.2	21.7	64 833	4.0
Ireland	6 889	848	12.3	0.18	4 818.7	70	1 782.7	25.9	294.1	61 767	7.8
Italy	29 414	11 432	38.9	0.19	60 627.3	206	18 073.8	61.4	1 725.0	29 060	1.6
Latvia	6 218	3 519	56.6	1.82	1 928.5	31	620.1	10.0	27.0	13 866	4.6
Liechtenstein	16	7	43.5	0.18	37.9	237	32.5	203.1	5.6	147 328	0.7
Lithuania	6 265	2 263	36.1	0.81	2 801.3	45	918.8	14.7	42.2	14 598	4.1
Luxembourg	243	91	37.6	0.15	604.2	249	55.3	22.8	55.3	94 780	1.5
Malta	32	0	1.1	0.00	439.2	1 373	25.5	79.8	11.1	25 856	6.7
Monaco	0	-	-	-	38.7	19 341	-	-	5.7	146 795	-
Montenegro	1 345	964	71.7	1.54	627.8	47	208.6	15.5	4.3	6 836	4.7
Netherlands	3 369	370	11.0	0.02	17 059.6	506	1 528.6	45.4	737.1	43 264	3.2
North Macedonia	2 522	1 144	45.4	0.55	2 083.0	83	880.2	34.9	10.0	4 805	0.2
Norway	30 413	14 325	47.1	2.68	5 338.0	18	956.7	3.1	354.5	66 817	2.0
Poland	30 619	9 483	31.0	0.25	37 921.6	124	15 150.1	49.5	467.0	12 234	4.8
Portugal	9 161	4 855	53.0	0.47	10 256.2	112	3 641.0	39.7	173.1	16 756	0.9
Republic of Moldova	3 288	462	14.0	0.11	4 051.9	123	2 038.8	62.0	7.2	1 780	4.5
Romania	23 008	6 947	30.2	0.36	19 506.1	85	9 021.2	39.2	188.0	9 551	6.9
Russian Federation	1 637 687	8 82 310	53.9	6.05	145 734.0	9	37 147.2	2.3	1 400	9 722	1.5
Serbia	8 746	3 228	36.9	0.37	8 802.8	101	3 093.3	35.4	36.9	5 246	2.0
Slovakia	4 808	1 946	40.5	0.36	5 453.0	113	2 515.6	52.3	84.9	15 576	3.2
Slovenia	2 014	1 265	62.8	0.61	2 077.8	103	944.9	46.9	43.0	20 673	4.9
Spain	49 966	27 954	55.9	0.60	46 692.9	93	9 281.4	18.6	1 166.3	25 161	3.0
Sweden	40 731	30 344	74.5	3.04	9 971.6	24	1 292.8	3.2	475.3	47 958	2.1
Switzerland	3 952	1 344	34.0	0.16	8 525.6	216	2 217.4	56.1	602.5	71 082	1.6
Turkey	76 963	22 933	29.8	0.28	82 340.1	107	20 473.7	26.6	755.7	9 359	7.4
Ukraine	57 929	9 716	16.8	0.22	44 246.2	76	13 787.4	23.8	99.5	2 250	2.5
United Kingdom	24 193	3 210	13.3	0.05	67 141.7	278	11 129.5	46.0	2 335.0	35 281	1.7

Sources: Land area: FAOSTAT (http://www.fao.org/faostat/en/#data/RL)
Forest, Other Wodded Land: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators
Population: Total population (2018): http://data.un.org/, World Population Prospects: The 2019 Revision;
Rural Population: https://data.worldbank.org/indicator/SP.RUR.TOTL;
Population of Holy See: https://www.indexmundi.com/g/g.aspx?c=vt&v=21
GDP: UNDATA (http://data.un.org/)

Table 2: Ind. 1.1 Area of forest and other wooded land, 2020

Country	Forest		Other wooded land		Other land		Total
					Total	of which with tree cover	
	1 000 ha	% of land area	1 000 ha	% of land area	1 000 ha		
Albania	785	28.6	452	16.5	1 514	-	2 752
Andorra	16	34.0	0	0.0	29	-	45
Austria	3 899	47.2	130	1.6	4 223	-	8 252
Belarus	8 768	43.2	630	3.1	10 894	58	20 291
Belgium	689	22.7	33	1.1	2 306	-	3 028
Bosnia and Herzegovina	2 188	42.7	625	12.2	2 307	-	5 120
Bulgaria	3 893	35.9	24	0.2	6 939	-	10 856
Croatia	1 939	34.7	618	11.0	3 039	205	5 596
Cyprus	173	18.7	213	23.1	538	9	924
Czech Republic	2 677	34.7	0	0.0	5 045	45	7 722
Denmark	628	15.0	37	0.9	3 534	2	4 199
Estonia	2 438	56.1	94	2.2	2 001	-	4 534
Finland	22 409	73.7	746	2.5	7 236	214	30 391
France	17 253	31.5	843	1.5	36 660	-	54 756
Georgia	2822	40.6	7	0.1	4 141	-	6 970
Germany	11 419	32.7	0	0.0	23 467	1 400	34 886
Greece	3 903	30.3	2 636	20.4	6 351	-	12 890
Holy See	0	0.0	0	0.0	0	0	0
Hungary	2 053	22.7	200	2.2	6 800	82	9 053
Iceland	51	0.5	150	1.5	9 824	10	10 025
Ireland	782	11.4	66	1.0	6 041	7	6 889
Italy	9 566	32.5	1 866	6.3	17 982	2 865	29 414
Latvia	3 411	54.9	108	1.7	2 699	35	6 218
Liechtenstein	7	41.9	0	1.6	9	-	16
Lithuania	2 201	35.1	62	1.0	4 002	17	6 265
Luxembourg	89	36.5	3	1.1	152	-	243
Malta	0	1.1	0	0.0	32	-	32
Monaco	0	0.0	0	0.0	0	0	0
Montenegro	827	61.5	137	10.2	381	-	1 345
Netherlands	370	11.0	0	0.0	3 001	-	3 371
North Macedonia	1 001	39.7	143	5.7	1 378	-	2 522
Norway	12 180	40.0	2 145	7.1	16 088	-	30 413
Poland	9 483	31.0	-	-	-	-	9 483
Portugal	3 312	36.2	1 543	16.8	-	-	4 855
Republic of Moldova	387	11.8	75	2.3	2 827	23	3 289
Romania	6 929	30.1	16	0.1	15 953	-	22 898
Russian Federation	809 090	49.4	73 220	4.5	755 829	-	1 638 139
Serbia	2 720	31.1	508	5.8	5 518	-	8 746
Slovakia	1 926	40.1	20	0.4	2 862	288	4 808
Slovenia	1 238	61.5	27	1.4	762	35	2 027
Spain	18 572	37.2	9 382	18.8	-	-	27 954
Sweden	27 980	68.7	2 364	5.8	10 387	-	40 731
Switzerland	1 269	32.1	75	1.9	2 608	301	3 952
Turkey	22 220	28.9	713	0.9	54 030	14	76 963
Ukraine	9 690	16.7	26	0.04	48 213	907	57 929
United Kingdom	3 190	13.2	20	0.1	20 983	26	24 193

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 3: Ind. 1.1 Change in forest area, 1990-2020

Country	Forest (1 000 ha)	Forest									
		Area (1 000 ha)						Annual change rate			
								1990-2020		2010-2020	
	2020	1990	2000	2005	2010	2015	2020	1 000 ha	%	1 000 ha	%
Albania	785	789	770	783	776	785	785	- 0.1	-0.0	0.9	0.1
Andorra	16	16	16	16	16	16	16	-	-	-	-
Austria	3 899	3 776	3 838	3 851	3 863	3 881	3 899	4.1	0.1	3.6	0.1
Belarus	8 768	7 780	8 273	8 436	8 630	8 634	8 768	32.9	0.4	13.8	0.2
Belgium	689	677	667	674	690	689	689	0.4	0.1	-0.1	-0.0
Bosnia and Herzegovina	2 188	2 210	2 112	2 112	2 103	2 161	2 188	-0.7	-0.0	8.5	0.4
Bulgaria	3 893	3 327	3 375	3 651	3 737	3 833	3 893	18.9	0.5	15.6	0.4
Croatia	1 939	1 850	1 885	1 903	1 920	1 922	1 939	3.0	0.2	1.9	0.1
Cyprus	173	161	172	173	173	173	173	0.4	0.2	-0.0	-0.0
Czech Republic	2 677	2 629	2 637	2 647	2 657	2 668	2 677	1.6	0.1	2.0	0.1
Denmark	628	531	572	538	586	625	628	3.2	0.6	4.2	0.7
Estonia	2 438	2 206	2 239	2 300	2 336	2 421	2 438	7.8	0.3	10.2	0.4
Finland	22 409	21 875	22 446	22 162	22 242	22 409	22 409	17.8	0.1	16.7	0.1
France	17 253	14 436	15 289	15 882	16 419	16 836	17 253	93.9	0.6	83.4	0.5
Georgia	2 822	2 752	2 761	2 773	2 822	2 822	2 822	2.3	0.1	-	-
Germany	11 419	11 300	11 354	11 384	11 409	11 419	11 419	4.0	0.0	1.0	0.0
Greece	3 903	3 299	3 601	3 752	3 903	3 903	3 903	20.1	0.6	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	1 814	1 921	1 984	2 046	2 061	2 053	8.0	0.4	0.7	0.0
Iceland	51	17	30	38	45	48	51	1.1	3.7	0.7	1.4
Ireland	782	462	630	690	720	755	782	10.7	1.8	6.2	0.8
Italy	9 566	7 590	8 369	8 759	9 028	9 297	9 566	65.9	0.8	53.8	0.6
Latvia	3 411	3 173	3 241	3 297	3 372	3 391	3 411	7.9	0.2	3.9	0.1
Liechtenstein	7	7	7	7	7	7	7	0.0	0.1	-	-
Lithuania	2 201	1 945	2 020	2 121	2 170	2 187	2 201	8.5	0.4	3.1	0.1
Luxembourg	89	86	87	87	89	89	89	0.1	0.1	0.0	0.0
Malta	0	0	0	0	0	0	0	0.0	0.0	0.0	0.1
Monaco	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	626	626	626	827	827	827	6.7	0.9	-	-
Netherlands	370	345	360	365	373	365	370	0.8	0.2	-0.4	-0.1
North Macedonia	1 001	912	958	955	960	994	1 001	3.0	0.3	4.1	0.4
Norway	12 180	12 132	12 113	12 092	12 102	12 141	12 180	1.6	0.0	7.8	0.1
Poland	9 483	8 882	9 059	9 200	9 329	9 420	9 483	20.0	0.2	15.4	0.2
Portugal	3 312	3 399	3 281	3 303	3 252	3 312	3 312	-2.9	-0.1	6.0	0.2
Republic of Moldova	387	325	344	363	375	386	387	2.0	0.6	1.2	0.3
Romania	6 929	6 371	6 366	6 391	6 515	6 901	6 929	18.6	0.3	41.4	0.6
Russian Federation	809 090	808 950	809 269	808 790	809 090	809 090	809 090	4.7	0.0	0.0	0.0
Serbia	2 720	2 313	2 460	2 476	2 713	2 720	2 720	13.6	0.5	0.7	0.0
Slovakia	1 926	1 902	1 901	1 912	1 918	1 922	1 926	0.8	0.0	0.8	0.0
Slovenia	1 238	1 188	1 233	1 243	1 247	1 248	1 238	1.7	0.1	-0.9	-0.1
Spain	18 572	13 905	17 094	18 083	18 545	18 551	18 572	155.6	1.0	2.7	0.0
Sweden	27 980	28 063	28 163	28 218	28 073	27 980	27 980	-2.8	-0.0	-9.3	-0.0
Switzerland	1 269	1 154	1 196	1 218	1 235	1 252	1 269	3.9	0.3	3.4	0.3
Turkey	22 220	19 783	20 148	20 536	21 083	21 630	22 220	81.2	0.4	113.7	0.5
Ukraine	9 690	9 274	9 510	9 575	9 548	9 657	9 690	13.9	0.1	14.2	0.1
United Kingdom	3 190	2 778	2 954	3 021	3 059	3 155	3 190	13.7	0.5	13.1	0.4

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 4: Ind. 1.1 Change in area of forest available for wood supply, 1990-2020

Country	Forest (1 000 ha)	Forest available for wood supply									
		Area (1 000 ha)						Annual change rate			
								1990-2020		2010-2020	
	2020	1990	2000	2005	2010	2015	2020	1 000 ha	%	1 000 ha	%
Albania	785	685	620	611	587	565	565	-4.0	-0.6	-2.2	-0.4
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 899	3 308	3 342	3 343	3 336	3 319	3 305	-0.1	-0.0	-3.1	-0.1
Belarus	8 768	5 925	6 350	6 376	6 479	6 478	6 575	21.7	0.3	9.7	0.1
Belgium	689	673	663	665	668	666	664	-0.3	-0.0	-0.4	-0.1
Bosnia and Herzegovina	2 188	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	2 365	2 258	2 561	2 387	2 514	2 039	-10.9	-0.5	-34.8	-1.6
Croatia	1 939	1 758	1 749	1 745	1 741	1 740	1 743	-0.5	-0.0	0.2	0.0
Cyprus	173	43	43	41	41	41	41	-0.1	-0.2	-0.0	-0.1
Czech Republic	2 677	2 575	2 561	2 519	2 310	2 298	2 304	-9.0	-0.4	-0.6	-0.0
Denmark	628	531	564	531	579	617	614	2.8	0.5	3.5	0.6
Estonia	2 438	2 079	2 049	2 070	2 076	2 110	2 106	0.9	0.0	3.0	0.1
Finland	22 409	20 428	20 306	20 051	19 409	19 719	19 719	-23.6	-0.1	31.0	0.2
France	17 253	13 779	14 465	15 195	15 607	16 015	16 493	90.5	0.6	88.6	0.6
Georgia	2 822	566	566	577	588	588	588	0.7	0.1	-	-
Germany	11 419	10 671	10 671	10 489	10 306	10 124	9 942	-24.3	-0.2	-36.4	-0.4
Greece	3 903	3 038	3 317	3 456	3 595	3 595	3 595	18.5	0.6	-0.0	-0.0
Holy See	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	1 741	1 835	1 878	1 925	1 910	1 871	4.4	0.2	-5.4	-0.3
Iceland	51	6	14	20	24	27	30	0.8	5.7	0.5	2.0
Ireland	782	-	-	581	603	586	607	-	-	0.4	0.1
Italy	9 566	6 708	7 396	7 741	7 979	8 216	8 454	58.2	0.8	47.6	0.6
Latvia	3 411	2 824	3 024	3 088	3 167	3 177	3 199	12.5	0.4	3.2	0.1
Liechtenstein	7	4	4	4	4	4	4	0.0	0.4	-	-
Lithuania	2 201	1 695	1 756	1 835	1 852	1 924	1 936	8.0	0.4	8.4	0.4
Luxembourg	89	86	87	86	86	86	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	545	545	545	728	728	728	6.1	1.0	-	-
Netherlands	370	276	288	292	299	295	299	0.8	0.3	0.0	0.0
North Macedonia	1 001	804	804	804	804	804	804	-	-	-	-
Norway	12 180	8 510	8 448	8 393	8 326	8 295	8 264	-8.2	-0.1	-6.2	-0.1
Poland	9 483	8 323	8 342	8 417	8 128	8 268	8 331	0.3	0.0	20.3	0.2
Portugal	3 312	2 239	2 173	2 194	2 142	2 199	2 199	-1.3	-0.1	5.7	0.3
Republic of Moldova	387	246	269	287	292	314	314	2.3	0.8	2.2	0.7
Romania	6 929	5 617	5 029	5 049	5 147	4 627	5 586	-1.0	-0.0	43.9	0.8
Russian Federation	809 090	698 527	703 781	690 978	677 204	677 204	677 204	-710.8	-0.10	0.0	0.0
Serbia	2 720	-	-	-	-	-	-	-	-	-	-
Slovakia	1 926	1 772	1 767	1 751	1 779	1 795	1 796	0.8	0.0	1.8	0.1
Slovenia	1 238	1 114	1 157	1 166	1 175	1 139	1 130	0.5	0.0	-4.5	-0.4
Spain	18 572	-	-	-	17 082	17 082	17 079	-	-	-0.3	-0.0
Sweden	27 980	22 830	20 771	20 234	20 033	19 664	19 556	-109.1	-0.5	-47.6	-0.2
Switzerland	1 269	1 120	1 159	1 178	1 193	1 208	1 223	3.4	0.3	3.0	0.3
Turkey	22 220	7 579	7 714	7 774	7 835	8 262	8 480	30.0	0.4	64.5	0.8
Ukraine	9 690	4 164	5 999	5 653	5 122	5 228	5 016	28.4	0.6	-10.6	-0.2
United Kingdom	3 190	2 778	2 954	3 021	3 059	3 155	3 190	13.7	0.5	13.1	0.4

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 5: Ind. 1.1 Forest area per capita, 1990-2015

Country	Forest (1 000 ha)	Forest area (ha/capita)											
		Forest						Forest available for wood supply					
	2020	1990	2000	2005	2010	2015	2020	1990	2000	2005	2010	2015	2020
Albania	785	0.24	0.25	0.26	0.27	0.27	0.27	0.21	0.20	0.20	0.20	0.20	0.20
Andorra	16	0.29	0.24	0.20	0.19	0.21	0.21	-	-	-	-	-	-
Austria	3 899	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.38	0.37
Belarus	8 768	0.76	0.83	0.87	0.91	0.91	0.93	0.58	0.64	0.66	0.68	0.68	0.70
Belgium	689	0.07	0.07	0.06	0.06	0.06	0.06	0.07	0.06	0.06	0.06	0.06	0.06
Bosnia and Herzegovina	2 188	0.50	0.56	0.56	0.56	0.61	0.66	-	-	-	-	-	-
Bulgaria	3 893	0.38	0.41	0.48	0.51	0.53	0.55	0.27	0.28	0.33	0.32	0.35	0.29
Croatia	1 939	0.39	0.42	0.44	0.45	0.46	0.47	0.37	0.39	0.40	0.41	0.41	0.42
Cyprus	173	0.21	0.18	0.17	0.16	0.15	0.15	0.06	0.05	0.04	0.04	0.04	0.03
Czech Republic	2 677	0.25	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.22	0.22	0.22
Denmark	628	0.10	0.11	0.10	0.11	0.11	0.11	0.10	0.11	0.10	0.10	0.11	0.11
Estonia	2 438	1.41	1.60	1.70	1.75	1.84	1.84	1.32	1.47	1.53	1.56	1.60	1.59
Finland	22 409	4.39	4.34	4.22	4.15	4.09	4.06	4.10	3.92	3.82	3.62	3.60	3.57
France	17 253	0.25	0.25	0.25	0.25	0.25	0.27	0.24	0.24	0.24	0.24	0.24	0.25
Georgia	2 822	0.57	0.68	0.71	0.75	0.76	0.71	0.12	0.14	0.15	0.16	0.16	0.15
Germany	11 419	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12
Greece	3 903	0.32	0.33	0.34	0.35	0.36	0.37	0.30	0.31	0.31	0.32	0.33	0.34
Holy See	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	0.17	0.19	0.20	0.20	0.21	0.21	0.17	0.18	0.19	0.19	0.19	0.19
Iceland	51	0.07	0.11	0.13	0.14	0.15	0.15	0.02	0.05	0.07	0.08	0.08	0.09
Ireland	782	0.13	0.17	0.17	0.16	0.16	0.16	-	-	0.14	0.13	0.12	0.13
Italy	9 566	0.13	0.15	0.15	0.15	0.15	0.16	0.12	0.13	0.13	0.13	0.14	0.14
Latvia	3 411	1.19	1.37	1.47	1.61	1.71	1.77	1.06	1.28	1.38	1.51	1.61	1.66
Liechtenstein	7	0.23	0.20	0.19	0.19	0.18	0.18	0.13	0.12	0.11	0.11	0.11	0.11
Lithuania	2 201	0.53	0.58	0.64	0.70	0.75	0.79	0.46	0.50	0.55	0.60	0.66	0.69
Luxembourg	89	0.22	0.20	0.19	0.17	0.16	0.15	0.22	0.20	0.19	0.17	0.15	-
Malta	0	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	1.03	1.04	1.02	1.33	1.33	1.32	0.90	0.90	0.89	1.18	1.17	1.16
Netherlands	370	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
North Macedonia	1 001	0.46	0.47	0.46	0.46	0.48	0.48	0.40	0.40	0.39	0.39	0.39	0.39
Norway	12 180	2.86	2.70	2.62	2.48	2.34	2.28	2.01	1.88	1.82	1.70	1.60	1.55
Poland	9 483	0.23	0.24	0.24	0.25	0.25	0.25	0.22	0.22	0.22	0.21	0.22	0.22
Portugal	3 312	0.34	0.32	0.31	0.31	0.32	0.32	0.22	0.21	0.21	0.20	0.21	0.21
Republic of Moldova	387	0.09	0.09	0.10	0.11	0.11	0.10	0.07	0.07	0.08	0.08	0.09	0.08
Romania	6 929	0.27	0.28	0.30	0.32	0.35	0.36	0.24	0.22	0.24	0.25	0.23	0.29
Russian Federation	809 090	5.46	5.52	5.64	5.66	5.61	5.55	4.71	4.80	4.81	4.74	4.70	4.65
Serbia	2 720	0.30	0.33	0.33	0.37	0.38	0.31	-	-	-	-	-	-
Slovakia	1 926	0.36	0.35	0.36	0.36	0.35	0.35	0.33	0.33	0.33	0.33	0.33	0.33
Slovenia	1 238	0.59	0.62	0.62	0.61	0.60	0.60	0.56	0.58	0.58	0.57	0.55	0.54
Spain	18 572	0.36	0.42	0.41	0.40	0.40	0.40	-	-	-	0.37	0.37	0.37
Sweden	27 980	3.28	3.17	3.13	2.99	2.86	2.81	2.67	2.34	2.24	2.14	2.01	1.96
Switzerland	1 269	0.17	0.17	0.16	0.16	0.15	0.15	0.17	0.16	0.16	0.15	0.15	0.14
Turkey	22 220	0.37	0.32	0.30	0.29	0.28	0.27	0.14	0.12	0.11	0.11	0.11	0.10
Ukraine	9 690	0.18	0.19	0.20	0.21	0.21	0.22	0.08	0.12	0.12	0.11	0.12	0.11
United Kingdom	3 190	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 6: Ind. 1.2 Growing stock, 2020

Country	Forest (1 000 ha)	Growing stock (million m³)			
		Forest	of which available for wood supply	Other wooded land	Forest and other wooded land
Albania	785	-	-	-	-
Andorra	16	-	-	-	-
Austria	3 899	1 166	1 141	0	1 166
Belarus	8 768	1 806	1 448	18	1 825
Belgium	689	181	168	0	-
Bosnia and Herzegovina	2 188	405	405	-	-
Bulgaria	3 893	767	-	-	767
Croatia	1 939	427	402	6	434
Cyprus	173	-	-	-	-
Czech Republic	2 677	791	682	0	791
Denmark	628	133	129	0	133
Estonia	2 438	494	422	3	498
Finland	22 409	2 449	2 203	7	2 456
France	17 253	3 056	2 921	-	-
Georgia	2 822	455	94	0	455
Germany	11 419	3 663	3 505	0	3 663
Greece	3 903	-	-	-	-
Holy See	0	-	-	-	-
Hungary	2 053	397	357	-	397
Iceland	51	1	1	0	1
Ireland	782	121	102	-	-
Italy	9 566	-	-	-	-
Latvia	3 411	672	618	2	675
Liechtenstein	7	3	-	-	3
Lithuania	2 201	559	474	2	561
Luxembourg	89	35	-	-	-
Malta	0	-	-	-	-
Monaco	0	-	-	-	-
Montenegro	827	121	116	0	122
Netherlands	370	83	67	0	83
North Macedonia	1 001	76	66	-	-
Norway	12 180	1 233	1 093	9	1 242
Poland	9 483	2 730	2 366	-	2 730
Portugal	3 312	-	-	-	-
Republic of Moldova	387	40	37	3	44
Romania	6 929	2 355	1 865	0	2 356
Russian Federation	809 090	-	-	-	-
Serbia	2 720	-	-	-	-
Slovakia	1 926	538	501	0	538
Slovenia	1 238	414	384	1	415
Spain	18 572	1 109	979	-	-
Sweden	27 980	3 654	2 719	21	3 675
Switzerland	1 269	449	433	1	450
Turkey	22 220	1 644	822	52	1 697
Ukraine	9 690	2 280	1 493	1	2 281
United Kingdom	3 190	677	677	-	-

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 7: Ind. 1.2 Change in growing stock on forest, 1990-2020

Country	Forest (1 000 ha)	Forest									
		Growing stock (million m³)						Annual change rate			
								1990-2020		2010-2020	
	2020	1990	2000	2005	2010	2015	2020	million m³	%	million m³	%
Albania	785	75	75	59	52	52	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 899	927	1 067	1 102	1 126	1 146	1 166	8.0	0.8	4.0	0.3
Belarus	8 768	1 093	1 339	1 435	1 598	1 669	1 806	23.8	1.7	20.9	1.2
Belgium	689	128	157	169	179	180	181	1.8	1.2	0.2	0.1
Bosnia and Herzegovina	2 188	291	358	358	389	400	405	3.8	1.1	1.5	0.4
Bulgaria	3 893	405	526	591	645	680	767	12.1	2.2	12.2	1.7
Croatia	1 939	310	360	385	410	415	427	3.9	1.1	1.7	0.4
Cyprus	173	7	8	8	10	11	-	-	-	-	-
Czech Republic	2 677	624	699	735	755	768	791	5.5	0.8	3.6	0.5
Denmark	628	66	92	109	117	131	133	2.2	2.4	1.6	1.3
Estonia	2 438	393	429	437	456	492	494	3.4	0.8	3.8	0.8
Finland	22 409	1 878	2 078	2 181	2 343	2 449	2 449	19.0	0.9	10.6	0.4
France	17 253	2 077	2 254	2 512	2 649	2 856	3 056	32.6	1.3	40.7	1.4
Georgia	2 822	421	445	456	455	455	455	1.1	0.3	-	-
Germany	11 419	2 815	3 381	3 502	3 617	3 663	3 663	28.3	0.9	4.6	0.1
Greece	3 903	156	170	177	185	185	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	291	326	341	359	379	397	3.5	1.0	3.8	1.0
Iceland	51	0	0	0	0	1	1	0.0	10.1	0.0	9.6
Ireland	782	-	-	73	94	114	121	-	-	2.7	2.5
Italy	9 566	855	1 068	1 174	1 279	1 385	-	-	-	-	-
Latvia	3 411	442	537	557	640	656	672	7.7	1.4	3.2	0.5
Liechtenstein	7	3	3	3	3	3	3	-0.0	-0.3	-	-
Lithuania	2 201	413	450	465	490	537	559	4.9	1.0	6.9	1.3
Luxembourg	89	20	26	26	31	33	35	0.5	1.8	0.3	1.0
Malta	0	0	0	0	0	0	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	73	73	121	121	121	-	-	-	-
Netherlands	370	52	61	71	76	79	83	1.0	1.5	0.7	0.9
North Macedonia	1 001	76	79	76	76	76	76	0.0	0.0	-	-
Norway	12 180	788	898	981	1 069	1 151	1 233	14.8	1.5	16.4	1.4
Poland	9 483	1 485	1 736	1 909	2 372	2 550	2 730	41.5	2.1	35.8	1.4
Portugal	3 312	-	198	185	170	171	-	-	-	-	-
Republic of Moldova	387	33	37	40	40	41	40	0.2	0.7	0.0	0.1
Romania	6 929	1 348	1 346	1 352	1 378	2 222	2 355	33.6	1.9	97.7	5.5
Russian Federation	809 090	80 040	80 270	80 479	81 523	81 523	-	-	-	-	-
Serbia	2 720	235	250	298	415	418	-	-	-	-	-
Slovakia	1 926	402	459	491	517	535	538	4.5	1.0	2.0	0.4
Slovenia	1 238	273	333	374	406	415	414	4.7	1.4	0.8	0.2
Spain	18 572	560	906	946	1 035	1 059	1 109	18.3	2.3	7.4	0.7
Sweden	27 980	-	-	3 185	3 295	3 478	3 654	-	-	35.9	1.0
Switzerland	1 269	394	416	421	430	440	449	1.8	0.4	1.9	0.4
Turkey	22 220	871	1 163	1 273	1 376	1 608	1 644	25.8	2.1	26.9	1.8
Ukraine	9 690	1 414	1 884	2 004	2 100	2 196	2 280	28.9	1.6	18.0	0.8
United Kingdom	3 190	370	484	540	597	637	677	10.2	2.0	8.0	1.3

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 8: Ind. 1.2 Growing stock per hectare, 1990-2020

Country	Forest (1 000 ha)	Growing stock (m^3/ha)											
		Forest						Other wooded land					
	2020	1990	2000	2005	2010	2015	2020	1990	2000	2005	2010	2015	2020
Albania	785	95.3	98.0	75.5	67.0	66.2	-	27.0	28.3	54.4	88.9	52.5	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 899	245.5	278.0	286.2	291.5	295.3	299.1	-	-	-	-	-	-
Belarus	8 768	140.5	161.9	170.1	185.1	193.4	206.0	-	84.1	46.3	31.3	19.0	30.0
Belgium	689	189.0	235.9	251.1	258.7	260.4	262.0	-	-	-	-	-	-
Bosnia and Herzegovina	2 188	131.7	169.5	169.5	185.2	185.0	185.0	-	-	-	-	-	-
Bulgaria	3 893	121.7	155.9	161.9	172.6	177.4	197.0	-	-	-	-	-	-
Croatia	1 939	167.8	191.0	202.3	213.5	215.9	220.3	10.3	10.3	10.3	10.3	10.3	10.3
Cyprus	173	46.0	46.2	48.5	57.4	64.4	-	-	-	-	-	-	-
Czech Republic	2 677	237.5	264.9	277.7	284.0	287.9	295.4	-	-	-	-	-	-
Denmark	628	123.9	160.2	202.8	199.4	210.0	211.1	27.2	27.2	27.2	23.0	10.3	10.3
Estonia	2 438	178.3	191.5	190.0	195.2	203.1	202.7	32.1	44.5	41.4	40.7	44.3	42.2
Finland	22 409	85.9	92.6	98.4	105.3	109.3	109.3	7.6	6.4	9.7	9.6	9.6	9.6
France	17 253	143.9	147.4	158.2	161.3	169.6	177.1	-	-	-	-	-	-
Georgia	2 822	153.0	161.3	164.4	161.0	161.0	161.0	22.5	22.2	23.2	23.2	23.2	23.2
Germany	11 419	249.1	297.8	307.6	317.0	320.8	320.8	-	-	-	-	-	-
Greece	3 903	47.3	47.2	47.2	47.4	47.4	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	160.4	169.9	172.1	175.4	183.7	193.4	-	-	-	-	-	-
Iceland	51	2.7	3.3	5.2	7.4	10.5	16.0	0.2	0.2	0.2	0.2	0.2	0.2
Ireland	782	-	-	106.2	131.0	151.0	155.2	-	-	-	-	-	-
Italy	9 566	112.6	127.6	134.0	141.7	148.9	-	-	-	-	-	-	-
Latvia	3 411	139.3	165.7	168.9	189.8	193.5	197.1	17.0	16.9	16.9	22.8	22.8	22.8
Liechtenstein	7	460.0	428.4	409.0	409.0	409.0	409.0	-	-	-	-	-	-
Lithuania	2 201	212.3	222.5	219.0	225.7	245.6	254.0	30.0	30.1	30.1	29.8	34.6	34.6
Luxembourg	89	237.5	299.3	299.1	352.4	369.0	390.1	-	-	-	-	-	-
Malta	0	230.5	230.5	230.5	230.5	230.5	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	115.9	115.9	146.8	146.8	146.8	-	12.7	12.7	2.9	2.9	2.9
Netherlands	370	151.9	169.7	194.8	203.5	216.6	223.9	-	-	-	-	-	-
North Macedonia	1 001	83.7	82.4	80.0	79.6	76.8	76.3	-	-	-	-	-	-
Norway	12 180	65.0	74.1	81.1	88.3	94.8	101.2	2.6	3.1	3.4	3.7	4.0	4.3
Poland	9 483	167.2	191.6	207.5	254.3	270.7	287.9	-	-	-	-	-	-
Portugal	3 312	-	60.2	55.9	52.3	51.7	-	-	-	-	1.7	1.4	-
Republic of Moldova	387	100.7	108.3	109.8	106.6	106.6	103.9	46.2	46.2	47.3	46.2	46.3	46.2
Romania	6 929	211.5	211.5	211.5	211.5	321.9	339.8	-	-	-	-	61.8	50.7
Russian Federation	809 090	98.9	99.2	99.5	100.8	100.8	-	21.4	22.3	22.6	24.3	24.3	-
Serbia	2 720	101.6	101.6	120.4	153.0	153.7	-	20.9	5.8	5.8	63.4	72.8	-
Slovakia	1 926	211.1	241.4	257.1	269.7	278.5	279.2	-	-	-	-	-	-
Slovenia	1 238	230.0	270.0	300.9	325.7	332.4	334.6	60.0	60.0	60.0	60.0	60.0	37.6
Spain	18 572	40.3	53.0	52.3	55.8	57.1	59.7	0.1	0.2	0.2	0.2	0.2	-
Sweden	27 980	-	-	112.9	117.4	124.3	130.6	-	-	5.7	5.3	7.1	9.1
Switzerland	1 269	341.8	347.6	345.7	348.5	351.2	353.9	-	-	9.8	11.3	12.7	13.9
Turkey	22 220	44.0	57.7	62.0	65.3	74.3	74.0	31.1	52.4	56.6	62.3	72.1	74.0
Ukraine	9 690	152.5	198.1	209.3	219.9	227.4	235.3	-	-	-	38.5	38.5	38.5
United Kingdom	3 190	133.2	163.8	178.7	195.2	201.9	212.2	-	-	-	-	-	-

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 9: Ind. 1.2 Growing stock per capita, 1990-2020

Country	Forest (1 000 ha)	Growing stock (m³/capita)											
		Forest						Forest available for wood supply					
	2020	1990	2000	2005	2010	2015	2020	1990	2000	2005	2010	2015	2020
Albania	785	22.9	24.4	19.6	17.9	18.1	-	20.1	19.1	18.9	17.2	17.4	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 899	120.7	133.2	133.9	134.6	132.6	131.1	116.7	129.6	130.3	130.6	129.1	128.3
Belarus	8 768	107.3	134.2	148.5	168.3	175.9	191.1	83.5	109.5	121.5	136.9	142.6	153.1
Belgium	689	12.8	15.4	16.2	16.4	15.9	15.7	12.7	15.3	15.3	15.2	14.8	14.6
Bosnia and Herzegovina	2 188	65.2	95.0	94.7	104.6	113.0	121.8	65.2	95.0	94.7	104.6	113.0	121.8
Bulgaria	3 893	46.5	64.4	77.2	87.2	94.7	108.8	29.7	39.3	49.4	50.3	59.1	-
Croatia	1 939	65.0	80.6	89.3	95.4	98.7	102.8	61.5	74.4	81.7	86.3	92.5	96.8
Cyprus	173	9.7	8.4	8.2	8.9	9.6	-	4.0	3.3	3.0	3.0	3.1	-
Czech Republic	2 677	60.4	68.1	72.0	72.0	72.8	74.1	-	-	69.1	63.8	63.9	63.9
Denmark	628	12.8	17.1	20.1	21.1	23.1	23.1	12.8	16.9	19.8	20.7	22.7	22.4
Estonia	2 438	250.6	306.8	322.6	342.6	373.9	373.5	236.2	281.5	291.3	305.9	324.0	319.4
Finland	22 409	376.6	401.5	415.7	436.9	446.9	443.5	371.0	370.9	382.2	393.8	402.0	398.9
France	17 253	35.5	37.0	39.8	40.7	42.9	47.0	33.9	34.8	37.6	38.7	40.8	45.0
Georgia	2 822	87.7	109.2	116.8	120.0	122.0	113.5	18.7	22.3	23.7	24.8	25.2	23.4
Germany	11 419	35.4	41.1	42.5	44.2	44.8	44.1	42.3	40.8	41.3	42.2	42.9	42.2
Greece	3 903	15.3	15.7	16.1	16.6	17.1	-	14.1	14.5	14.8	15.3	15.7	-
Holy See	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	28.0	32.0	33.8	35.9	38.5	40.9	26.6	30.1	31.6	33.2	35.1	36.7
Iceland	51	0.2	0.4	0.7	1.0	1.5	2.4	0.1	0.2	0.5	0.8	1.3	2.0
Ireland	782	-	-	17.6	20.7	24.2	25.2	-	-	15.4	18.4	20.4	21.2
Italy	9 566	15.1	18.8	20.3	21.6	22.8	-	14.0	17.4	18.8	20.0	21.2	-
Latvia	3 411	166.0	226.8	248.8	305.1	331.8	348.6	150.6	209.4	230.5	282.9	306.0	320.6
Liechtenstein	7	104.0	86.2	78.6	76.1	73.3	72.3	46.0	42.0	40.1	38.9	37.4	-
Lithuania	2 201	111.7	128.4	139.8	158.2	184.9	199.6	-	112.0	119.8	131.7	156.7	169.2
Luxembourg	89	53.4	59.5	55.8	61.7	57.5	57.3	-	-	-	-	-	-
Malta	0	0.2	0.2	0.2	0.2	0.2	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	120.0	118.2	196.0	195.1	193.4	-	111.9	110.2	188.3	187.4	185.1
Netherlands	370	3.5	3.8	4.4	4.6	4.7	4.9	2.8	3.1	3.5	3.7	3.8	3.9
North Macedonia	1 001	38.2	38.8	37.1	36.9	36.7	36.7	33.1	32.4	32.0	31.9	31.7	31.7
Norway	12 180	185.8	200.0	212.2	218.6	221.8	231.0	171.4	182.8	193.2	197.0	198.1	204.8
Poland	9 483	39.0	45.4	50.0	62.4	67.1	72.0	-	41.4	45.2	53.3	57.8	62.4
Portugal	3 312	-	19.2	17.6	16.1	16.5	-	-	16.1	14.0	13.0	13.3	-
Republic of Moldova	387	8.9	10.2	11.1	11.2	11.6	9.9	7.9	9.3	10.1	10.1	10.7	9.0
Romania	6 929	58.1	60.0	63.4	68.1	112.1	120.7	51.1	47.4	50.1	53.8	88.6	95.6
Russian Federation	809 090	539.7	547.6	560.8	570.7	565.8	-	466.1	476.2	479.1	477.7	473.5	-
Serbia	2 720	31.0	33.3	40.0	56.9	58.9	-	-	28.0	33.7	48.0	49.7	-
Slovakia	1 926	75.8	85.2	91.5	95.9	98.7	98.6	68.5	81.1	84.1	89.1	92.0	91.9
Slovenia	1 238	136.7	167.4	187.0	198.2	201.0	199.3	128.2	157.1	175.4	186.8	188.0	184.7
Spain	18 572	14.4	22.3	21.7	22.2	22.8	23.7	-	-	-	20.5	21.0	21.0
Sweden	27 980	-	-	352.7	351.3	354.9	366.4	304.3	290.6	287.7	285.8	279.0	272.7
Switzerland	1 269	58.7	57.9	56.6	55.0	53.1	52.7	57.0	56.1	54.7	53.1	51.2	50.8
Turkey	22 220	16.1	18.4	18.8	19.0	20.5	20.0	8.1	9.2	9.4	9.6	10.0	10.0
Ukraine	9 690	27.2	38.3	42.5	45.8	48.6	51.5	13.2	24.5	25.4	30.3	31.8	33.7
United Kingdom	3 190	6.5	8.2	8.9	9.5	9.8	10.1	6.5	8.2	8.9	9.5	9.8	10.1

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 10: Ind. 1.2 Growing stock in forest available for wood supply, 1990-2020

Country	Forest (1 000 ha)	Forest available for wood supply									
		Growing stock (million m³)						Annual change rate			
								1990-2020		2010-2020	
	2020	1990	2000	2005	2010	2015	2020	million m³	%	million m³	%
Albania	785	66	59	57	50	50	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 899	896	1 038	1 072	1 092	1 116	1 141	8.2	0.8	4.9	0.4
Belarus	8 768	851	1 093	1 174	1 300	1 353	1 448	19.9	1.8	14.8	1.1
Belgium	689	127	157	160	166	167	168	1.4	0.9	0.2	0.1
Bosnia and Herzegovina	2 188	291	358	358	389	400	405	3.8	1.1	1.5	0.4
Bulgaria	3 893	259	321	378	372	424	-	-	-	-	-
Croatia	1 939	294	333	352	371	389	402	3.6	1.1	3.1	0.8
Cyprus	173	3	3	3	3	4	-	-	-	-	-
Czech Republic	2 677	-	-	705	668	674	682	-	-	1.4	0.2
Denmark	628	66	90	107	115	129	129	2.1	2.3	1.4	1.2
Estonia	2 438	371	393	395	407	426	422	1.7	0.4	1.5	0.4
Finland	22 409	1 850	1 920	2 005	2 112	2 203	2 203	11.8	0.6	9.1	0.4
France	17 253	1 984	2 119	2 377	2 517	2 716	2 921	31.2	1.3	40.4	1.5
Georgia	2 822	90	91	93	94	94	94	0.1	0.1	-	-
Germany	11 419	3 357	3 357	3 406	3 455	3 505	3 505	4.9	0.1	5.0	0.1
Greece	3 903	144	157	163	170	170	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	276	307	318	332	345	357	2.7	0.9	2.5	0.7
Iceland	51	0	0	0	0	0	1	0.0	13.3	0.0	10.1
Ireland	782	-	-	64	84	96	102	-	-	1.8	2.0
Italy	9 566	794	992	1 090	1 188	1 286	-	-	-	-	-
Latvia	3 411	401	496	516	593	605	618	7.2	1.5	2.5	0.4
Liechtenstein	7	1	1	1	1	1	-	-	-	-	-
Lithuania	2 201	-	392	398	408	455	474	-	-	6.6	1.5
Luxembourg	89	-	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	68	68	117	117	116	-	-	-0.0	-0.0
Netherlands	370	42	49	57	61	64	67	0.8	1.6	0.6	1.0
North Macedonia	1 001	66	66	66	66	66	66	-	-	-	-
Norway	12 180	727	821	893	963	1 028	1 093	12.2	1.4	13.0	1.3
Poland	9 483	-	1 584	1 724	2 028	2 197	2 366	-	-	33.8	1.6
Portugal	3 312	-	166	147	137	138	-	-	-	-	-
Republic of Moldova	387	29	34	36	36	38	37	0.3	0.8	0.1	0.2
Romania	6 929	1 186	1 064	1 068	1 089	1 755	1 865	22.6	1.5	77.6	5.5
Russian Federation	809 090	69 114	69 807	68 756	68 234	68 234	-	-	-	-	-
Serbia	2 720	-	211	251	350	353	-	-	-	-	-
Slovakia	1 926	363	437	452	481	499	501	4.6	1.1	2.0	0.4
Slovenia	1 238	256	312	351	383	388	384	4.2	1.4	0.1	0.0
Spain	18 572	-	-	-	955	976	979	-	-	2.4	0.2
Sweden	27 980	2 605	2 579	2 597	2 680	2 734	2 719	3.8	0.1	3.9	0.1
Switzerland	1 269	383	403	407	416	424	433	1.7	0.4	1.7	0.4
Turkey	22 220	435	582	637	692	780	822	12.9	2.1	13.0	1.7
Ukraine	9 690	685	1 207	1 198	1 390	1 438	1 493	26.9	2.6	10.3	0.7
United Kingdom	3 190	370	484	540	597	637	677	10.2	2c.0	8.0	1.3

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 11: Ind. 1.3 Age-class distribution in all even-aged forest stands, 2015

Country	Forest (1 000 ha)	Forest: even-aged stands (1 000 ha)					of which: available for wood supply (1 000 ha)				
		Total	Development phase				Total	Development phase			
			Regeneration phase	Intermediate phase	Mature phase	Unspecified		Regeneration phase	Intermediate phase	Mature phase	Unspecified
Albania	785	-	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	1 733	271	1 028	264	170
Belarus	8 634	8 634	554	7 008	1 072	-	6 478	444	5 342	692	-
Belgium	689	485	88	243	40	114	463	86	225	39	112
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	3 833	1 269	1 878	686	-	2 514	-	-	-	-
Croatia	1 922	936	107	625	204	-	852	101	570	181	-
Cyprus	173	-	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	2 668	447	1 671	515	35	2 298	390	1 480	429	-
Denmark	625	523	126	213	132	52	523	126	213	132	52
Estonia	2 421	2 065	242	1 354	469	-	1 823	205	1 222	395	-
Finland	22 409	22 409	3 552	13 445	3 251	2 161	19 719	3 497	12 707	2 195	1 320
France	16 836	-	-	-	-	-	-	-	-	-	-
Georgia	2 822	565	40	271	254	-	118	8	56	53	-
Germany	11 419	11 419	2 159	5 028	2 625	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	1 484	207	1 080	197	0	1 439	196	1 052	191	-
Iceland	48	37	24	12	0	-	26	18	9	0	-
Ireland	755	594	216	235	139	4	532	174	226	130	3
Italy	9 297	-	-	-	-	-	-	-	-	-	-
Latvia	3 391	3 391	582	1 891	919	-	3 177	580	1 810	788	-
Liechtenstein	7	-	-	-	-	-	-	-	-	-	-
Lithuania	2 187	2 187	403	1 235	420	129	1 894	391	978	410	115
Luxembourg	89	-	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	626	-	-	-	-	570	-	-	-	-
Netherlands	365	256	29	35	192	-	207	23	28	155	-
North Macedonia	994	-	-	-	-	-	-	-	-	-	-
Norway	12 141	4 469	1 462	1 480	1 526	-	4 350	1 448	1 462	1 439	-
Poland	9 420	9 420	1 398	6 222	1 800	-	8 268	1 256	5 565	1 447	-
Portugal	3 312	2 435	389	684	1 342	19	1 388	290	667	428	3
Republic of Moldova	386	-	-	-	-	-	-	-	-	-	-
Romania	6 901	5 855	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-	-
Slovakia	1 922	1 453	256	927	271	-	1 367	250	890	227	-
Slovenia	1 248	-	-	-	-	-	-	-	-	-	-
Spain	18 551	1 527	28	854	644	-	1 445	26	816	604	-
Sweden	27 980	19 376	2 392	12 417	4 567	-	16 522	2 058	10 645	3 819	-
Switzerland	1 252	-	-	-	-	-	892	91	615	186	-
Turkey	21 630	21 198	6 423	13 109	1 664	-	8 096	2 453	5 007	636	-
Ukraine	9 657	9 272	1 585	6 447	1 240	-	4 990	1 074	3 358	558	-
United Kingdom	3 155	1 614	-	-	-	-	1 614	-	-	-	-

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 11: Ind. 1.3 Age-class distribution in all even-aged forest stands, 2015 *(Cont.)*

Country	Forest (1 000 ha)	Forest: even-aged stands (1 000 ha)					on which: available for wood supply (1 000 m³)				
		Total	Development phase				Total	Development phase			
			Regeneration phase	Intermediate phase	Mature phase	Unspecified		Regeneration phase	Intermediate phase	Mature phase	Unspecified
Albania	785	-	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	579 614	2 259	381 797	156 505	39 054
Belarus	8 634	8 634	554	7 008	1 072	-	1 352 840	22 694	1 154 306	175 840	-
Belgium	689	485	88	243	40	114	125 722	7 796	75 617	17 231	25 079
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	3 833	1 269	1 878	686	-	-	-	-	-	-
Croatia	1 922	936	107	625	204	-	206 559	1 454	146 731	58 374	-
Cyprus	173	-	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	2 668	447	1 671	515	35	674 158	3 387	473 613	197 158	-
Denmark	625	523	126	213	132	52	107 231	3 803	44 003	47 146	12 279
Estonia	2 421	2 065	242	1 354	469	-	357 385	5 909	227 041	124 434	-
Finland	22 409	22 409	3 552	13 445	3 251	2 161	2 203 000	66 000	1 621 000	485 000	32 000
France	16 836	-	-	-	-	-	-	-	-	-	-
Georgia	2 822	565	40	271	254	-	18 180	-	-	-	-
Germany	11 419	11 419	2 159	5 028	2 625	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	1 484	207	1 080	197	0	267 439	6 546	213 396	47 497	-
Iceland	48	37	24	12	0	-	416	19	376	21	-
Ireland	755	594	216	235	139	4	86 112	2 539	40 088	42 931	554
Italy	9 297	-	-	-	-	-	-	-	-	-	-
Latvia	3 391	3 391	582	1 891	919	-	605 110	-	342 050	263 060	-
Liechtenstein	7	-	-	-	-	-	-	-	-	-	-
Lithuania	2 187	2 187	403	1 235	420	129	455 000	30 000	294 000	131 000	-
Luxembourg	89	-	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	626	-	-	-	-	91 927	3 269	67 101	21 556	-
Netherlands	365	256	29	35	192	-	44 814	1 390	6 255	37 169	-
North Macedonia	994	-	-	-	-	-	-	-	-	-	-
Norway	12 141	4 469	1 462	1 480	1 526	-	532 464	42 136	270 020	220 308	-
Poland	9 420	9 420	1 398	6 222	1 800	-	2 197 000	47 000	1 595 000	555 000	-
Portugal	3 312	2 435	389	684	1 342	19	82 160	4 608	46 313	31 239	45
Republic of Moldova	386	-	-	-	-	-	-	-	-	-	-
Romania	6 901	5 855	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-	-
Slovakia	1 922	1 453	256	927	271	-	352 037	2 551	236 407	113 079	-
Slovenia	1 248	-	-	-	-	-	-	-	-	-	-
Spain	18 551	1 527	28	854	644	-	167 886	364	48 948	118 574	-
Sweden	27 980	19 376	2 392	12 417	4 567	-	2 169 048	24 483	1 198 551	946 014	-
Switzerland	1 252	-	-	-	-	-	321 436	8 140	197 780	115 516	-
Turkey	21 630	21 198	6 423	13 109	1 664	-	780 185	9 674	657 540	112 971	-
Ukraine	9 657	9 272	1 585	6 447	1 240	-	1 164 000	76 000	923 000	165 000	-
United Kingdom	3 155	1 614	-	-	-	-	374 000	-	-	-	-

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 12: Ind. 1.3 Diameter distribution in uneven-aged forest stands, 1990-2015

Country	Forest (1 000 ha)	Forest: uneven-aged stands (1 000 m³ o.b.)							
		<20 cm				21-40 cm			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	27 000	-	-	-	15 600	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	-	-	-
Belarus	8 634	-	-	-	-	-	-	-	-
Belgium	689	-	2 554	3 620	3 240	-	13 429	15 178	14 496
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-
Croatia	1 922	8 057	6 820	6 168	22 342	37 304	35 006	35 636	89 117
Cyprus	173	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	-	-	-	-	-	-
Denmark	625	-	-	3 296	3 778	-	-	7 131	9 959
Estonia	2 421	26 036	17 780	19 392	21 099	87 723	39 851	45 460	49 975
Finland	22 409	-	-	-	-	-	-	-	-
France	16 836	-	-	-	-	-	-	-	-
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-
Hungary	2 061	5 778	7 733	8 884	11 699	22 857	32 339	56 771	69 473
Iceland	48	24	25	27	28	7	7	8	8
Ireland	755	-	-	5 744	6 567	-	-	7 787	8 700
Italy	9 297	30 016	36 061	42 105	-	90 408	121 624	152 840	-
Latvia	3 391	-	-	-	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	2 590	3 569	-	-	6 725	10 280
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	238 501	264 477	-	-	239 389	277 162
Poland	9 420	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	4 368	-	-	-	7 365	-
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	7 601	10 598	15 342	-	80 441	105 150	103 263
Slovenia	1 248	-	-	-	-	-	-	-	-
Spain	18 551	-	-	284 749	285 992	-	-	402 438	404 977
Sweden	27 980	-	-	323 872	301 215	-	-	516 517	501 400
Switzerland	1 252	-	-	-	-	-	-	-	-
Turkey	21 630	11 450	11 650	11 830	12 480	47 010	47 850	48 600	51 240
Ukraine	9 657	15 000	16 000	10 000	8 000	20 000	32 000	41 000	68 000
United Kingdom	3 155	-	-	48 010	-	-	-	82 553	-

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 12: Ind. 1.3B Diameter distribution in uneven-aged forest stands, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Forest: uneven-aged stands (1 000 m³ o.b.)							
		41-60 cm				>60 cm			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	9 400	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	-	-	-
Belarus	8 634	-	-	-	-	-	-	-	-
Belgium	689	-	14 291	15 527	14 575	-	6 998	9 290	9 221
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-
Croatia	1 922	34 588	34 319	36 883	62 757	20 516	19 409	19 923	25 663
Cyprus	173	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	-	-	-	-	-	-
Denmark	625	-	-	4 078	5 694	-	-	3 318	4 501
Estonia	2 421	2 766	9 460	10 948	12 187	162	1 082	1 285	1 476
Finland	22 409	-	-	-	-	-	-	-	-
France	16 836	-	-	-	-	-	-	-	-
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-
Hungary	2 061	4 188	9 522	15 254	18 608	308	696	681	983
Iceland	48	-	-	-	-	-	-	-	-
Ireland	755	-	-	2 636	3 936	-	-	2 264	3 444
Italy	9 297	59 614	91 331	123 048	-	23 127	30 710	38 293	-
Latvia	3 391	-	-	-	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	4 104	7 159	-	-	1 685	2 646
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	47 073	56 420	-	-	2 937	4 731
Poland	9 420	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	5 290	-	-	-	4 029	-
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	18 353	35 546	42 093	-	257	339	292
Slovenia	1 248	-	-	-	-	-	-	-	-
Spain	18 551	-	-	131 166	133 990	-	-	54 847	55 948
Sweden	27 980	-	-	98 875	116 019	-	-	11 299	14 810
Switzerland	1 252	-	-	-	-	-	-	-	-
Turkey	21 630	53 930	54 890	55 750	58 790	39 190	39 880	40 510	42 720
Ukraine	9 657	8 000	9 000	11 000	20 000	-	-	-	-
United Kingdom	3 155	-	-	57 800	-	-	-	46 635	-

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 13: Ind. 1.4 Carbon stock on forest and other wooded land, 2020 and in harvested wood products, 1990-2015

Country	Forest (1 000 ha)	Forest (million metric tonnes)					Other wooded land (million metric tonnes)					Harvested wood products			
		Biomass		Dead-wood	Litter	Soil	Biomass		Dead-wood	Litter	Soil	Total carbon stock in HWP (million metric tonnes)			
		Above-ground	Below-ground				Above-ground	Below-ground				1990	2000	2010	2015
Albania	785	-	-	-	-	67.9	-	-	-	-	23.2	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 899	321.2	80.0	6.9	-	-	1.5	0.5	0.0	-	-	46.8	53.1	62.5	64.8
Belarus	8 768	676.0	102.6	3.5	92.9	895.3	-	-	-	-	-	-	-	-	-
Belgium	689	62.0	12.9	2.6	5.6	60.2	-	-	-	-	-	-	-	-	0.9
Bosnia and Herzegovina	2 188	95.1	22.8	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	84.8	20.2	-	-	-	-	-	-	-	-	-	-	-	-
Croatia	1 939	158.6	37.6	-	-	-	9.0	4.1	-	-	-	-	-	-	-
Cyprus	173	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	2 677	205.2	51.7	20.8	12.9	166.7	-	-	-	-	-	35.3	36.9	41.4	42.4
Denmark	628	33.6	7.3	0.6	7.0	108.0	0.1	0.0	0.0	0.3	7.7	5.2	5.1	4.8	5.0
Estonia	2 438	132.8	31.3	4.6	-	380.3	1.1	0.3	0.0	-	14.7	5.7	6.2	8.2	9.3
Finland	22 409	669.7	193.9	16.3	246.4	3 647.8	2.2	0.7	0.6	9.9	434.8	71.8	84.7	94.0	97.2
France	17 253	1 110.0	316.0	139.0	-	-	-	-	-	-	-	-	-	-	-
Georgia	2 822	168.4	43.9	-	53.6	191.1	-	-	-	-	-	-	-	-	-
Germany	11 419	1 057.1	164.9	26.4	212.7	771.2	-	-	-	-	-	279.4	279.4	279.4	283.2
Greece	3 903	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	102.7	25.7	6.6	-	-	-	-	-	-	-	10.1	10.0	10.0	9.9
Iceland	51	0.6	0.2	-	0.3	4.4	1.1	0.3	-	0.9	12.7	-	-	-	-
Ireland	782	43.7	9.4	15.3	10.1	254.3	-	-	-	-	-	1.7	3.7	6.4	7.4
Italy	9 566	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Latvia	3 411	218.5	69.9	17.4	41.4	574.8	0.8	0.4	-	2.4	6.8	12.4	14.9	20.0	22.6
Liechtenstein	7	0.8	0.1	-	-	-	0.0	0.0	-	-	-	-	-	-	-
Lithuania	2 201	146.7	34.1	10.9	51.1	158.5	0.6	0.1	0.0	1.5	4.5	7.1	8.8	12.1	14.0
Luxembourg	89	7.5	1.5	-	-	-	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	48.4	8.0	4.2	-	-	0.2	0.0	0.0	-	-	-	-	-	-
Netherlands	370	27.6	5.5	2.2	12.3	35.5	-	-	-	-	-	2.5	2.3	2.1	2.0
North Macedonia	1 001	47.9	12.5	0.4	-	-	-	-	-	-	-	-	-	-	-
Norway	12 180	390.7	104.0	-	-	-	2.7	0.9	-	-	-	27.3	29.3	29.9	29.5
Poland	9 483	738.0	148.0	37.0	-	-	-	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.2
Republic of Moldova	387	18.0	6.7	0.7	0.9	24.7	3.5	1.3	0.1	0.2	4.6	-	-	-	-
Romania	6 929	675.7	136.8	64.0	156.0	629.2	1.5	0.3	0.1	0.4	1.4	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	1 926	162.5	32.5	16.8	22.6	270.5	-	-	-	-	-	13.6	15.4	20.9	22.5
Slovenia	1 238	111.2	25.4	7.7	12.9	127.9	0.3	0.1	0.1	0.1	2.8	-	-	-	-
Spain	18 572	507.4	206.5	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	27 980	1 021.6	342.6	114.7	664.2	1 353.8	5.7	2.1	1.5	-	-	122.7	122.7	146.9	155.8
Switzerland	1 269	122.5	32.4	11.2	21.2	159.7	0.3	0.1	0.0	1.3	9.4	14.6	16.0	17.5	17.9
Turkey	22 220	570.0	143.8	5.1	116.7	1 119.5	0.6	0.2	0.0	0.1	1.2	11.9	18.3	24.6	27.8
Ukraine	9 690	673.0	150.0	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	3 190	184.0	66.0	41.0	52.0	753.0	-	-	-	-	-	65.0	80.0	101.0	109.0

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 14: Ind. 1.4 Carbon stock in forest, 1990-2020

Country	Forest (1 000 ha)	Forest (million metric tonnes)														
		Biomass					Deadwood					Soil and litter				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	49.2	49.3	48.8	48.8	-	-	-	-	-	-	80.9	78.8	79.6	79.6	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 899	334.8	368.5	385.4	393.3	401.2	3.0	4.0	5.8	6.5	6.9	463.0	-	585.0	-	-
Belarus	8 768	385.9	536.9	666.2	719.2	778.6	3.1	3.3	3.4	3.4	3.5	777.2	870.3	938.1	978.2	1 031.0
Belgium	689	48.3	59.7	68.4	71.7	74.9	1.4	1.4	1.8	2.2	2.6	60.1	62.5	67.3	65.9	64.5
Bosnia and Herzegovina	2 188	95.9	117.9	117.9	117.9	117.9	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	64.0	81.7	91.8	94.2	105.0	-	-	-	-	-	-	-	-	-	-
Croatia	1 939	183.5	185.9	188.2	190.2	196.2	-	-	-	-	-	-	-	-	-	-
Cyprus	173	2.6	2.7	3.4	3.8	-	-	-	-	-	-	3.6	3.9	3.9	3.9	-
Czech Republic	2 677	198.5	224.6	243.9	249.0	256.9	19.6	19.6	19.7	19.7	20.8	175.5	176.7	178.4	179.2	188.4
Denmark	628	30.7	33.0	36.0	40.6	40.8	0.4	0.4	0.5	0.6	0.6	97.4	105.3	112.8	114.3	115.0
Estonia	2 438	130.6	141.0	151.4	163.3	164.1	2.5	2.6	4.0	4.6	4.6	344.1	349.2	364.4	377.6	380.3
Finland	22 409	633.0	715.5	780.1	863.6	863.6	15.1	15.1	16.3	16.3	16.3	3 873.2	3 917.6	3 947.5	3 894.1	3 894.1
France	17 253	965.0	1 049.0	1 247.0	1 337.0	1 426.0	-	-	130.0	134.0	139.0	-	-	-	-	-
Georgia	2 822	-	202.7	212.3	212.3	212.3	-	-	-	-	-	-	244.7	244.7	244.7	244.7
Germany	11 419	871.4	1 038.3	1 115.3	1 168.6	1 222.0	17.1	25.8	31.8	29.1	26.4	838.9	888.1	937.7	961.2	983.9
Greece	3 903	67.0	73.0	79.0	79.0	-	-	-	-	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	96.5	107.4	117.2	123.1	128.3	4.5	5.2	5.9	6.3	6.6	-	-	-	-	-
Iceland	51	0.2	0.3	0.4	0.6	0.8	-	-	-	-	-	1.5	2.7	4.1	4.4	4.7
Ireland	782	24.6	34.4	43.2	47.7	53.0	13.8	13.6	14.1	14.5	15.3	168.0	221.2	246.0	254.2	264.4
Italy	9 566	400.0	496.0	593.0	641.0	-	18.0	23.0	27.0	29.0	-	644.0	711.0	767.0	790.0	-
Latvia	3 411	189.6	230.4	274.5	281.5	288.4	5.1	5.4	19.1	21.1	17.4	615.1	613.0	610.0	611.5	616.2
Liechtenstein	7	1.0	1.0	0.9	0.9	0.9	-	0.0	0.0	0.0	-	-	0.6	0.6	0.6	-
Lithuania	2 201	134.1	145.6	158.7	173.5	180.8	9.8	10.2	10.9	10.8	10.9	186.7	193.9	208.3	208.3	209.6
Luxembourg	89	5.4	6.9	8.3	8.7	9.0	-	-	0.4	-	-	9.0	9.1	9.1	9.1	-
Malta	0	0.1	0.1	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	33.4	56.4	56.4	56.4	-	2.4	4.2	4.2	4.2	-	-	-	-	-
Netherlands	370	20.5	24.0	28.9	31.6	33.1	0.5	0.6	1.7	1.9	2.2	46.0	48.0	49.5	47.2	47.8
North Macedonia	1 001	60.1	62.1	60.4	60.4	60.4	-	0.1	0.4	0.4	0.4	-	-	-	-	-
Norway	12 180	329.9	374.1	439.7	467.2	494.7	-	61.0	-	-	-	1 850.0	-	-	-	-
Poland	9 483	467.0	546.0	767.0	826.0	886.0	-	-	32.0	37.0	37.0	-	-	822.0	-	-
Portugal	3 312	-	-	84.1	85.6	-	-	-	2.2	2.3	-	-	-	-	-	-
Republic of Moldova	387	19.8	20.9	24.0	24.7	24.7	0.5	0.6	0.7	0.7	0.7	20.8	22.1	24.0	24.8	25.6
Romania	6 929	382.3	382.0	390.9	780.5	812.5	-	-	-	63.7	64.0	722.6	721.8	738.9	782.1	785.2
Russian Federation	809 090	32 504	32 157	32 500	32 500	-	7 317	7 228	7 400	7 400	-	87 600	87 500	87 600	87 600	-
Serbia	2 720	122.0	138.2	235.1	236.9	-	17.1	19.4	33.1	33.4	-	258.7	273.1	301.1	301.9	-
Slovakia	1 926	134.2	160.1	183.1	193.5	195.0	12.2	14.4	16.2	16.7	16.8	287.2	290.0	292.9	293.0	293.1
Slovenia	1 238	88.4	107.2	132.2	136.0	136.7	7.2	8.8	5.6	6.8	7.7	123.7	128.4	129.8	141.9	140.7
Spain	18 572	-	-	683.1	694.4	713.9	-	-	-	20.0	-	-	-	-	55.4	-
Sweden	27 980	1 128.1	1 128.1	1 246.5	1 305.3	1 364.1	74.4	74.4	94.5	104.6	114.7	1 825.4	1 825.4	1 903.3	1 960.7	2 018.1
Switzerland	1 269	-	140.8	148.0	151.5	154.9	-	9.2	10.2	10.7	11.2	-	170.5	176.0	178.4	180.9
Turkey	22 220	429.9	476.1	593.3	674.7	713.7	3.2	3.4	4.2	4.8	5.1	977.3	1 050.7	1 104.1	1 187.3	1 236.1
Ukraine	9 690	499.0	662.0	758.0	792.0	823.0	3.5	4.5	27.0	-	-	280.9	288.1	290.0	-	-
United Kingdom	3 190	140.0	179.0	218.0	234.0	250.0	35.0	38.0	39.0	40.0	41.0	690.0	739.0	767.0	794.0	805.0

Sources: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 15: Ind. 2.2 National averages of forest soil condition parameters for 2015 LUCAS Soil

Country	Organic Carbon	pH ($CaCl_2$)	Total Nitrogen	Soluble Phosphorous	Extractable Potassium	CEC	C:N Ratio
	g kg^{-1}	pH($CaCl_2$)	g kg^{-1}	mg kg^{-1}	mg kg^{-1}	cmol(+) kg^{-1}	unitless
Denmark	32.4	4.4	2.3	41.3	84.1	17.7	14.2
Estonia	119.6	5.1	7.5	30.9	83.8	25.6	16.1
Finland	141.6	3.8	6.5	41.0	143.6	13.4	20.9
Lithuania	50.8	4.9	3.5	23.1	66.2	16.1	13.5
Latvia	128.0	4.8	7.5	29.0	95.9	30.8	16.2
Sweden	136.2	3.9	6.0	34.3	120.8	14.8	20.9
North Europe	133.8	4.0	6.3	36.0	123.9	15.7	20.2
Austria	67.1	4.7	4.5	25.5	131.3	20.3	14.4
Belgium	41.7	3.9	2.9	31.2	93.5	10.3	13.8
Germany	55.3	4.2	3.3	35.4	93.6	19.6	16.6
France	53.4	5.2	4.0	20.5	170.9	18.4	13.3
Ireland	200.8	4.2	11.4	63.7	175.7	25.2	15.3
Luxembourg	32.1	4.1	2.3	23.8	76.3	7.3	14.0
Netherlands	96.6	4.5	6.4	65.6	133.8	22.5	15.1
United Kingdom	138.0	4.0	7.5	56.8	187.6	17.7	16.3
Central-West Europe	61.8	4.7	4.1	28.7	137.3	19.2	14.8
Czech Republic	57.7	3.9	3.6	35.1	85.3	18.3	15.2
Hungary	21.4	6.0	2.1	24.2	128.7	25.6	10.0
Poland	48.6	4.2	2.9	42.2	63.2	18.6	15.4
Romania	35.0	4.8	2.9	16.2	155.1	19.1	11.3
Slovakia	47.8	5.1	3.6	22.7	181.2	17.0	12.3
Central-East Europe	42.6	4.5	2.9	31.0	106.3	18.9	13.6
Spain	43.6	5.6	3.1	10.7	169.7	17.1	14.5
Italy	44.1	5.8	3.5	14.0	232.2	20.8	13.9
Malta	-	-	-	-	-	-	-
Portugal	33.2	4.5	2.1	13.2	80.1	5.3	15.8
South-West Europe	43.4	5.6	3.2	12.2	188.6	17.9	14.3
Bulgaria	25.1	5.3	2.1	10.5	179.7	13.2	12.4
Cyprus	5.7	7.4	0.5	4.9	531.0	40.3	11.4
Greece	28.3	6.3	2.2	7.9	195.0	21.2	13.8
Croatia	41.8	5.5	3.3	8.9	127.7	22.9	12.2
Slovenia	56.8	5.2	3.9	12.8	102.2	25.4	14.3
South-East Europe	34.9	5.7	2.6	9.8	164.5	20.0	13.3
EU-28	82.4	4.6	4.5	28.4	137.7	17.4	16.5

Notes: The table contains the national averages and averages aggregated to regions from sample data with LUCAS coverage. For Malta none of the LUCAS Soil sample locations is on forest land.
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European Commission Joint Research Centre
Sustainable Resources - Land Resources
Eurostat LUCAS primary data: https://ec.europa.eu/eurostat/web/lucas/data/primary-data/2015

Table 16: Ind. 2.2 Average changes in forest soil condition parameters between LUCAS Soil Data 2009/2012 and 2015

Country	Organic Carbon	pH ($CaCl_2$)	Total Nitrogen	Soluble Phosphorus	Extractable Potassium	CEC	C:N Ratio
	g kg^{-1}	pH($CaCl_2$)	g kg^{-1}	mg kg^{-1}	mg kg^{-1}	cmol(+) kg^{-1}	-
Denmark	7.1	0.2	0.8	24.0	-15.0	12.0	-1.3
Estonia	3.0	0.1	0.9	12.5	-25.8	-8.4	-1.2
Finland	-12.8	0.0	0.2	12.9	16.8	0.2	-3.3
Lithuania	7.6	0.0	1.0	11.9	-3.6	-5.5	-1.0
Latvia	-1.5	0.1	0.3	7.1	-7.0	6.8	-1.7
Sweden	1.7	0.1	0.8	13.4	-2.5	-0.3	-4.2
North Europe	-3.1	0.1	0.6	12.8	2.4	-0.2	-3.4
Austria	23.3	0.2	1.9	19.6	30.5	6.0	-1.7
Belgium	-5.2	-0.1	0.1	1.4	-24.9	0.8	-0.9
Germany	14.3	0.1	1.0	16.1	17.7	9.6	-1.8
France	7.7	-0.1	0.9	6.1	1.2	2.9	-1.8
Ireland	-62.2	-0.2	-2.6	87.2	213.6	1.3	-0.9
Luxembourg	6.5	-0.6	0.6	-4.5	-4.5	-0.1	-1.6
Netherlands	4.6	-0.0	0.5	19.3	-28.2	13.0	-1.0
United Kingdom	-12.0	0.2	0.3	2.1	-6.7	1.0	-2.6
Central-West Europe	10.4	0.1	1.0	11.9	10.6	6.0	-1.8
Czech Republic	-3.6	0.0	0.3	10.9	-19.7	7.0	-3.6
Hungary	2.6	0.2	0.5	5.1	11.6	14.9	-1.4
Poland	-2.2	0.1	0.1	9.2	-5.7	11.7	-2.3
Romania	0.9	-0.0	0.0	4.2	-14.1	-1.4	0.1
Slovakia	7.7	0.3	0.9	11.0	31.4	-1.6	-1.3
Central-East Europe	-0.3	0.1	0.2	8.4	-4.9	6.5	-1.6
Spain	5.0	0.1	0.8	7.1	10.2	4.3	-1.9
Italy	-4.3	-0.1	0.1	2.5	-55.6	0.7	-0.8
Malta	-	-	-	-	-	-	-
Portugal	0.1	-0.2	0.4	7.0	-23.8	-0.7	-2.8
South-West Europe	0.5	-0.0	0.4	5.1	-22.0	2.2	-1.5
Bulgaria	6.3	-0.2	0.5	3.9	-42.4	-9.5	-0.5
Cyprus	-	-	-	-	-	-	-
Greece	-7.7	0.4	0.0	-0.9	-49.1	-4.3	-3.6
Croatia	-	-	-	-	-	-	-
Slovenia	-7.3	0.2	-0.1	3.6	-5.3	0.4	-0.9
South-East Europe	-1.7	0.0	0.2	2.7	-30.7	-4.8	-1.3
EU-28	1.3	0.1	0.6	10.6	-0.6	2.5	-2.4

Note: Average changes in regional values were calculated from repeatedly sampled data.
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Eurostat LUCAS primary data: https://ec.europa.eu/eurostat/web/lucas/data/primary-data/2015

Table 17: Ind. 2.4 Area of forest and other wooded land with damage, by damaging agents, 2015

Country	Forest (1 000 ha)	Total area of forest with damage (1 000 ha)	Forest (1 000 ha)							
			Biotic agents		Abiotic agents	Human induced		Primarily damaged by fire		Unspecified/ Mixed damage
			Insects & disease	Wildlife & grazing	Storm, wind, snow, etc.	Forest operations	Other	Total	Of which human induced	
Albania	785	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	-	-	-	-
Belarus	8 634	197.34	176.75	0.00	6.45	0.00	0.00	13.89	13.89	0.25
Belgium	689	44.10	13.90	27.10	1.30	1.80	-	0.00	-	0.00
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	9.47	-	-
Bulgaria	3 833	146.65	35.92	0.00	105.72	0.00	0.00	4.30	3.36	0.71
Croatia	1 922	82.43	25.58	5.52	49.56	-	-	1.77	0.05	-
Cyprus	173	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	37.79	20.69	1.70	15.06	-	-	0.34	-	-
Denmark	625	34.23	11.43	9.74	11.26	0.40	0.00	0.00	0.00	1.39
Estonia	2 421	10.07	1.86	3.86	2.71	0.01	0.14	0.08	-	1.41
Finland	22 409	29.00	2.00	2.00	6.00	0.00	0.00	0.00	0.00	19.00
France	16 836	-	7.84	-	5.61	0.05	0.00	25.00	-	1.75
Georgia	2 822	26.83	26.40	-	0.22	-	-	0.21	-	-
Germany	11 419	-	111.20	10.30	15.46	-	-	0.53	0.39	16.16
Greece	3 903	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-
Hungary	2 061	60.62	8.03	14.60	34.81	0.42	-	1.60	1.60	1.97
Iceland	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ireland	755	55.26	1.80	34.07	8.41	10.81	-	0.18	-	-
Italy	9 297	-	-	-	-	-	-	21.79	21.79	-
Latvia	3 391	1.24	0.26	0.06	0.87	0.00	0.00	0.01	-	0.04
Liechtenstein	7	-	1.06	-	-	-	-	-	-	-
Lithuania	2 187	10.00	5.00	2.00	3.00	0.00	0.00	0.07	-	-
Luxembourg	89	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-
Montenegro	827	-	0.42	-	0.05	4.90	0.52	30.53	-	-
Netherlands	365	-	9.56	-	-	-	-	0.02	-	-
North Macedonia	994	-	-	-	-	-	-	3.17	-	-
Norway	12 141	-	-	-	-	-	-	-	-	-
Poland	9 420	365.00	42.00	64.00	17.00	29.00	2.00	1.00	0.00	210.00
Portugal	3 312	-	436.00	-	-	-	-	-	-	-
Republic of Moldova	386	75.54	75.19	-	-	-	-	0.35	-	-
Romania	6 901	238.96	37.68	-	199.61	-	-	1.67	0.30	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-
Slovakia	1 922	15.39	4.37	0.94	9.58	-	0.15	0.35	0.24	0.00
Slovenia	1 248	4.93	2.00	0.01	2.44	0.08	0.00	0.17	-	0.23
Spain	18 551	-	-	-	-	-	-	32.88	23.87	-
Sweden	27 980	2631.73	589.26	772.53	947.11	137.02	2.38	0.35	-	183.08
Switzerland	1 252	-	1.20	0.00	4.80	0.00	0.00	0.02	-	-
Turkey	21 630	338.60	28.51	-	306.87	-	-	3.22	3.06	0.00
Ukraine	9 657	27.77	8.44	-	8.35	-	2.42	8.56	-	-
United Kingdom	3 155	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 17: Ind. 2.4 Area of forest and other wooded land with damage, by damaging agents, 2015 *(Cont.)*

Country	Forest (1 000 ha)	Total area of OWL with damage (1 000 ha)	Forest (1 000 ha)							
			Biotic agents		Abiotic agents	Human induced		Primarily damaged by fire		Unspecified/ Mixed damage
			Insects & disease	Wildlife & grazing	Storm, wind, snow, etc.	Forest operations	Other	Total	Of which human induced	
Albania	785	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	-	-	-	-
Belarus	8 634	-	-	-	-	-	-	-	-	-
Belgium	689	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-	-
Croatia	1 922	4.79	-	-	-	-	-	4.79	0.01	-
Cyprus	173	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	-	-	-	-	-	-	-
Denmark	625	0.27	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00
Estonia	2 421	-	-	-	-	-	-	-	-	-
Finland	22 409	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
France	16 836	-	-	-	-	-	-	13.00	-	-
Georgia	2 822	-	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-
Hungary	2 061	-	-	-	-	-	-	0.63	0.63	-
Iceland	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ireland	755	-	-	-	-	-	-	-	-	-
Italy	9 297	-	-	-	-	-	-	4.07	4.07	-
Latvia	3 391	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Liechtenstein	7	-	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	9.69	-	-
Netherlands	365	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
North Macedonia	994	-	-	-	-	-	-	-	-	-
Norway	12 141	-	-	-	-	-	-	-	-	-
Poland	9 420	-	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	0.00	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-
Slovakia	1 922	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00
Slovenia	1 248	-	-	-	-	-	-	-	-	-
Spain	18 551	-	-	-	-	-	-	76.91	64.31	-
Sweden	27 980	-	-	-	-	-	-	-	-	-
Switzerland	1 252	-	0.00	0.00	0.00	0.00	0.00	-	-	-
Turkey	21 630	11.14	0.94	-	10.10	-	-	0.11	0.10	0.00
Ukraine	9 657	-	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 18: Ind. 2.4 Damaged forest area by selected agents, 1990-2015

Country	Forest (1 000 ha)	Forest (1 000 ha)											
		Insects & disease				Wildlife & grazing				Storm, wind, snow, etc.			
	2015	1990	2000	2010	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	0.00	0.00	-	222.90	141.00	262.00	-	-	0.00	0.00	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	-	-	-	-	-	-	-
Belarus	8 634	-	244.00	169.00	176.75	-	0.00	0.00	0.00	-	1.00	12.00	6.45
Belgium	689	-	45.10	17.10	13.90	-	40.30	26.33	27.10	-	2.60	2.00	1.30
Bosnia and Herzegovina	2 161	3.75	11.19	-	-	-	-	-	-	1.12	1.13	-	-
Bulgaria	3 833	163.00	167.78	103.35	35.92	0.40	0.00	0.20	0.00	8.60	5.71	3.78	105.72
Croatia	1 922	-	22.44	88.23	25.58	-	19.79	0.70	5.52	-	25.40	54.90	49.56
Cyprus	173	-	-	1.23	-	-	-	3.90	-	0.00	0.00	0.00	-
Czech Republic	2 668	27.00	12.76	21.00	20.69	-	1.73	1.32	1.70	23.10	10.85	15.62	15.06
Denmark	625	-	-	8.53	11.43	-	-	6.76	9.74	-	20.00	14.53	11.26
Estonia	2 421	6.08	3.51	3.11	1.86	33.13	8.67	0.87	3.86	-	3.85	8.00	2.71
Finland	22 409	-	-	9.00	2.00	-	-	14.00	2.00	-	-	18.00	6.00
France	16 836	-	-	26.00	7.84	-	-	-	-	-	-	408.00	5.61
Georgia	2 822	-	-	26.27	26.40	-	-	-	-	-	-	-	0.22
Germany	11 419	-	120.97	143.86	111.20	-	33.83	12.91	10.30	-	3.69	4.91	15.46
Greece	3 903	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0.0	-	-	-	-	0.0	0.0	0.0	-	-	-	-	-
Hungary	2 061	84.74	74.93	66.07	8.03	28.18	19.88	19.66	14.60	33.56	37.07	38.11	34.81
Iceland	48	0.00	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ireland	755	-	-	0.08	1.80	-	-	24.88	34.07	-	-	8.01	8.41
Italy	9 297	-	-	-	-	-	-	-	-	-	-	-	-
Latvia	3 391	0.33	0.55	0.65	0.26	0.24	0.22	0.06	0.06	0.36	1.10	4.11	0.87
Liechtenstein	7	0.10	1.06	1.06	1.06	-	1.70	1.60	-	0.01	0.01	0.01	-
Lithuania	2 187	19.00	59.00	29.00	5.00	25.30	18.00	8.00	2.00	37.10	97.00	22.00	3.00
Luxembourg	89	-	-	-	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	0.42	-	-	-	-	-	-	-	0.05
Netherlands	365	-	-	-	9.56	-	-	-	-	-	-	-	-
North Macedonia	994	27.20	58.30	3.51	-	-	-	-	-	-	-	1.74	-
Norway	12 141	-	-	-	-	-	-	-	-	-	-	-	-
Poland	9 420	-	-	70.00	42.00	-	-	46.00	64.00	-	-	10.00	17.00
Portugal	3 312	452.80	259.80	290.00	436.00	26.90	15.40	-	-	36.50	20.90	-	-
Republic of Moldova	386	-	86.00	24.60	75.19	-	-	-	-	-	50.10	-	-
Romania	6 901	1 833.00	1 291.00	78.00	37.68	26.00	13.00	577.00	-	151.50	136.50	1.40	199.61
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	1.00	85.00	20.00	-	1.00	0.00	-	-	0.00	0.00	0.00	-
Slovakia	1 922	25.60	8.14	14.57	4.37	1.30	0.80	0.20	0.94	4.80	6.14	5.49	9.58
Slovenia	1 248	-	0.46	0.60	2.00	-	0.02	0.01	0.01	-	0.49	0.45	2.44
Spain	18 551	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	27 980	-	-	425.99	589.26	-	-	960.44	772.53	-	-	486.38	947.11
Switzerland	1 252	-	1.40	1.35	1.20	-	0.00	0.00	0.00	-	3.40	3.83	4.80
Turkey	21 630	55.64	57.68	167.19	28.51	-	-	-	-	56.68	64.84	126.58	306.87
Ukraine	9 657	0.40	1.67	6.93	8.44	-	-	-	-	2.00	6.42	10.11	8.35
United Kingdom	3 155	-	-	-	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 18: Ind. 2.4 Damaged forest area by selected agents, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Forest (1 000 ha)											
		Forest operations				Human induced: Other				Fires: Total			
	2015	1990	2000	2010	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	0.00	0.00	-	-	-	-	-	-	3.70	1.10	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	-	-	-	-	-	-	-
Belarus	8 634	-	19.00	30.00	0.0	-	0.00	0.00	0.00	-	6.00	0.00	13.89
Belgium	689	-	6.60	1.33	1.80	-	0.00	0.00	0.00	0.02	0.01	0.02	0.00
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	1.12	12.50	2.50	9.47
Bulgaria	3 833	0.00	0.00	0.00	0.00	0.10	0.00	0.70	0.00	1.01	37.40	6.50	4.30
Croatia	1 922	-	-	-	-	-	-	-	-	0.27	17.17	0.34	1.77
Cyprus	173	-	-	0.00	-	0.00	0.00	0.00	-	0.01	2.14	0.28	-
Czech Republic	2 668	-	-	-	-	-	-	-	-	0.70	0.38	0.21	0.34
Denmark	625	-	-	2.10	0.40	-	-	0.00	0.00	-	-	0.00	0.00
Estonia	2 421	-	0.01	0.01	0.01	-	0.10	0.16	0.14	0.19	0.68	0.02	0.08
Finland	22 409	-	-	0.00	0.00	-	-	1.00	0.00	-	-	0.40	0.00
France	16 836	-	-	-	0.05	-	-	-	0.00	-	-	39.00	25.00
Georgia	2 822	-	-	-	-	-	-	-	-	-	0.09	0.37	0.21
Germany	11 419	-	-	-	-	-	-	-	-	1.00	0.58	0.52	0.53
Greece	3 903	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0.0	-	-	-	-	-	-	-	-	0.00	0.00	0.00	-
Hungary	2 061	-	-	-	0.42	-	-	-	-	-	0.81	0.24	1.60
Iceland	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ireland	755	-	-	-	10.81	-	-	-	-	0.39	0.32	1.48	0.18
Italy	9 297	-	-	-	-	-	-	-	-	82.00	48.91	16.35	21.79
Latvia	3 391	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.12	0.03	0.01
Liechtenstein	7	-	-	-	-	-	-	-	-	0.00	0.00	0.00	-
Lithuania	2 187	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.33	0.02	0.07
Luxembourg	89	-	-	-	-	-	-	-	-	0.00	0.00	0.00	-
Malta	0	-	-	-	-	-	-	-	-	0.00	0.01	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	4.90	-	-	-	0.52	-	-	-	30.53
Netherlands	365	-	-	-	-	-	-	-	-	0.04	0.02	0.00	0.02
North Macedonia	994	-	-	-	-	-	-	-	-	5.76	37.92	3.28	3.17
Norway	12 141	-	-	-	-	-	-	-	-	-	-	-	-
Poland	9 420	-	-	7.00	29.00	-	-	1.00	2.00	-	-	6.00	1.00
Portugal	3 312	-	-	-	-	-	-	-	-	80.00	69.00	46.00	-
Republic of Moldova	386	-	-	-	-	-	-	-	-	0.04	0.03	0.05	0.35
Romania	6 901	-	-	215.00	-	-	-	2.00	-	0.44	3.61	0.21	1.67
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	0.30	1.80	0.70	-
Slovakia	1 922	-	-	-	-	5.10	0.77	0.21	0.15	0.50	0.90	0.19	0.35
Slovenia	1 248	-	0.11	0.08	0.08	-	0.11	0.00	0.00	0.37	0.30	0.20	0.17
Spain	18 551	-	-	-	-	-	-	-	-	73.20	46.14	10.18	32.88
Sweden	27 980	-	-	108.26	137.02	-	-	4.26	2.38	-	1.11	0.29	0.35
Switzerland	1 252	-	0.00	0.00	0.00	-	-	-	-	-	0.04	0.03	0.02
Turkey	21 630	-	-	-	-	-	-	-	-	13.74	26.35	3.22	3.22
Ukraine	9 657	0.00	0.00	0.00	-	0.30	0.12	0.69	2.42	2.40	0.70	3.13	8.56
United Kingdom	3 155	-	-	-	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 18: Ind. 2.4 Damaged forest area by selected agents, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Forest (1 000 ha)							
		Fires: Human induced				Unspecified / Mixed damage			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	-	-	-
Belarus	8 634	-	6.00	0.00	13.89	-	0.00	0.00	0.25
Belgium	689	-	-	-	-	0.00	0.00	0.00	0.00
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	5.60	3.36	0.11	38.09	3.07	0.71
Croatia	1 922	-	-	0.21	0.05	-	-	-	-
Cyprus	173	0.01	2.14	0.28	-	0.00	0.00	0.00	-
Czech Republic	2 668	-	-	-	-	-	-	-	-
Denmark	625	-	-	0.00	0.00	-	-	0.53	1.39
Estonia	2 421	-	-	-	-	-	0.35	1.52	1.41
Finland	22 409	-	-	0.40	0.00	-	-	11.00	19.00
France	16 836	-	-	-	-	-	-	-	1.75
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	0.21	0.16	0.09	0.39	0.00	0.00	0.00	16.16
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0.0	0.00	0.00	0.00	-	0.00	0.00	0.00	-
Hungary	2 061	-	-	-	1.60	3.03	6.19	6.15	1.97
Iceland	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ireland	755	-	-	-	-	-	-	-	-
Italy	9 297	82.00	48.91	16.35	21.79	-	-	-	-
Latvia	3 391	-	-	-	-	0.01	0.00	0.02	0.04
Liechtenstein	7	0.00	0.00	0.00	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	0.00	0.00	0.00	-	-	-	-	-
Malta	0	0.00	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	-	-	-	-	-	-
Poland	9 420	-	-	-	0.00	-	-	66.00	210.00
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	0.30	-	-	6.00	-
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	0.40	0.15	0.24	-	0.00	0.00	0.00
Slovenia	1 248	-	-	-	-	-	-	0.12	0.23
Spain	18 551	57.94	37.61	8.92	23.87	-	-	-	-
Sweden	27 980	-	-	-	-	-	-	242.06	183.08
Switzerland	1 252	-	-	-	-	-	-	-	-
Turkey	21 630	11.68	21.87	2.70	3.06	0.00	0.00	0.00	0.00
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 19: Ind. 3.1 Increment in forest available for wood supply, 1990-2015

Country	Forest (1 000 ha)	Net annual increment (over bark)							
		1 000 m³				m³/ha FAWS			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	835	875	224	-	1.2	1.4	0.4	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	25 370	29 297	27 024	27 024	7.7	8.8	8.1	8.1
Belarus	8 634	19 970	22 980	25 670	26 765	3.4	3.6	4.0	4.1
Belgium	689	4 878	4 583	4 610	5 291	7.2	6.9	6.9	7.9
Bosnia and Herzegovina	2 161	5 480	5 480	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-
Croatia	1 922	7 502	8 062	8 144	8 863	4.3	4.6	4.7	5.1
Cyprus	173	47	42	47	-	1.1	1.0	1.1	-
Czech Republic	2 668	17 146	19 268	21 047	21 696	6.7	7.5	9.1	9.4
Denmark	625	3 652	3 798	6 369	6 608	6.9	6.7	11.0	10.7
Estonia	2 421	10 530	11 097	11 428	12 326	5.1	5.4	5.5	5.8
Finland	22 409	73 640	79 831	94 586	96 200	3.6	3.9	4.9	4.9
France	16 836	-	-	82 356	81 375	-	-	5.3	5.1
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	118 761	118 590	104 160	-	11.1	11.5	10.3
Greece	3 903	3 813	-	-	-	1.3	-	-	-
Holy See	-	-	-	-	-	-	-	-	-
Hungary	2 061	9 540	8 594	10 551	10 869	5.5	4.7	5.5	5.7
Iceland	48	5	11	27	42	0.8	0.8	1.1	1.6
Ireland	755	-	-	6 713	7 291	-	-	11.1	12.4
Italy	9 297	27 779	30 162	32 543	-	4.1	4.1	4.1	-
Latvia	3 391	-	-	-	-	-	-	-	-
Liechtenstein	7	25	25	25	-	6.9	6.3	6.3	-
Lithuania	2 187	-	-	11 030	13 580	-	-	6.0	7.1
Luxembourg	89	650	650	760	760	7.6	7.5	8.8	8.8
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	1 115	2 020	2 020	-	2.0	2.8	2.8
Netherlands	365	1 763	1 782	2 190	2 156	6.4	6.2	7.3	7.3
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	23 657	26 718	25 645	25 548	2.8	3.2	3.1	3.1
Poland	9 420	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	1 130	1 327	1 462	-	4.6	4.9	5.0	-
Romania	6 901	31 874	28 591	29 260	41 383	5.7	5.7	5.7	8.9
Russian Federation	809 090	832 700	841 050	852 927	-	1.2	1.2	1.3	-
Serbia	2 720	5 643	5 232	-	-	-	-	-	-
Slovakia	1 922	10 248	12 097	12 576	12 681	5.8	6.8	7.1	7.1
Slovenia	1 248	6 024	7 339	9 165	8 565	5.4	6.3	7.8	7.5
Spain	18 551	28 701	32 090	35 479	-	-	-	2.1	-
Sweden	27 980	-	-	95 864	94 843	-	-	4.8	4.8
Switzerland	1 252	-	8 069	9 529	10 269	-	7.0	8.0	8.5
Turkey	21 630	27 310	32 492	37 799	38 072	3.6	4.2	4.8	4.6
Ukraine	9 657	17 124	23 880	21 400	20 730	4.1	4.0	4.2	4.0
United Kingdom	3 155	19 282	21 070	22 987	21 488	6.9	7.1	7.5	6.8

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 19: Ind. 3.1 Increment in forest available for wood supply, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Fellings								Fellings as percent of net annual increment (%)			
		1 000 m³				m³/ha FAWS							
	2015	1990	2000	2010	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	1 950	2 600	985	-	2.8	4.2	1.7	-	233.5	297.2	440.3	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 881	17 326	16 986	23 534	23 534	5.2	5.1	7.1	7.1	68.3	58.0	87.1	87.1
Belarus	8 634	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	689	4 352	3 524	3 885	5 221	6.5	5.3	5.8	7.8	89.2	76.9	84.3	98.7
Bosnia and Herzegovina	2 161	-	-	5 231	5 757	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-	-	-	-	-
Croatia	1 922	4 446	4 267	5 459	6 340	2.5	2.4	3.1	3.6	59.3	52.9	67.0	71.5
Cyprus	173	52	24	9	-	1.2	0.6	0.2	-	110.8	57.6	19.9	-
Czech Republic	2 668	12 536	15 858	17 482	18 247	4.9	6.2	7.6	7.9	73.1	82.3	83.1	84.1
Denmark	625	3 872	3 978	3 913	4 426	7.3	7.1	6.8	7.2	106.0	104.7	61.4	67.0
Estonia	2 421	3 770	10 989	7 665	10 221	1.8	5.4	3.7	4.8	35.8	99.0	67.1	82.9
Finland	22 409	50 500	64 753	64 749	77 348	2.5	3.2	3.3	3.9	68.6	81.1	68.5	80.4
France	16 836	-	-	42 177	48 805	-	-	2.7	3.0	-	-	51.2	60.0
Georgia	2 822	-	-	-	-	-	-	-	-	-	-	-	-
Germany	11 419	-	91 175	95 171	79 663	-	8.5	9.2	7.9	-	76.8	80.3	76.5
Greece	3 903	3 108	2 318	1 486	-	1.0	0.7	0.4	-	81.5	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	7 450	6 775	7 027	7 201	4.3	3.7	3.7	3.8	78.1	78.8	66.6	66.3
Iceland	48	-	0	3	5	-	0.0	0.14	0.2	-	3.4	12.6	12.8
Ireland	755	-	-	3 506	4 702	-	-	5.8	8.0	-	-	52.2	64.5
Italy	9 297	13 337	14 327	12 755	-	2.0	1.9	1.6	-	48.0	47.5	39.2	-
Latvia	3 391	-	-	-	-	-	-	-	-	-	-	-	-
Liechtenstein	7	18	20	24	-	5.1	5.1	6.1	-	73.6	81.9	97.6	-
Lithuania	2 187	-	-	8 640	9 550	-	-	4.7	5.0	-	-	78.3	70.3
Luxembourg	89	-	-	-	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	694	570	503	503	1.3	1.0	0.7	0.7	-	51.1	24.9	24.9
Netherlands	365	1 022	1 083	1 036	1 026	3.7	3.8	3.5	3.5	58.0	60.8	47.3	47.6
North Macedonia	994	-	1 148	871	849	-	1.4	1.1	1.1	-	-	-	-
Norway	12 141	15 270	13 376	14 026	15 261	1.8	1.6	1.7	1.8	64.5	50.1	54.7	59.7
Poland	9 420	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	359	359	-	-	1.3	1.2	-	-	27.0	24.6	-
Romania	6 901	17 226	14 088	17 600	18 164	3.1	2.8	3.4	3.9	54.0	49.3	60.2	43.9
Russian Federation	809 090	340 000	166 000	170 000	-	0.5	0.2	0.3	-	40.8	19.7	19.9	-
Serbia	2 720	-	2 600	5 800	-	-	-	-	-	-	49.7	-	-
Slovakia	1 922	5 833	6 629	10 234	10 000	3.3	3.8	5.8	5.6	56.9	54.8	81.4	78.9
Slovenia	1 248	2 099	2 547	3 401	5 251	1.9	2.2	2.9	4.6	34.8	34.7	37.1	61.3
Spain	18 551	17 741	16 873	19 706	-	-	-	1.2	-	61.8	52.6	55.5	-
Sweden	27 980	-	-	82 752	89 025	-	-	4.1	4.5	-	-	86.3	93.9
Switzerland	1 252	-	7 592	8 009	8 208	-	6.6	6.7	6.8	-	94.1	84.0	79.9
Turkey	21 630	16 448	12 880	16 424	21 241	2.2	1.7	2.1	2.6	60.2	39.6	43.5	55.8
Ukraine	9 657	-	8 352	12 827	-	-	1.4	2.5	-	-	35.0	59.9	-
United Kingdom	3 155	7 890	9 678	11 646	13 517	2.8	3.3	3.8	4.3	40.9	45.9	50.7	62.9

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 20: Ind. 3.2 Volume and value of total roundwood removals, 1990-2015

Country	Forest (1 000 ha)	Total roundwood							
		Volume (1 000 m³)				Volume (m³/ha FAWS)			
	2015	1990*	2000*	2010*	2015*	1990*	2000*	2010*	2015*
Albania	785	2 347	255	304	1 180	3.4	0.4	0.5	2.1
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	13 214	13 941	18 614	17 288	4.0	4.2	5.6	5.2
Belarus	8 634	9 704	11 399	15 895	20 283	1.6	1.8	2.5	3.1
Belgium	689	3 816	3 348	3 691	4 151	5.7	5.0	5.5	6.2
Bosnia and Herzegovina	2 161	40	4 117	3 741	4 270	-	-	-	-
Bulgaria	3 833	3 785	4 238	5 864	6 071	1.6	1.9	2.5	2.4
Croatia	1 922	-	-	4 876	5 445	-	-	2.8	3.1
Cyprus	173	-	-	-	11	-	-	-	0.3
Czech Republic	2 668	11 774	14 310	15 773	16 795	4.6	5.6	6.8	7.3
Denmark	625	1 949	2 099	2 621	3 753	3.7	3.7	4.5	6.1
Estonia	2 421	2 758	8 793	6 839	9 508	1.3	4.3	3.3	4.5
Finland	22 409	41 727	53 431	49 270	59 630	2.0	2.6	2.5	3.0
France	16 836	61 420	58 760	54 020	51 260	4.5	4.1	3.5	3.2
Georgia	2 822	351	389	667	603	0.6	0.7	1.1	1.0
Germany	11 419	48 575	42 452	53 268	53 772	4.6	4.0	5.2	5.3
Greece	3 903	2 590	1 932	1 239	1 471	0.9	0.6	0.3	0.4
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	5 510	4 856	5 709	5 778	3.2	2.6	3.0	3.0
Iceland	48	-	0	3	4	-	0.0	0.1	0.2
Ireland	755	1 626	2 525	2 561	3 018	-	-	4.2	5.1
Italy	9 297	8 495	9 125	8 016	6 234	1.3	1.2	1.0	0.8
Latvia	3 391	2 471	12 930	11 429	12 622	0.9	4.3	3.6	4.0
Liechtenstein	7	12	18	26	14	3.3	4.5	6.6	3.5
Lithuania	2 187	3 160	5 424	6 415	6 872	1.9	3.1	3.5	3.6
Luxembourg	89	-	261	285	356	-	3.0	3.3	4.1
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	417	1 058	-	-	0.6	1.5
Netherlands	365	1 286	962	1 030	2 194	4.7	3.3	3.4	7.4
North Macedonia	994	-	806	644	772	-	1.0	0.8	1.0
Norway	12 141	12 061	10 302	10 888	11 853	1.4	1.2	1.3	1.4
Poland	9 420	22 448	27 495	36 747	41 875	2.7	3.3	4.5	5.1
Portugal	3 312	10 367	9 209	10 211	12 024	4.6	4.2	4.8	5.5
Republic of Moldova	386	-	326	352	1 352	-	1.2	1.2	4.3
Romania	6 901	14 221	13 016	13 956	15 131	2.5	2.6	2.7	3.3
Russian Federation	809 090	227 900	176 196	175 956	204 192	0.3	0.3	0.3	0.3
Serbia	2 720	-	-	5 416	7 708	-	-	-	-
Slovakia	1 922	4 584	5 809	9 074	8 971	2.6	3.3	5.1	5.0
Slovenia	1 248	2 285	2 199	3 119	4 692	2.1	1.9	2.7	4.1
Spain	18 551	15 471	14 995	15 610	16 639	-	-	0.9	1.0
Sweden	27 980	53 580	62 500	69 700	72 840	2.3	3.0	3.5	3.7
Switzerland	1 252	5 654	6 752	5 880	4 669	5.0	5.8	4.9	3.9
Turkey	21 630	19 139	15 159	19 743	20 652	2.5	2.0	2.5	2.5
Ukraine	9 657	-	11 394	16 221	18 829	-	1.9	3.2	3.6
United Kingdom	3 155	6 343	7 766	9 350	10 853	2.3	2.6	3.1	3.4

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

**Data for reference years were used as follows:*
1990 - average over period 1988-1992
2000 - average over period 1998-2002
2005 - average over period 2003-2007
2010 - average over period 2008-2012
2015 - average over period 2013-2017

Table 20: Ind. 3.2 Volume and value of total roundwood removals, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Total roundwood							
		Value (million euro)				Value (euro/ha FAWS)			
	2015	1990*	2000*	2010*	2015*	1990*	2000*	2010*	2015*
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	849	871	1 265	1 279	256.6	260.6	379.3	385.5
Belarus	8 634	-	-	-	-	-	-	-	-
Belgium	689	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-
Croatia	1 922	-	-	219	228	-	-	125.7	131.3
Cyprus	173	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	830	944	-	-	359.3	410.6
Denmark	625	87	78	105	152	164.6	138.8	182.0	246.2
Estonia	2 421	-	-	-	-	-	-	-	-
Finland	22 409	1 640	1 796	1 836	2 168	80.3	88.5	94.6	110.0
France	16 836	2 689	2 517	2 442	2 788	195.2	174.0	156.4	174.1
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	688	1 974	3 277	4 114	64.4	185.0	318.0	406.3
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	169	149	289	311	96.9	81.0	150.3	163.1
Iceland	48	-	0	0	1	-	2.4	12.7	37.0
Ireland	755	-	-	-	-	-	-	-	-
Italy	9 297	454	444	594	354	67.7	60.0	74.4	43.1
Latvia	3 391	-	-	-	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	125	223	274	-	71.4	120.5	142.6
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	28	65	-	-	94.4	220.6
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	520	422	472	438	61.2	49.9	56.7	52.9
Poland	9 420	-	804	1 502	1 879	-	96.3	184.8	227.3
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	497	-	-	-	107.3
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	165	388	423	-	93.6	218.0	235.7
Slovenia	1 248	98	77	152	231	87.6	66.8	129.1	202.6
Spain	18 551	-	-	-	-	-	-	-	-
Sweden	27 980	2 363	2 394	2 802	2 826	103.5	115.3	139.8	143.7
Switzerland	1 252	-	-	-	-	-	-	-	-
Turkey	21 630	720	479	960	987	95.1	62.1	122.6	119.4
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	317	350	334	573	114.3	118.5	109.2	181.8

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

**Data for reference years were used as follows:*
1990 - average over period 1988-1992
2000 - average over period 1998-2002
2005 - average over period 2003-2007
2010 - average over period 2008-2012
2015 - average over period 2013-2017

Table 21: Ind. 3.3 Harvested quantity and market value of non-wood forest goods: plant product/raw material, 2015

Country	Forest (1 000 ha)	Food		Fodder		Raw material for medicine and aromatic products		Raw material for colorants and dyes	
		Marketed value	Quantity	Marketed value	Quantity	Marketed value	Quantity	Marketed value	Quantity
		EUR 1 000	metric tonnes	EUR 1 000	metric tonnes	EUR 1 000	metric tonnes	EUR 1 000	metric tonnes
Albania	785	-	210	-	-	10 738	3 990	-	1 800
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	2 875	250	-	-	582	41	-	-
Belarus	8 634	13 164	19 748	-	-	4	2	3 579	3 010
Belgium	689	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	56	765	-	-	30	730	-	-
Croatia	1 922	2	7	0	2	85	648	-	-
Cyprus	173	-	-	-	-	0	0	-	-
Czech Republic	2 668	202 087	37 000	-	-	13 893	3 100	-	-
Denmark	625	-	-	-	-	-	-	-	-
Estonia	2 421	-	-	-	-	-	-	-	-
Finland	22 409	214 389	156 032	-	-	-	-	-	-
France	16 836	5 000	5 000	-	-	5 000	5 000	-	-
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	-	-	-	-	-	-	-
Iceland	48	-	-	-	-	-	-	-	-
Ireland	755	-	-	-	-	-	-	-	-
Italy	9 297	87 908	-	253	-	-	-	-	-
Latvia	3 391	63 709	51 259	-	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	1 227	1 005	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	21 804	11 500	-	-	-	-	-	-
Poland	9 420	20 987	10 759	-	-	-	-	-	-
Portugal	3 312	196 969	49 990	-	-	-	-	-	-
Republic of Moldova	386	246	740	-	-	93	55	-	-
Romania	6 901	3 006	4 025	-	-	687	660	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	14 404	-	-	-	3 994	-	-	-
Slovakia	1 922	-	-	-	-	-	-	-	-
Slovenia	1 248	370	37	-	-	-	-	-	-
Spain	18 551	184 354	43 988	-	-	-	-	-	-
Sweden	27 980	32 178	35 875	-	-	-	-	-	-
Switzerland	1 252	11 166	513	-	-	-	-	-	-
Turkey	21 630	7 654	37 973	-	-	-	-	-	-
Ukraine	9 657	-	5 889	-	1 171	-	125	-	-
United Kingdom	3 155	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators
National currencies are converted to euro.

Table 21: Ind. 3.3 Harvested quantity and market value of non-wood forest goods: plant product/raw material, 2015 *(Cont.)*

Country	Forest (1 000 ha)	Raw material for utensils, handicrafts & construction		Ornamental plants			Exudates		Other plant products
		Marketed value	Quantity	Marketed value	Quantity	Unit	Marketed value	Quantity	Market edvalue
		EUR 1 000	metric tonnes	EUR 1 000			EUR 1 000	metric tonnes	EUR 1 000
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	-	47 000	2 350	1 000 pcs	-	-	18 853
				2 350	1 410	tonne			
Belarus	8 634	-	-	121	143	1 000 pcs	-	-	-
Belgium	689	-	-	-	-	-	-	-	191
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	49	21	1 000 pcs	-	-	181
Croatia	1 922	-	-	105	5	1 000 pcs	-	-	416
				0	1	-			
Cyprus	173	-	-	-	-	-	-	-	81
Czech Republic	2 668	-	-	-	-	-	-	-	-
Denmark	625	-	-	117 405	1 080	1 000 pcs	-	-	-
				-	32 000	tonne			
Estonia	2 421	-	-	4 500	200	1 000 pcs	-	-	-
Finland	22 409	-	-	27 000	1 350	1 000 pcs	-	-	-
				1 332	223	tonne			
France	16 836	550	1 610	56 000	5 300	1 000 pcs	-	-	46 080
Georgia	2 822	-	-	1 192	30	tonne	-	-	541
Germany	11 419	-	-	700 000	24 000	1 000 pcs	-	-	80 000
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	-	-	-	-	-	-	-
Iceland	48	-	-	477	7	1 000 pcs	-	-	-
Ireland	755	-	-	-	-	-	-	-	-
Italy	9 297	11 175	-	-	-	-	-	-	-
Latvia	3 391	-	-	3 136	655	1 000 pcs	-	-	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	1 659	237	1 000 pcs	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	363	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	1 152	630	tonne	-	-	-
				16 772	900	1 000 pcs			
Poland	9 420	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	8 932	8 028	40 619
Republic of Moldova	386	-	-	8	20	1 000 pcs	-	-	-
Romania	6 901	-	-	2 410	15 166	1 000 pcs	-	-	393
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	2 964
Slovakia	1 922	-	-	12	-	-	-	-	42
Slovenia	1 248	-	-	215	21	1 000 pcs	-	-	-
Spain	18 551	-	-	-	-	-	12 792	12 183	64 917
Sweden	27 980	-	-	17 960	2 800	1 000 pcs	-	-	-
Switzerland	1 252	-	-	3 373	820	1 000 pcs	-	-	-
Turkey	21 630	-	-	-	-	-	-	-	812
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	-	385 754	7 000	1 000 pcs	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators
National currencies are converted to euro.

Table 22: Ind. 3.3: Harvested quantity and market value of non-wood forest goods: animal product/raw material, 2015

Country	Forest (1 000 ha)	Living animals		Hides, skins and trophies		Wild honey and bee-wax		Wild meat	
		Marketed value	Quantity	Marketed value	Quantity	Marketed value	Quantity	Marketed value	Quantity
	2015	EUR 1 000	1 000 pcs	EUR 1 000	1 000 pcs	EUR 1 000	metric tonnes	EUR 1 000	metric tonnes
Albania	785	-	-	-	-	35 793	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	-	7 248	276	28 325	2 500	19 177	7 400
Belarus	8 634	-	-	-	-	-	-	-	-
Belgium	689	-	-	-	-	-	-	3 415	1 543
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-
Croatia	1 922	-	-	-	-	-	-	-	-
Cyprus	173	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	-	-	-	-	19 158	-
Denmark	625	-	-	-	-	-	-	-	-
Estonia	2 421	-	-	-	-	-	-	7 041	2 347
Finland	22 409	-	-	-	-	-	-	65 621	8 117
France	16 836	-	-	-	-	54 694	8 139	294 454	33 083
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	70 646	7 008	190 443	-
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	-	-	-	-	-	-	-
Iceland	48	-	-	-	-	-	-	-	-
Ireland	755	-	-	-	-	-	-	-	-
Italy	9 297	-	-	-	-	-	-	-	-
Latvia	3 391	-	-	46	13	554	141	4 497	2 774
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	3 065	51	-	-	3 596	2 970
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	43	1	3 324	554	148	42
Netherlands	365	-	-	-	-	-	-	2 664	592
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	76	3	-	-	55 908	6 500
Poland	9 420	-	-	-	-	-	-	23 489	12 689
Portugal	3 312	-	-	-	-	41 655	12 623	-	-
Republic of Moldova	386	-	-	-	-	8	4	-	-
Romania	6 901	-	-	1 329	-	2	1	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	4 061	-	10	-	3 289	-
Slovakia	1 922	287	18	3 431	-	-	-	2 942	1 233
Slovenia	1 248	-	-	444	-	-	-	891	-
Spain	18 551	-	-	-	-	9 365	35 243	89 932	47 930
Sweden	27 980	-	-	-	-	-	-	72 266	20 214
Switzerland	1 252	-	-	-	-	48 720	2 211	18 739	1 800
Turkey	21 630	-	-	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	-	-	-	-	-	10 366	3 588

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators
National currencies are converted to euro.

No data was reported on Harvested quantity and market value of non-wood forest goods, animal product/raw material in categories Raw material for medicine, Raw material for colorants, Other edible & non-edible animal products.

Table 23: Ind. 3.4 Value of marketed services on forest and other wooded land 2015

Country	Forest (1 000 ha)	Ecological services			Biospheric services			Social services		
		Service provision		Unit	Service provision		Unit	Service provision		Unit
		Value (EUR 1 000)	Amount of service/ product		Value (EUR 1 000)	Amount of service/ product		Value (EUR 1 000)	Amount of service/ product	
Albania	785	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-
Austria	3 881	11 400	820	1 000 ha	18 455	1 019	1 000 ha	90 190	-	-
Belarus	8 634	-	-	-	-	-	-	-	-	-
Belgium	689	-	-	-	-	-	-	4 166	20 662	licenses
								12 935	44	euro/ha
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-	-
Croatia	1 922	-	-	-	-	-	-	-	2 887	1 000 pcs
Cyprus	173	-	-	-	-	-	-	46	-	-
Czech Republic	2 668	-	-	-	-	-	-	-	-	-
Denmark	625	-	-	-	-	-	-	-	-	-
Estonia	2 421	-	-	-	-	-	-	-	-	-
Finland	22 409	-	-	-	-	-	-	10 107	306	1 000 pcs
France	16 836	-	-	-	-	-	-	46 671	-	-
Georgia	2 822	-	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-
Hungary	2 061	-	-	-	-	-	-	-	-	-
Iceland	48	-	-	-	-	-	-	-	-	-
Ireland	755	-	-	-	-	-	-	-	-	-
Italy	9 297	-	-	-	-	-	-	-	-	-
Latvia	3 391	-	-	-	1 340	0	1 000 ha	18 909	-	-
								244	150	1 000 visits
Liechtenstein	7	-	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	576	-	-
Luxembourg	89	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-	-
Norway	12 141	-	-	-	-	-	-	61 834	-	-
Poland	9 420	-	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	10 246	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-
Slovakia	1 922	1 430	301	1 000 ha	5 294	794	1 000 ha	5 604	3 863	1 000 ha
Slovenia	1 248	-	-	-	2	10	1 000 ha	1 271	-	-
Spain	18 551	-	-	-	-	-	-	-	-	-
Sweden	27 980	-	-	-	100 787	18	1 000 ha	126	0.21	1 000 ha
					12 401	-	-			
Switzerland	1 252	-	-	-	-	-	-	-	-	-
Turkey	21 630	80	35	1 000 ha	860	1	1 000 ha	25 635	71	1 000 ha
Ukraine	9 657	-	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators
National currencies are converted to euro.

Table 23: Ind. 3.4 Value of marketed services on forest and other wooded land 2015 *(Cont.)*

Country	Forest (1 000 ha)	Amenity services			Other services		
		Service provision		Unit	Service provision		Unit
		Value (EUR 1 000)	Amount of service/ product		Value (EUR 1 000)	Amount of service/ product	
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881				23 909	-	-
Belarus	8 634	-	-	-	-	-	-
Belgium	689	-	-	-	1 113	3	euro/ha
Bosnia and Herzegovina	2 161	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-
Croatia	1 922	-	-	-	-	-	-
Cyprus	173	-	-	-	-	-	-
Czech Republic	2 668	-	-	-	-	-	-
Denmark	625	-	-	-	-	-	-
Estonia	2 421	-	-	-	-	-	-
Finland	22 409	-	-	-	-	-	-
France	16 836	-	-	-	23 400	-	-
Georgia	2 822	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-
Hungary	2 061	-	-	-	-	-	-
Iceland	48	-	-	-	-	-	-
Ireland	755	-	-	-	-	-	-
Italy	9 297	-	-	-	-	-	-
Latvia	3 391	-	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-
Norway	12 141	-	-	-	-	-	-
Poland	9 420	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-
Slovakia	1 922	-	-	-	2 660	-	-
Slovenia	1 248	-	-	-	-	-	-
Spain	18 551	-	-	-	-	-	-
Sweden	27 980	121	0.04	1 000 ha	-	-	-
		153	-	-			
Switzerland	1 252	-	-	-	-	-	-
Turkey	21 630	-	-	-	2 589	757 695	tonne
Ukraine	9 657	-	-	-	-	-	-
United Kingdom	3 155	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators
National currencies are converted to euro.

Table 24: Ind. 4.1 Forest area classified by number of tree species occurring, 2015

Country	Forest (1 000 ha)	Number of tree species occurring in a forest stand/inventory plot							
		1		2-3		4-5		6+	
		Area	Share	Area	Share	Area	Share	Area	Share
		1 000 ha	%	1 000 ha	%	1 000 ha	%	1 000 ha	%
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	1 535.00	46.25	1 610.00	48.51	166.00	5.00	8.00	0.24
Belarus	8 634	2 285.30	26.47	5 140.59	59.54	1 169.68	13.55	37.93	0.44
Belgium	689	183.04	26.55	326.14	47.31	145.52	21.11	34.64	5.03
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	1 734.00	45.24	405.00	10.57	1 694.00	44.20	-	-
Croatia	1 922	394.00	20.50	1 186.00	61.71	321.00	16.70	21.00	1.09
Cyprus	173	-	-	-	-	-	-	-	-
Czech Republic	2 668	410.82	15.40	1 154.75	43.28	739.42	27.71	363.40	13.62
Denmark	625	167.05	29.97	262.59	47.12	100.88	18.10	26.81	4.81
Estonia	2 421	409.69	16.92	1 420.60	58.68	545.75	22.54	44.96	1.86
Finland	22 409	7 558.00	33.73	13 408.00	59.83	1 413.00	6.31	31.00	0.14
France	16 836	3 861.00	22.93	8 550.00	50.78	3 035.00	18.03	1 390.00	8.26
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	353.76	18.23	526.31	27.12	439.83	22.66	620.83	31.99
Iceland	48	29.23	60.68	16.27	33.79	2.55	5.30	0.11	0.23
Ireland	755	195.07	25.85	336.64	44.61	144.04	19.09	78.92	10.46
Italy	9 297	-	-	-	-	-	-	-	-
Latvia	3 391	1 183.61	34.90	1 787.29	52.70	393.41	11.60	27.13	0.80
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	303.00	14.72	996.00	48.40	595.00	28.91	164.00	7.97
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	374.78	45.33	262.00	31.69	190.00	22.98	0.0	0.0
Netherlands	365	56.87	15.59	183.93	50.42	108.86	29.84	15.17	4.16
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	5 642.00	46.47	6 102.00	50.26	385.00	3.17	12.00	0.10
Poland	9 420	4 097.00	43.49	4 607.00	48.91	686.00	7.28	30.00	0.32
Portugal	3 312	1 642.64	51.04	1 415.47	43.98	149.54	4.65	10.84	0.34
Republic of Moldova	386	-	-	-	-	-	-	386.40	100.00
Romania	6 901	1 922.33	27.74	3 517.60	50.77	1 217.41	17.57	271.71	3.92
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	295.70	15.39	891.42	46.39	570.97	29.71	163.65	8.52
Slovenia	1 248	135.09	10.82	632.36	50.67	390.23	31.27	90.33	7.24
Spain	18 551	3 412.74	18.40	6 237.59	33.62	4 568.70	24.63	4 332.15	23.35
Sweden	27 980	4 098.32	14.65	20 078.38	71.76	3 537.40	12.64	266.13	0.95
Switzerland	1 252	200.92	16.31	588.25	47.75	351.54	28.53	91.27	7.41
Turkey	21 630	15 719.06	72.67	5 908.18	27.31	3.06	0.01	0.0	0.0
Ukraine	9 657	3 117.00	32.28	4 929.00	51.04	1 515.00	15.69	96.00	0.99
United Kingdom	3 155	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 25: Ind. 4.1 Trend in forest area classified by number of tree species occurring, 1990-2015

Country	Forest (1 000 ha)	Forest (1 000 ha)											
		Number of tree species occuring											
		1				2-5				6+			
	2015	1990	2000	2010	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	636	605	568	-	153	164	158	-	0	0	51	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 881	1 603	1 542	1 490	1 535	1 697	1 790	1 836	1 776	9	11	9	8
Belarus	8 634	1 368	1 344	2 337	2 285	6 293	6 791	6 260	6 310	119	138	33	38
Belgium	689	-	353	208	183	-	310	450	472	-	4	23	35
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	1 564	1 403	1 704	1 734	1 763	1 972	2 033	2 099	-	-	-	-
Croatia	1 922	455	414	394	394	1 378	1 453	1 505	1 507	17	18	21	21
Cyprus	173	159	169	169	-	3	3	4	-	0	0	0	-
Czech Republic	2 668	-	-	439	411	-	-	1 889	1 894	-	-	330	363
Denmark	625	-	-	172	167	-	-	333	363	-	-	20	27
Estonia	2 421	542	526	475	410	1 658	1 704	1 839	1 966	6	9	22	45
Finland	22 409	10 449	9 554	7 850	7 558	11 448	12 905	14 357	14 821	-	-	36	31
France	16 836	3 999	3 899	3 899	3 861	9 987	10 853	11 187	11 585	450	537	1 333	1 390
Georgia	2 822	-	-	-	-	-	-	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	597	629	485	354	1 039	1 091	1 064	966	50	68	373	621
Iceland	48	13	20	27	29	4	10	18	19	0	0	0	0
Ireland	755	-	-	210	195	-	-	452	481	-	-	58	79
Italy	9 297	-	2 339	-	-	-	5 879	-	-	-	152	-	-
Latvia	3 391	-	-	1 186	1 184	-	-	2 161	2 181	-	-	26	27
Liechtenstein	7	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	2 187	-	311	314	303	-	1 487	1 588	1 591	-	130	155	164
Luxembourg	89	-	6	6	-	-	53	53	-	-	29	29	-
Malta	0	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	375	375	-	-	452	452	-	-	0	0
Netherlands	365	-	70	63	57	-	275	295	293	-	15	16	15
North Macedonia	994	-	-	-	-	-	-	-	-	-	-	-	-
Norway	12 141	-	-	5 674	5 642	-	-	6 415	6 487	-	-	13	12
Poland	9 420	-	4 518	4 220	4 097	-	4 484	5 084	5 293	-	57	25	30
Portugal	3 312	1 675	1 608	1 611	1 643	1 597	1 538	1 534	1 565	10	11	11	11
Republic of Moldova	386	-	-	-	-	-	-	-	-	325	344	375	386
Romania	6 901	-	-	1 937	1 922	-	-	4 343	4 735	-	-	235	272
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	1 922	351	343	312	296	1 436	1 437	1 461	1 462	115	121	144	164
Slovenia	1 248	-	68	182	135	-	1 095	1 038	1 023	-	71	27	90
Spain	18 551	3 596	3 241	3 440	3 413	9 527	9 910	10 790	10 806	782	3 943	4 316	4 332
Sweden	27 980	-	-	4 082	4 098	-	-	23 692	23 616	-	-	298	266
Switzerland	1 252	-	246	216	201	-	892	925	940	-	29	71	91
Turkey	21 630	14 377	14 642	15 321	15 719	5 407	5 506	5 762	5 911	0	0	0	0
Ukraine	9 657	3 392	3 479	3 487	3 117	4 914	5 038	5 065	6 444	968	993	996	96
United Kingdom	3 155	-	-	-	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 26: Ind. 4.2 Share of forest expansion and regeneration types from the area regenerated in 2015

Country	Forest (1 000 ha)	Annual afforestation and natural expansion				Annual regeneration					
		Afforestation		Natural expansion		Natural regeneration		Regeneration by planting and/or seeding		Coppice sprouting	
		Area	Share	Area	Share	Area	Share	Area	Share	Area	Share
		1 000 ha	%	1 000 ha	%	1 000 ha	%	1 000 ha	%	1 000 ha	%
Albania	785	-	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 881	0.3	0.7	9.1	22.4	25.3	62.3	3.4	8.4	2.5	6.2
Belarus	8 634	2.8	5.1	17.1	30.8	5.9	10.6	29.6	53.5	-	-
Belgium	689	1.0	18.5	0.7	13.0	0.4	6.5	3.4	62.0	-	-
Bosnia and Herzegovina	2 161	0.4	18.5	-	-	-	-	1.6	81.5	-	-
Bulgaria	3 833	0.5	0.4	65.8	45.6	33.0	22.9	0.0	0.0	45.0	31.2
Croatia	1 922	0.3	2.9	3.1	28.4	6.6	60.0	0.6	5.3	0.4	3.5
Cyprus	173	-	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	0.1	0.3	-	-	5.2	20.7	19.8	79.0	-	-
Denmark	625	1.7	32.0	0.0	0.0	0.5	8.8	3.1	59.2	0.0	0.0
Estonia	2 421	1.7	4.6	6.8	18.4	14.4	39.0	14.0	38.0	0.0	0.0
Finland	22 409	4.0	2.7	1.2	0.8	19.0	12.9	122.4	83.5	0.0	0.0
France	16 836	-	-	-	-	-	-	47.0	79.7	12.0	20.3
Georgia	2 822	0.0	0.0	0.0	0.0	-	-	0.0	100.0	-	-
Germany	11 419	4.0	7.3	3.0	5.4	41.1	74.7	6.4	11.7	0.5	0.9
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	0.7	2.4	1.9	6.9	7.8	28.3	9.5	34.5	7.7	28.0
Iceland	48	0.6	78.4	0.0	5.6	0.1	15.9	0.0	0.0	0.0	0.0
Ireland	755	6.1	41.3	0.3	1.7	-	-	8.5	57.1	-	-
Italy	9 297	-	-	-	-	-	-	-	-	-	-
Latvia	3 391	1.5	3.5	2.3	5.2	26.7	61.2	13.1	30.1	0.0	0.0
Liechtenstein	7	0.0	100.0	-	-	-	-	-	-	-	-
Lithuania	2 187	2.1	9.6	0.9	4.0	9.8	45.4	8.8	40.9	0.0	0.0
Luxembourg	89	-	-	0.0	0.0	-	-	0.3	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	0.3	2.3	11.7	89.3	-	-	1.1	8.4	-	-
Netherlands	365	-	-	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-	-	-
Norway	12 141	0.2	0.9	-	-	-	-	16.9	99.1	0.0	0.0
Poland	9 420	2.8	4.8	0.2	0.3	7.8	13.6	46.4	81.2	0.0	0.0
Portugal	3 312	26.5	28.1	25.1	26.6	17.4	18.4	13.3	14.1	12.1	12.8
Republic of Moldova	386	0.4	3.9	-	-	-	-	6.2	67.7	2.6	28.4
Romania	6 901	0.9	3.1	-	-	16.8	59.5	10.6	37.4	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-	-
Slovakia	1 922	0.1	0.6	-	-	6.3	37.2	10.5	62.2	-	-
Slovenia	1 248	0.0	0.0	0.8	29.5	1.2	48.8	0.4	13.8	0.2	7.9
Spain	18 551	0.1	0.6	7.9	50.2	-	-	7.7	49.2	-	-
Sweden	27 980	13.1	8.1	0.0	0.0	13.8	8.5	134.7	83.4	0.0	0.0
Switzerland	1 252	0.0	0.0	3.4	5.9	48.3	85.3	3.6	6.4	1.3	2.3
Turkey	21 630	70.3	19.0	60.4	16.4	32.2	8.7	118.8	32.2	87.3	23.7
Ukraine	9 657	5.7	8.9	0.7	1.1	20.3	31.9	36.9	58.0	-	-
United Kingdom	3 155	8.9	36.0	-	-	-	-	15.8	64.0	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 27: Ind. 4.2 Total forest area by types of stand origin, 1990-2015

	Forest (1 000 ha)	Area (1 000 ha)											
		Natural regeneration and natural expansion				Afforestation and regeneration by planting and/or seeding				Coppice			
	2015	1990	2000	2010	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	686	673	682	-	103	96	94	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 881	1 945	2 069	2 102	2 133	1 739	1 684	1 679	1 675	92	85	82	74
Belarus	8 634	6 576	6 413	6 484	6 422	1 204	1 861	2 146	2 212	-	-	-	-
Belgium	689	231	259	283	251	418	391	390	424	29	17	16	15
Bosnia and Herzegovina	2 161	1 163	1 186	1 469	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	1 263	1 466	1 195	1 201	1 032	933	817	824	1 032	976	1 725	1 808
Croatia	1 922	1 758	1 803	1 845	1 847	92	82	75	75	-	-	-	-
Cyprus	173	137	144	142	-	24	28	30	-	0.0	0.0	0.0	-
Czech Republic	2 668	31	47	88	115	2 598	2 586	2 560	2 543	-	4	10	10
Denmark	625	-	-	138	162	-	-	447	460	-	-	2	3
Estonia	2 421	2 011	2 041	2 129	2 207	195	198	207	214	-	-	-	-
Finland	22 409	17 485	17 301	15 334	15 041	4 390	5 144	6 908	7 368	0.0	0.0	0.0	0.0
France	16 836	-	-	12 651	13 388	1 528	1 586	2 073	2 260	-	-	1 695	1 188
Georgia	2 822	2 698	2 701	2 750	2 750	54	60	72	72	-	-	-	-
Germany	11 419	5 837	5 863	6 041	6 041	5 388	5 416	5 290	5 290	75	75	78	78
Greece	3 903	3 181	3 472	3 763	-	118	129	140	-	-	-	-	-
Holy See	0	0	0	0	-	0	0	0	-	-	-	-	-
Hungary	2 061	-	-	1 253	1 268	-	-	794	793	-	-	632	644
Iceland	48	11	11	11	12	7	19	33	37	0	0	0	0
Ireland	755	81	81	81	97	380	549	640	658	-	-	-	-
Italy	9 297	7 043	7 785	8 407	8 658	501	584	621	639	46	-	-	-
Latvia	3 391	2 859	2 919	2 964	2 955	314	322	408	437	0	0	0	0
Liechtenstein	7	0	0	0	0	0	0	0	0	-	-	-	-
Lithuania	2 187	1 534	1 554	1 634	1 602	411	466	536	585	0	0	0	0
Luxembourg	89	58	59	59	59	28	28	30	30	-	-	-	-
Malta	0	0	0	0	-	0	0	0	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	422	422	-	-	8	8	-	-	397	397
Netherlands	365	-	46	41	40	-	292	305	298	-	22	28	27
North Macedonia	994	807	853	893	-	-	-	-	-	-	-	-	-
Norway	12 141	-	-	11 987	12 033	-	-	115	108	0	0	0	0
Poland	9 420	-	-	-	2 054	-	-	-	7 366	-	-	-	-
Portugal	3 312	1 326	1 013	1 030	1 056	1 499	1 644	1 541	1 561	574	623	680	695
Republic of Moldova	386	179	189	163	168	146	155	212	219	-	-	-	-
Romania	6 901	4 309	4 306	4 407	4 668	883	882	903	956	1 179	1 178	1 205	1 277
Russian Federation	809 090	796 299	793 908	792 099	-	12 651	15 360	16 991	-	-	-	-	-
Serbia	2 720	2 274	2 421	2 533	-	-	-	-	-	-	-	-	-
Slovakia	1 922	1 085	1 109	1 089	1 097	739	755	741	747	78	37	88	78
Slovenia	1 248	1 151	1 193	1 211	1 212	34	36	31	31	3	4	5	5
Spain	18 551	11 959	14 703	15 949	15 932	1 945	2 391	2 596	2 620	-	-	-	-
Sweden	27 980	19 974	17 845	15 592	14 754	8 089	10 318	12 481	13 226	0	0	0	0
Switzerland	1 252	919	972	1 022	1 045	182	172	161	155	52	52	52	52
Turkey	21 630	16 929	17 242	18 006	18 420	546	556	622	698	2 309	2 351	2 455	2 512
Ukraine	9 657	3 030	3 180	3 193	3 228	4 567	4 695	4 817	4 872	1 677	1 635	1 538	1 557
United Kingdom	3 155	344	344	344	344	2 434	2 610	2 715	2 811	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 28: Ind. 4.3 Forest and other wooded land by classes of naturalness, 2020

Country	Forest (1 000 ha)	Forest (1 000 ha)			Other wooded land (1 000 ha)			Forest and Other wooded land (1 000 ha)			Forest [%]		
		Undis-turbed by man	Semi-natural	Planta-tions	Undis-turbed by man	Semi-natural	Planta-tions	Undis-turbed by man	Semi-natural	Planta-tions	Undis-turbed by man	Semi-natural	Planta-tions
Albania	785	-	-	-	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 881	63	3 836	0	55	75	0	118	3 911	0	1.6	98.4	0.0
Belarus	8 634	135	8 627	6	0	630	0	135	9 256	6	1.5	98.4	0.1
Belgium	689	0	219	470	-	-	-	-	-	-	0.0	31.8	68.2
Bosnia and Herzegovina	2 161	-	-	119	-	-	0	3	2 691	119	-	-	5.5
Bulgaria	3 833	704	2 412	777	-	-	-	-	-	-	18.1	62.0	20.0
Croatia	1 922	7	1 864	69	0	618	0	7	2 482	69	0.3	96.1	3.5
Cyprus	173	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	10	2 667	0	-	-	-	-	-	-	0.4	99.6	0.0
Denmark	625	21	385	223	3	32	2	24	417	225	3.4	61.2	35.4
Estonia	2 421	52	2 380	7	2	92	0	55	2 471	7	2.1	97.6	0.3
Finland	22 409	203	22 172	34	11	735	0	214	22 908	34	0.9	98.9	0.1
France	16 836	-	17 253	0	0	843	0	-	18 096	0	-	100.0	0.0
Georgia	2 822	500	2 250	72	0	7	0	500	2 257	72	17.7	79.7	2.5
Germany	11 419	0	11 419	0	0	0	0	0	11 419	0	0.0	100.0	0.0
Greece	3 903	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	0	1 923	130	-	-	-	-	-	-	0.0	93.7	6.3
Iceland	48	0	51	0	0	150	0	0	201	0	0.0	100.0	0.0
Ireland	755	-	108	674	-	-	-	-	-	-	-	13.8	86.2
Italy	9 297	93	8 828	128	0	-	-	93	-	-	1.0	92.3	1.3
Latvia	3 391	17	3 375	18	0	108	0	17	3 483	18	0.5	99.0	0.5
Liechtenstein	7	2	5	1	-	-	-	-	-	-	22.4	71.6	9.0
Lithuania	2 187	27	2 174	0	0	62	0	27	2 237	0	1.2	98.8	0.0
Luxembourg	89	0	89	0	-	-	-	-	-	-	0.0	100.0	0.0
Malta	0	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	91	727	8	-	-	-	-	-	-	11.1	87.9	1.0
Netherlands	365	0	367	3	0	0	0	0	367	3	0.0	99.2	0.8
North Macedonia	994	-	-	-	-	-	-	-	-	-	-	-	-
Norway	12 141	200	11 872	108	-	-	-	-	-	-	1.6	97.5	0.9
Poland	9 420	0	9 479	4	-	-	-	0	9 479	4	0.0	100.0	0.0
Portugal	3 312	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-	-	-	-	-
Romania	6 901	165	6 764	-	0	-	-	-	-	-	2.4	97.6	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	1 922	11	1 907	8	0	20	0	11	1 927	8	0.5	99.0	0.4
Slovenia	1 248	34	1 204	0	17	11	0	50	1 215	0	2.7	97.3	0.0
Spain	18 551	-	17 568	1 004	-	-	-	-	-	-	0.0	94.6	5.4
Sweden	27 980	2 249	25 349	382	1 075	1 289	0	3 324	26 638	382	8.0	90.6	1.4
Switzerland	1 252	43	1 225	1	9	66	-	52	1 292	1	3.4	96.6	0.1
Turkey	21 630	-	21 503	717	0	713	0	0	21 503	717	0.0	96.8	3.2
Ukraine	9 657	59	9 261	370	0	26	0	59	9 287	370	0.6	95.6	3.8
United Kingdom	3 155	0	344	2 846	0	-	-	0	-	-	0.0	10.8	89.2

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 29: Ind. 4.3 Forest by classes of naturalness, 1990-2020

Country	Forest (1 000 ha)	Forest area (1 000 ha)														
		Undisturbed by man					Semi-natural					Plantations				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	-	262	122	62	-	-	412	560	628	-	-	96	94	95	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 899	63	63	63	63	63	3 713	3 775	3 800	3 818	3 836	0	0	0	0	0
Belarus	8 768	-	135	135	135	135	7 779	8 137	8 493	8 493	8 627	1	1	2	6	6
Belgium	689	0	0	0	0	0	210	237	283	251	219	467	430	406	438	470
Bosnia and Herzegovina	2 188	-	-	-	-	-	-	-	-	-	-	124	124	128	119	119
Bulgaria	3 893	157	270	597	704	704	2 138	2 172	2 323	2 305	2 412	1 032	933	817	824	777
Croatia	1 939	7	7	7	7	7	1 751	1 797	1 838	1 840	1 864	92	82	75	75	69
Cyprus	173	13	13	13	13	-	124	131	129	129	-	24	28	30	31	-
Czech Republic	2 677	10	10	10	10	10	2 619	2 627	2 647	2 658	2 667	0	0	0	0	0
Denmark	628	-	-	28	22	21	-	-	309	363	385	-	-	250	239	223
Estonia	2 438	40	57	59	51	52	2 160	2 176	2 270	2 363	2 380	6	6	7	7	7
Finland	22 409	-	-	234	203	203	21 853	22 421	21 975	22 172	22 172	22	25	33	34	34
France	17 253	-	-	-	-	-	14 436	15 288	16 419	16 836	17 253	0	0	0	0	0
Georgia	2 822	500	500	500	500	500	2 198	2 201	2 250	2 250	2 250	54	60	72	72	72
Germany	11 419	0	0	0	0	0	11 300	11 354	11 409	11 419	11 419	0	0	0	0	0
Greece	3 903	0	0	0	0	-	3 181	3 472	3 763	3 763	-	118	129	140	140	-
Holy See	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	-	-	0	0	0	-	-	1 896	1 920	1 923	-	-	151	141	130
Iceland	51	0	0	0	0	0	17	30	45	48	51	0	0	0	0	0
Ireland	782	-	-	-	-	-	81	81	81	97	108	380	549	640	658	674
Italy	9 566	93	93	93	93	93	6 950	7 692	8 314	8 565	8 828	131	125	125	126	128
Latvia	3 411	15	15	15	15	17	3 158	3 226	3 351	3 364	3 375	0	0	7	12	18
Liechtenstein	7	2	2	2	2	2	5	5	5	5	5	0	0	0	0	1
Lithuania	2 201	20	21	26	27	27	1 925	1 999	2 144	2 160	2 174	0	0	0	0	0
Luxembourg	89	0	0	0	0	0	86	87	89	89	89	0	0	0	0	0
Malta	0	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	109	109	91	-	-	710	710	727	-	-	8	8	8
Netherlands	370	0	0	0	0	-	314	356	370	362	367	31	4	4	3	3
North Macedonia	1 001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	12 180	200	200	200	200	200	-	-	11 787	11 833	11 872	-	-	115	108	108
Poland	9 483	-	0	0	0	0	-	9 053	9 325	9 416	9 479	-	6	4	4	4
Portugal	3 312	22	22	22	22	-	2 802	2 635	2 549	2 595	-	574	623	680	695	-
Republic of Moldova	387	-	-	-	-	-	325	344	375	386	-	1	1	2	2	-
Romania	6 929	128	128	128	128	165	6 243	6 238	6 387	6 773	6 764	-	-	-	-	-
Russian Federation	809 090	241 726	258 131	256 482	256 482	-	554 573	535 777	535 618	535 618	-	12 651	15 360	16 991	16 991	-
Serbia	2 720	1	1	1	1	-	2 273	2 420	2 532	2 504	-	39	39	180	215	-
Slovakia	1 926	11	11	11	11	11	1 892	1 890	1 899	1 902	1 907	-	1	9	9	8
Slovenia	1 238	49	53	49	49	34	1 139	1 180	1 198	1 199	1 204	0	0	0	0	0
Spain	18 572	0	0	0	0	0	13 146	16 161	17 530	17 535	17 568	759	933	1 015	1 017	1 004
Sweden	27 980	-	-	2 366	2 249	2 249	-	-	25 024	25 349	25 349	-	-	683	382	382
Switzerland	1 269	43	43	43	43	43	1 110	1 153	1 191	1 208	1 225	1	1	1	1	1
Turkey	22 220	0	0	0	0	0	19 238	19 593	20 461	20 932	21 503	546	556	622	698	717
Ukraine	9 690	59	59	59	59	59	8 912	9 120	9 146	9 230	9 261	303	331	343	368	370
United Kingdom	3 190	0	0	0	0	0	344	344	344	344	344	2 434	2 610	2 715	2 811	2 846

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 30: Ind. 4.4 Area of forest dominated by introduced tree species, 1990-2020

Country	Forest (1 000 ha)	Introduced tree species						of which invasive				
		1990	2000	2010	2015	2020		1990	2000	2010	2015	2020
	2020	1 000 ha					%	1 000 ha				
Albania	785	15.5	7.4	7.4	-	-	-	2.5	2.5	3.3	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-
Austria	3 899	36.0	43.0	46.0	49.0	52.0	1.3	15.0	19.0	21.0	25.0	29.0
Belarus	8 768	0.6	0.6	0.6	0.6	0.6	0.0	-	-	0.6	0.6	0.6
Belgium	689	-	318.5	310.1	249.6	189.0	27.4	-	-	-	-	-
Bosnia and Herzegovina	2 188	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	135.0	139.0	204.0	186.0	168.0	4.3	-	-	-	-	-
Croatia	1 939	82.0	82.0	83.0	66.6	66.6	3.4	0.0	0.0	0.0	0.0	0.0
Cyprus	173	1.4	1.4	1.4	1.4	-	-	-	-	-	-	-
Czech Republic	2 677	-	-	28.6	27.5	27.7	1.0	0.0	0.0	0.0	0.0	0.0
Denmark	628	-	-	269.6	277.5	279.2	44.4	-	-	66.8	69.9	70.3
Estonia	2 438	1.7	1.9	2.0	2.1	2.1	0.1	0.0	0.0	0.0	0.0	0.0
Finland	22 409	22.0	25.0	27.0	30.0	30.0	0.1	0.0	0.0	0.0	0.0	0.0
France	17 253	1 140.0	1 263.0	1 287.0	1 324.0	1 352.0	7.8	-	-	-	-	-
Georgia	2 822	16.5	16.5	16.5	16.5	16.5	0.6	0.0	0.0	0.0	0.0	0.0
Germany	11 419	-	170.9	218.7	218.7	-	-	0.0	0.0	0.0	0.0	0.0
Greece	3 903	-	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	397.0	478.9	592.7	607.9	607.9	29.6	245.0	303.8	389.1	409.3	417.9
Iceland	51	4.8	14.2	24.1	26.9	29.3	57.1	0.0	0.0	0.0	0.0	0.0
Ireland	782	293.4	423.6	488.5	488.0	492.4	63.0	0.0	0.0	0.0	0.0	0.0
Italy	9 566	325.0	327.0	334.0	341.0	348.8	3.6	201.0	223.0	241.0	248.0	255.6
Latvia	3 411	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Liechtenstein	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lithuania	2 201	4.0	4.0	3.2	3.1	3.0	0.1	0.0	0.0	0.0	0.0	0.0
Luxembourg	89	-	26.2	26.2	26.2	-	-	0.0	0.0	0.0	0.0	-
Malta	0	-	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	0.8	0.9	0.9	0.1	-	-	0.7	0.9	0.9
Netherlands	370	107.0	106.0	99.5	84.5	79.8	21.6	0.0	0.0	0.0	0.0	0.0
North Macedonia	1 001	-	-	-	-	-	-	-	-	-	-	-
Norway	12 180	-	63.0	75.0	76.0	76.0	0.6	0.0	0.0	0.0	0.0	0.0
Poland	9 483	-	20.0	45.0	53.0	53.0	0.6	-	-	39.0	49.0	49.0
Portugal	3 312	668.8	725.4	782.2	794.7	-	-	31.6	33.1	36.1	39.0	-
Republic of Moldova	387	-	-	-	-	-	-	-	-	-	-	-
Romania	6 929	-	349.0	312.0	312.0	329.0	4.7	-	-	70.1	70.1	70.1
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	2.0	1.3	1.6	-	-	-	0.0	0.0	-	-	-
Slovakia	1 926	43.6	42.4	56.3	56.1	57.0	3.0	26.2	26.4	34.0	34.4	35.5
Slovenia	1 238	-	11.9	36.2	13.9	13.9	1.1	-	9.4	9.0	0.0	0.0
Spain	18 572	698.0	861.4	938.1	939.4	926.5	5.0	1.8	2.7	1.9	1.7	1.7
Sweden	27 980	464.9	518.3	540.0	579.7	591.8	2.1	0.0	0.0	0.0	0.0	0.0
Switzerland	1 269	-	5.9	5.9	5.9	5.9	0.5	-	0.9	1.6	2.0	2.4
Turkey	22 220	18.1	19.9	38.8	52.7	65.4	0.3	0.0	0.0	0.0	0.0	0.0
Ukraine	9 690	303.0	331.0	343.0	368.0	370.0	3.8	24.0	26.0	27.0	29.0	29.0
United Kingdom	3 190	1 315.0	1 401.0	1 485.0	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 31: Ind. 4.5 Deadwood volume per hectare, 1990-2015

Country	Forest (1 000 ha)	Volume of deadwood (m^3/ha)											
		Total				Standing				Lying			
	2015	1990	2000	2010	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	0.0	-	-	-	0.0	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3 881	-	13.7	19.9	21.8	3.9	5.3	7.5	8.5	-	8.4	12.4	13.3
Belarus	8 634	-	2.1	1.2	1.5	-	1.2	0.9	1.1	-	0.8	0.4	0.4
Belgium	689	-	7.1	7.3	11.5	-	2.8	2.9	4.3	-	4.3	4.4	7.1
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-	-	-	-	-
Croatia	1 922	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	173	-	-	-	-	0.7	0.9	0.9	-	-	-	-	-
Czech Republic	2 668	-	-	25.2	25.2	-	-	8.7	8.7	-	-	16.5	16.5
Denmark	625	-	-	4.5	4.9	-	-	3.0	3.4	-	-	1.5	1.6
Estonia	2 421	8.8	8.9	13.3	14.8	5.9	5.3	6.6	6.3	2.9	3.5	6.7	8.5
Finland	22 409	-	5.6	5.8	6.0	-	1.3	1.7	1.8	-	4.3	4.0	4.2
France	16 836	-	-	-	-	-	-	7.5	6.8	-	-	16.8	16.2
Georgia	2 822	-	-	-	-	-	-	-	-	-	-	-	-
Germany	11 419	-	11.5	20.6	20.6	-	2.4	4.7	4.7	-	9.1	15.9	15.9
Greece	3 903	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	8.2	8.9	9.3	9.7	4.9	5.3	5.5	6.4	3.3	3.6	3.8	3.3
Iceland	48	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	755	-	-	7.6	10.1	-	-	3.2	3.5	-	-	4.4	6.7
Italy	9 297	7.3	8.3	9.2	-	4.5	5.0	5.6	-	2.9	3.3	3.6	-
Latvia	3 391	6.0	6.0	23.5	23.6	-	-	9.2	9.2	-	-	14.3	14.4
Liechtenstein	7	-	-	-	-	-	-	-	-	-	20.0	30.0	-
Lithuania	2 187	23.0	23.0	22.8	22.8	-	-	-	-	-	-	-	-
Luxembourg	89	-	11.6	-	-	-	4.4	-	-	-	7.2	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	5.3	6.7	6.7	-	2.5	3.1	3.1	-	2.8	3.5	3.5
Netherlands	365	5.7	7.7	11.9	13.2	2.7	3.6	5.7	6.4	3.0	4.1	6.2	6.8
North Macedonia	994	-	-	-	-	-	-	-	-	-	-	-	-
Norway	12 141	-	6.4	7.6	8.3	-	2.2	2.7	2.9	-	4.2	4.9	5.4
Poland	9 420	-	-	5.8	6.3	-	-	2.7	2.7	-	-	3.1	3.6
Portugal	3 312	-	-	2.3	2.3	-	-	1.1	1.0	-	-	1.2	1.3
Republic of Moldova	386	3.4	3.4	3.5	3.5	-	-	-	-	3.4	3.4	3.5	3.5
Romania	6 901	-	-	-	9.2	-	-	-	-	-	-	-	-
Russian Federation	809 090	22.5	21.9	22.0	-	6.8	6.6	6.7	-	15.8	15.4	15.3	-
Serbia	2 720	-	-	-	-	-	-	-	-	1.4	1.2	1.2	-
Slovakia	1 922	-	-	24.3	28.0	-	-	6.6	8.7	-	-	17.7	19.3
Slovenia	1 248	12.7	14.9	19.8	22.3	3.6	4.2	7.1	6.1	9.1	10.7	12.7	16.2
Spain	18 551	-	-	-	4.8	-	-	-	2.0	-	-	-	2.7
Sweden	27 980	-	-	7.7	8.4	-	-	3.1	3.3	-	-	4.6	5.2
Switzerland	1 252	-	19.0	23.0	25.0	-	11.8	11.8	11.8	-	7.3	11.2	13.2
Turkey	21 630	-	-	-	16.6	-	-	-	9.0	-	-	-	7.7
Ukraine	9 657	8.2	5.8	6.0	6.3	5.5	3.6	3.7	3.9	5.5	3.6	3.7	2.4
United Kingdom	3 155	11.4	11.4	11.4	11.4	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 32: Ind. 4.6 Genetic resources 1990-2020

Country	Dynamic conservation (*in situ* and *ex situ*) of native species populations									
	Dynamic Conservation Effort (number of populations)					Species Diversity index (0-1)				
	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania*	-	-	-	-	-	-	-	-	-	-
Andorra*	-	-	-	-	-	-	-	-	-	-
Austria*	86	565	586	586	586	0.16	0.35	0.38	0.38	0.38
Belarus*	0	1	1	1	1	0	0.05	0.05	0.05	0.05
Belgium*	12	17	31	31	31	0.04	0.09	0.13	0.13	0.13
Bosnia and Herzegovina*	0	9	112	112	112	0	0.09	0.16	0.16	0.16
Bulgaria*	0	0	6	6	6	0	0	0.08	0.08	0.08
Croatia*	17	19	20	20	20	0.077	0.09	0.10	0.10	0.10
Cyprus*-	-	-	-	-	-	-	-	-	-	-
Czech Republic*-	5	71	75	75	75	0.07	0.32	0.34	0.34	0.34
Denmark*	0	218	218	218	218	0	0.48	0.48	0.48	0.48
Estonia*	10	10	10	10	10	0.08	0.08	0.08	0.08	0.08
Finland*	0	46	56	61	63	0	0.27	0.30	0.30	0.30
France*	0	71	88	100	101	0	0.05	0.11	0.11	0.11
Georgia*	-	-	-	-	-	-	-	-	-	-
Germany	-	-	5438	8284	9212	-	-	0.69	0.81	0.88
Greece*	0	0	15	15	15	0	0	0.06	0.06	0.06
Holy See	-	-	-	-	-	-	-	-	-	-
Hungary*	0	0	0	4	13	0	0	0	0.03	0.09
Iceland*	0	0	1	1	1	0	0	0.33	0.33	0.33
Ireland*	0	1	21	21	22	0	0.05	0.35	0.35	0.40
Italy*-	173	177	206	216	222	0.25	0.25	0.29	0.31	0.31
Latvia*	14	23	34	34	34	0.22	0.30	0.33	0.33	0.33
Liechtenstein*	-	-	-	-	-	-	-	-	-	-
Lithuania*	0	0	131	131	131	0	0	0.21	0.21	0.21
Luxembourg*	0	12	37	40	54	0	0.17	0.48	0.48	0.48
Malta*	-	-	-	-	-	-	-	-	-	-
Moldova*	0	0	22	22	22	0	0	0.05	0.05	0.05
Monaco*	-	-	-	-	-	-	-	-	-	-
Montenegro*	-	-	-	-	-	-	-	-	-	-
Netherlands*	5	12	12	12	26	0.11	0.24	0.24	0.24	0.47
North Macedonia*	0	0	0	3	3	0	0	0	0.03	0.03
Norway*	0	0	24	30	38	0	0	0.39	0.44	0.44
Poland*	0	0	1	488	537	0	0	0.02	0.32	0.37
Portugal*	0	7	9	11	11	0	0.06	0.09	0.10	0.10
Romania	139	158	-	684	684	0.20	0.23	-	0.42	0.42
Russian Federation*	-	-	-	-	-	-	-	-	-	-
Serbia*	0	6	10	10	10	0	0.07	0.12	0.12	0.12
Slovakia*-	0	4	202	206	211	0	0.04	0.38	0.38	0.38
Slovenia*	0	0	31	37	39	0	0	0.25	0.29	0.31
Spain*	1	4	6	6	308	0.01	0.03	0.03	0.03	0.21
Sweden*	0	0	0	429	608	0	0	0	0.91	0.91
Switzerland*	0	4	4	4	4	0	0.04	0.04	0.04	0.04
Turkey*	4	157	219	257	276	0.03	0.33	0.48	0.56	0.56
Ukraine	-	-	601	599	598	-	-	0.52	0.50	0.50
United Kingdom*	0	0	0	0	1	0	0	0	0	0.02

** Data from EUFGIS (1° and 2° sub-indicator)*
- Data from FOREMATIS (3° sub-indicator)

Source: European Forest Genetic Resources Programme, European Forest Institute.

Data Providers: Thomas Geburek (Austria), Alain Servais (Belgium), Dalibor Ballian (Bosnia and Herzegovina), Mariya Belovarska (Bulgaria), Miran Lanšćak (Croatia), Josef Frýdl (Czech Republic), Gunnar Friis Proschowsky (Denmark), Tiit Maaten and Maret Parv (Estonia), Leena Yrjänä (Finland), Monique Guibert (France), Michaela Haverkamp (Germany), Despina Paitaridou (Greece), Sándor Bordács and Boglárka Némethné Kisgyörgy (Hungary), Thröstur Eysteinsson (Iceland), Brian Clifford (Ireland), Maurizio Marchi (Italy), Inga Zariņa (Latvia), Patrick Insinna (Liechtenstein), Darius Raudonius (Lithuania), Thierry PALGEN (Luxembourg), Valeriu Caisin (Moldova), Czesław Kozioł (Poland), Joukje Buiteveld (Netherlands), Kjersti Bakkebø Fjellstad (Norway), Maria Carolina Varela (Portugal), Ecaterina Nicoleta Apostol (Romania), Andrej Pilipovic (Serbia), Roman Longauer (Slovakia), Marjana Westergren and Hojka Kraigher (Slovenia), Eduardo Notivol Paino (Spain), Sanna Black-Samuelsson (Sweden), Rudow Andreas (Switzerland), Gaye Kandemir (Turkey), Svetlana Los (Ukraine), Amanda Campbell (United Kingdom)

Table 32: Ind. 4.6 Genetic resources 1990-2020 *(Cont.)*

Country	Dynamic conservation (*in situ* and *ex situ*) of native species populations									
	Ecozone Diversity index (0-1)					Insurance index (0-1)				
	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania*	-	-	-	-	-	-	-	-	-	-
Andorra*	-	-	-	-	-	-	-	-	-	-
Austria*	0.47	0.69	0.66	0.66	0.66	0.27	0.54	0.51	0.51	0.51
Belarus*	0	1	1	1	1	0	0	0	0	0
Belgium*	0.50	0.50	0.50	0.50	0.50	0.50	0.25	0.33	0.33	0.33
Bosnia and Herzegovina*	0	0.28	0.47	0.47	0.47	0	0.03	0.33	0.33	0.33
Bulgaria*	0	0	0.35	0.35	0.35	0	0	0	0	0
Croatia*	0.35	0.33	0.33	0.33	0.33	0.17	0.15	0.13	0.13	0.13
Cyprus*-	-	-	-	-	-	-	-	-	-	-
Czech Republic*-	0.44	0.55	0.55	0.55	0.55	0.11	0.33	0.34	0.34	0.34
Denmark*	0	0.74	0.74	0.74	0.74	0	0.56	0.56	0.56	0.56
Estonia*	1	1	1	1	1	0.67	0.67	0.67	0.67	0.67
Finland*	0	0.92	1	1	1	0	0.62	0.79	0.79	0.86
France*	0	0.65	0.54	0.54	0.54	0	0.35	0.27	0.30	0.30
Georgia*	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-
Greece*	0	0	0.5	0.50	0.50	0	0	0.22	0.22	0.22
Holy See	-	-	-	-	-	-	-	-	-	-
Hungary*	0	0	0	0.60	0.67	0	0	0	0.20	0.13
Iceland*	0	0	0.50	0.50	0.50	0	0	0	0	0
Ireland*	0	0.50	0.70	0.70	0.73	0	0	0.4	0.40	0.36
Italy*-	0.45	0.46	0.46	0.47	0.47	0.28	0.28	0.29	0.28	0.30
Latvia*	1	1	1	1	1	0.67	0.63	0.67	0.67	0.67
Liechtenstein*	-	-	-	-	-	-	-	-	-	-
Lithuania*	0	0	0.79	0.79	0.79	0	0	0.57	0.57	0.57
Luxembourg*	0	0.63	0.57	0.67	0.67	0	0.5	0.33	0.38	0.48
Malta*	-	-	-	-	-	-	-	-	-	-
Moldova*	0	0	1	1	1	0	0	1	1	1
Monaco*	-	-	-	-	-	-	-	-	-	-
Montenegro*	-	-	-	-	-	-	-	-	-	-
Netherlands*	1	1	1	1	1	0	0.09	0.09	0.09	0.24
North Macedonia*	0	0	0	0.30	0.30	0	0	0	0	0
Norway*	0	0	0.61	0.60	0.60	0	0	0.50	0.55	0.55
Poland*	0	0	1	0.64	0.62	0	0	0	0.57	0.52
Portugal*	0	0.4	0.36	0.33	0.33	0	0.07	0.05	0.07	0.07
Romania	0.54	0.53	-	-	-	0.30	0.32	-	-	-
Russian Federation*	-	-	-	-	-	-	-	-	-	-
Serbia*	0	0.27	0.26	0.26	0.26	0	0	0	0	0
Slovakia*-	0	0.29	0.52	0.52	0.52	0	0.14	0.40	0.40	0.40
Slovenia*	0	0	0.49	0.49	0.48	0	0	0.15	0.15	0.16
Spain*	0.25	0.38	0.38	0.38	0.79	0	0.13	0.25	0.25	0.68
Sweden*	0	0	0	0.70	0.75	0	0	0	0.60	0.60
Switzerland*	0	0.30	0.30	0.30	0.30	0	0.10	0.10	0.10	0.10
Turkey*	0.8	0.65	0.59	0.60	0.61	0	0.34	0.34	0.35	0.35
Ukraine	-	-	-	-	-	-	-	-	-	-
United Kingdom*	0	0	0	0	0.33	0	0	0	0	0

** Data from EUFGIS (1° and 2° sub-indicator)*
- Data from FOREMATIS (3° sub-indicator)

Source: European Forest Genetic Resources Programme, European Forest Institute.

Data Providers: Thomas Geburek (Austria), Alain Servais (Belgium), Dalibor Ballian (Bosnia and Herzegovina), Mariya Belovarska (Bulgaria), Miran Lanšćak (Croatia), Josef Frýdl (Czech Republic), Gunnar Friis Proschowsky (Denmark), Tiit Maaten and Maret Parv (Estonia), Leena Yrjänä (Finland), Monique Guibert (France), Michaela Haverkamp (Germany), Despina Paitaridou (Greece), Sándor Bordács and Boglárka Némethné Kisgyörgy (Hungary), Thröstur Eysteinsson (Iceland), Brian Clifford (Ireland), Maurizio Marchi (Italy), Inga Zariņa (Latvia), Patrick Insinna (Liechtenstein), Darius Raudonius (Lithuania), Thierry PALGEN (Luxembourg), Valeriu Caisin (Moldova), Czesław Kozioł (Poland), Joukje Buiteveld (Netherlands), Kjersti Bakkebø Fjellstad (Norway), Maria Carolina Varela (Portugal), Ecaterina Nicoleta Apostol (Romania), Andrej Pilipovic (Serbia), Roman Longauer (Slovakia), Marjana Westergren and Hojka Kraigher (Slovenia), Eduardo Notivol Paino (Spain), Sanna Black-Samuelsson (Sweden), Rudow Andreas (Switzerland), Gaye Kandemir (Turkey), Svetlana Los (Ukraine), Amanda Campbell (United Kingdom)

Table 32: Ind. 4.6 Genetic resources 1990-2020 *(Cont.)*

Country	Dynamic conservation (*ex situ*) of non-native species populations						Potential for the production of Forest Reproductive Material					
	Dynamic Conservation Effort (number of populations)						Number of units			Number of species with at least 1 unit		
	1990	2000	2005	2010	2015	2020	2010	2015	2020	2010	2015	2020
Albania*	-	-	-	-	-	-	-	-	-	-	-	-
Andorra*	-	-	-	-	-	-	-	-	-	-	-	-
Austria*	0	0	0	0	0	0	-	3 755	5 266	-	20	26
Belarus*	0	0	0	0	0	0	-	-	-	-	-	-
Belgium*	0	0	0	0	0	0	389	457	471	40	44	47
Bosnia and Herzegovina*	0	0	2	2	2	2	-	-	-	-	-	-
Bulgaria*	0	0	0	0	0	0	4 726	2 658	3 010	31	31	49
Croatia*	0	0	0	0	0	0	-	-	364	-	-	37
Cyprus*-	-	-	-	-	-	-	-	-	16	-	-	4
Czech Republic*-	0	0	0	0	0	0	-	-	22 774	-	-	29
Denmark*	0	3	3	3	3	3	373	316	314	35	35	35
Estonia*	0	0	0	0	0	0	1 106	1 105	175	10	10	11
Finland*	0	0	0	0	0	0	-	-	351	-	-	13
France*	0	0	0	0	0	0	1 799	1 573	1 656	48	53	55
Georgia*	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	347	347	588	650	26 238	20 264	20 264	27	27	27
Greece*	0	0	0	0	0	0	-	-	116	-	-	17
Holy See	-	-	-	-	-	-	-	-	-	-	-	-
Hungary*	0	0	0	0	0	0	3 451	3 571	3 534	55	54	54
Iceland*	0	0	0	0	0	0	-	-	-	-	-	-
Ireland*	0	0	0	0	0	1	358	402	373	23	24	26
Italy*-	4	4	4	4	4	6	-	-	897	-	-	36
Latvia*	0	0	0	0	0	0	647	647	542	15	15	19
Liechtenstein*	-	-	-	-	-	-	0	0	0	0	0	0
Lithuania*	0	0	1	2	2	2	524	534	553	18	24	24
Luxembourg*	0	3	3	3	3	3	16	16	31	7	7	13
Malta*	-	-	-	-	-	-	-	-	-	-	-	-
Moldova*	0	0	0	0	0	0	-	-	-	-	-	-
Monaco*	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro*	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands*	0	0	0	0	0	0	-	809	852	-	72	77
North Macedonia*	-	-	-	-	-	-	-	-	-	-	-	-
Norway*	0	0	0	0	0	0	-	67	67	-	19	19
Poland*	0	0	0	0	71	79	39 625	35 119	29 141	32	33	38
Portugal*	0	0	0	0	0	0	276	415	347	23	24	24
Romania	40	40	43	-	59	59	-	2 930	2 930	-	45	45
Russian Federation*	-	-	-	-	-	-	-	-	-	-	-	-
Serbia*	0	0	0	0	0	0	-	626	710	-	82	74
Slovakia*-	0	0	0	0	0	0	-	-	9 478	-	-	26
Slovenia*	0	0	0	0	0	0	199	205	238	29	33	38
Spain*	0	0	0	0	0	0	7 278	7 981	8 328	57	58	58
Sweden*	0	0	0	0	0	0	-	-	570	-	-	30
Switzerland*	-	-	-	-	-	-	-	-	595	-	-	51
Turkey*	0	0	0	0	0	0	-	-	-	-	-	-
Ukraine	-	-	9	9	9	9	1 405 634	954 408	1 269 831	131	115	114
United Kingdom*	0	0	0	0	0	0	389	528	554	23	23	24

** Data from EUFGIS (1° and 2° sub-indicator)*
- Data from FOREMATIS (3° sub-indicator)

Source: European Forest Genetic Resources Programme, European Forest Institute.

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Table 33: Ind. 4.6 Genetic resources 1990-2020 - Dynamic conservation and utilisation of forest tree genetic resources (*in situ* and *ex situ* genetic conservation) and populations managed for production of forest reproductive material. Data by selected tree species in 1990, 2000, 2005, 2010, 2015 and 2020

Tree species	Dynamic conservation (*in situ* and *ex situ*) of native species populations											
	Dynamic Conservation Effort (number of populations)						Conservation index (0-1)					
	1990	2000	2005	2010	2015	2020	1990	2000	2005	2010	2015	2020
Abies alba	74	158	194	264	323	331	0.23	0.5	0.60	0.60	0.64	0.68
Abies cephalonica	-	-	-	3	3	3	-	-	-	1	1	1
Abies pinsapo	-	-	-	-	-	-	-	-	-	-	-	-
Acer platanoides	-	12	14	19	34	35	-	0.08	0.14	0.19	0.28	0.28
Acer pseudoplatanus	2	34	54	68	88	94	0.07	0.16	0.32	0.36	0.39	0.39
Alnus glutinosa	5	21	29	38	98	106	0.08	0.13	0.23	0.26	0.36	0.39
Alnus incana	-	3	3	6	14	18	-	0.03	0.03	0.10	0.17	0.17
Betula pendula	2	20	29	34	56	67	0.05	0.13	0.24	0.24	0.32	0.37
Betula pubescens	-	17	21	23	39	49	-	0.09	0.13	0.16	0.19	0.25
Carpinus betulus	2	18	22	24	50	55	0.03	0.15	0.24	0.27	0.32	0.32
Castanea sativa	2	9	12	15	17	38	0.10	0.25	0.25	0.25	0.25	0.30
Cedrus libani	-	16	17	18	19	21	-	1	1	1	1	1
Fagus sylvatica	54	189	239	384	485	529	0.19	0.39	0.45	0.52	0.65	0.68
Fraxinus angustifolia	1	2	4	17	17	18	0.04	0.09	0.17	0.26	0.26	0.26
Fraxinus excelsior	12	45	63	82	105	130	0.11	0.24	0.37	0.40	0.47	0.50
Larix decidua	56	121	137	161	197	201	0.23	0.31	0.46	0.46	0.62	0.62
Larix sibirica	-	-	-	-	-	-	-	-	-	-	-	-
Picea abies	77	235	294	415	610	670	0.22	0.44	0.59	0.63	0.70	0.70
Pinus brutia	1	44	49	53	54	62	0.17	0.33	0.33	0.50	0.50	0.50
Pinus canariensis	-	-	-	-	-	-	-	-	-	-	-	-
Pinus cembra	14	49	50	58	58	58	0.50	0.50	0.50	0.63	0.63	0.63
Pinus halepensis	10	12	12	15	15	35	0.10	0.20	0.20	0.30	0.30	0.40
Pinus heldreichii	-	1	2	2	2	2	-	0.14	0.14	0.14	0.14	0.14
Pinus nigra	30	60	76	88	92	109	0.17	0.39	0.39	0.50	0.50	0.50
Pinus pinaster	12	12	12	17	17	62	0.25	0.25	0.25	0.50	0.50	0.75
Pinus pinea	7	10	10	10	10	10	0.11	0.22	0.22	0.22	0.22	0.22
Pinus sylvestris	41	105	171	232	381	445	0.21	0.35	0.47	0.50	0.56	0.62
Populus alba	1	1	3	9	9	9	0.03	0.03	0.07	0.14	0.14	0.14
Populus nigra	2	6	7	20	23	42	0.06	0.11	0.14	0.29	0.29	0.34
Populus tremula	3	20	22	25	61	80	0.03	0.08	0.10	0.13	0.15	0.18
Prunus avium	15	38	45	54	85	103	0.11	0.25	0.28	0.36	0.42	0.44
Quercus cerris	2	8	16	42	46	47	0.06	0.22	0.33	0.33	0.33	0.33
Quercus ilex	2	3	4	5	5	33	0.08	0.15	0.15	0.23	0.23	0.31
Quercus petraea	6	65	120	204	252	287	0.14	0.40	0.57	0.60	0.66	0.71
Quercus pubescens	1	3	4	4	5	8	0.04	0.08	0.12	0.12	0.15	0.23
Quercus robur	83	121	164	234	314	345	0.21	0.37	0.50	0.55	0.63	0.66
Quercus suber	-	4	5	5	6	27	-	0.25	0.50	0.50	0.50	0.75
Tilia cordata	2	22	24	36	75	86	0.06	0.17	0.20	0.260	0.31	0.34
Tilia platyphyllos	-	10	10	13	13	15	-	0.10	0.10	0.13	0.13	0.17
Ulmus glabra	1	17	20	29	35	38	0.03	0.13	0.16	0.24	0.26	0.26
Ulmus laevis	-	4	5	8	17	19	-	0.09	0.13	0.19	0.22	0.22
Ulmus minor	1	2	2	2	2	3	0.03	0.06	0.06	0.06	0.06	0.09

Source: European Forest Genetic Resources Programme, European Forest Institute.

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Table 33: Ind. 4.6 Genetic resources 1990-2020 - Dynamic conservation and utilisation of forest tree genetic resources (*in situ* and *ex situ* genetic conservation) and populations managed for production of forest reproductive material. Data by selected tree species in 1990, 2000, 2005, 2010, 2015 and 2020 *(Cont.)*

Tree species	Dynamic conservation (*in situ* and *ex situ*) of native species populations											
	Ecozone Diversity index (0-1)						Insurance index (0-1)					
	1990	2000	2005	2010	2015	2020	1990	2000	2005	2010	2015	2020
Abies alba	0.21	0.36	0.47	0.47	0.52	0.53	0.12	0.19	0.28	0.29	0.35	0.38
Abies cephalonica	-	-	-	1	1	1	-	-	-	0.50	0.50	0.50
Abies pinsapo	-	-	-	-	-	-	-	-	-	-	-	-
Acer platanoides	-	0.04	0.07	0.09	0.13	0.13	-	0.03	0.03	0.07	0.10	0.10
Acer pseudoplatanus	0.03	0.09	0.18	0.21	0.26	0.26	-	0.04	0.09	0.12	0.15	0.17
Alnus glutinosa	0.03	0.05	0.09	0.11	0.17	0.18	0.01	0.02	0.03	0.04	0.07	0.07
Alnus incana	-	0.01	0.01	0.04	0.07	0.07	-	0.01	0.01	0.01	0.03	0.04
Betula pendula	0.02	0.06	0.11	0.11	0.16	0.19	-	0.02	0.04	0.04	0.069	0.07
Betula pubescens	-	0.05	0.06	0.08	0.09	0.11	-	0.05	0.06	0.06	0.08	0.08
Carpinus betulus	0.01	0.05	0.09	0.10	0.13	0.13	0.01	0.03	0.04	0.04	0.07	0.08
Castanea sativa	0.03	0.10	0.11	0.11	0.11	0.18	-	0.01	0.03	0.05	0.05	0.19
Cedrus libani	-	1	1	1	1	1	-	0.67	1	1	1	1
Fagus sylvatica	0.11	0.26	0.32	0.38	0.44	0.49	0.07	0.19	0.26	0.31	0.38	0.42
Fraxinus angustifolia	0.01	0.03	0.05	0.08	0.08	0.08	-	-	-	0.01	0.01	0.03
Fraxinus excelsior	0.05	0.12	0.19	0.21	0.26	0.29	0.01	0.06	0.11	0.14	0.18	0.21
Larix decidua	0.16	0.21	0.30	0.30	0.37	0.37	0.16	0.21	0.30	0.30	0.37	0.37
Larix sibirica	-	-	-	-	-	-	-	-	-	-	-	-
Picea abies	0.15	0.25	0.39	0.43	0.49	0.49	0.10	0.17	0.27	0.32	0.38	0.38
Pinus brutia	0.05	0.24	0.24	0.29	0.29	0.29	-	0.19	0.19	0.24	0.24	0.29
Pinus canariensis	-	-	-	-	-	-	-	-	-	-	-	-
Pinus cembra	0.32	0.37	0.37	0.47	0.47	0.47	0.16	0.32	0.32	0.42	0.42	0.42
Pinus halepensis	0.07	0.11	0.11	0.15	0.15	0.26	0.07	0.07	0.07	0.11	0.11	0.22
Pinus heldreichii	-	0.05	0.05	0.05	0.05	0.05	-	-	0.05	0.05	0.05	0.05
Pinus nigra	0.14	0.24	0.25	0.32	0.32	0.34	0.07	0.15	0.19	0.20	0.20	0.24
Pinus pinaster	0.11	0.11	0.11	0.16	0.16	0.37	0.11	0.11	0.11	0.16	0.16	0.37
Pinus pinea	0.04	0.08	0.08	0.08	0.08	0.08	0.04	0.08	0.08	0.08	0.08	0.08
Pinus sylvestris	0.12	0.22	0.30	0.32	0.38	0.44	0.07	0.15	0.22	0.25	0.31	0.33
Populus alba	0.01	0.01	0.03	0.05	0.05	0.05	-	-	0.01	0.01	0.01	0.01
Populus nigra	0.02	0.04	0.05	0.12	0.12	0.17	-	0.01	0.01	0.04	0.06	0.10
Populus tremula	0.01	0.04	0.04	0.05	0.06	0.07	0.01	0.03	0.04	0.04	0.05	0.05
Prunus avium	0.04	0.10	0.12	0.17	0.20	0.24	0.02	0.05	0.057	0.06	0.10	0.14
Quercus cerris	0.02	0.07	0.13	0.16	0.16	0.18	0.02	0.05	0.07	0.11	0.11	0.11
Quercus ilex	0.05	0.08	0.08	0.10	0.10	0.20	-	-	0.03	0.03	0.03	0.13
Quercus petraea	0.05	0.19	0.27	0.31	0.34	0.40	0.01	0.10	0.17	0.20	0.22	0.27
Quercus pubescens	0.01	0.02	0.04	0.04	0.05	0.08	-	0.01	0.01	0.01	0.01	0.01
Quercus robur	0.11	0.18	0.25	0.28	0.34	0.38	0.08	0.15	0.21	0.23	0.27	0.30
Quercus suber	-	0.18	0.24	0.24	0.24	0.41	-	0.06	0.06	0.06	0.12	0.30
Tilia cordata	0.02	0.09	0.10	0.12	0.17	0.18	-	0.06	0.07	0.09	0.12	0.13
Tilia platyphyllos	-	0.06	0.06	0.07	0.07	0.08	-	0.02	0.02	0.04	0.04	0.05
Ulmus glabra	0.01	0.06	0.07	0.11	0.12	0.12	-	0.02	0.03	0.05	0.06	0.06
Ulmus laevis	-	0.05	0.06	0.08	0.11	0.11	-	-	-	0.01	0.02	0.04
Ulmus minor	0.01	0.02	0.02	0.02	0.02	0.03	-	-	-	-	-	-

Source: European Forest Genetic Resources Programme, European Forest Institute.

Data Providers: Thomas Geburek (Austria), Alain Servais (Belgium), Dalibor Ballian (Bosnia and Herzegovina), Mariya Belovarska (Bulgaria), Miran Lanšćak (Croatia), Josef Frýdl (Czech Republic), Gunnar Friis Proschowsky (Denmark), Tiit Maaten and Maret Parv (Estonia), Leena Yrjänä (Finland), Monique Guibert (France), Michaela Haverkamp (Germany), Despina Paitaridou (Greece), Sándor Bordács and Boglárka Némethné Kisgyörgy (Hungary), Thröstur Eysteinsson (Iceland), Brian Clifford (Ireland), Maurizio Marchi (Italy), Inga Zariņa (Latvia), Patrick Insinna (Liechtenstein), Darius Raudonius (Lithuania), Thierry PALGEN (Luxembourg), Valeriu Caisin (Moldova), Joukje Buiteveld (Netherlands), Kjersti Bakkebø Fjellstad (Norway), Czesław Kozioł (Poland), Maria Carolina Varela (Portugal), Ecaterina Nicoleta Apostol (Romania), Andrej Pilipovic (Serbia), Roman Longauer (Slovakia), Marjana Westergren and Hojka Kraigher (Slovenia), Eduardo Notivol Paino (Spain), Sanna Black-Samuelsson (Sweden), Rudow Andreas (Switzerland), Gaye Kandemir (Turkey), Svetlana Los (Ukraine), Amanda Campbell (United Kingdom)

Table 33: Ind. 4.6 Genetic resources 1990-2020 - Dynamic conservation and utilisation of forest tree genetic resources (*in situ* and *ex situ* genetic conservation) and populations managed for production of forest reproductive material. Data by selected tree species in 1990, 2000, 2005, 2010, 2015 and 2020 *(Cont.)*

Tree species	Dynamic conservation (*ex situ*) of non-native species populations					
	Dynamic Conservation Effort (number of populations)					
	1990	2000	2005	2010	2015	2020
Abies alba	-	-	-	-	-	-
Abies cephalonica	-	-	-	-	-	-
Abies grandis	-	-	-	-	-	-
Abies pinsapo	-	-	-	-	-	-
Acer platanoides	-	-	-	-	-	-
Acer pseudoplatanus	-	-	-	-	-	-
Alnus incana	-	-	-	-	-	-
Betula pendula	-	-	-	-	-	-
Betula pubescens	-	-	-	-	-	-
Carpinus betulus	-	-	-	-	-	-
Castanea sativa	-	-	-	-	-	-
Cedrus atlantica	-	-	-	-	-	1
Cedrus libani	-	-	-	-	-	-
Fagus sylvatica	-	-	-	-	-	-
Fraxinus angustifolia	-	-	-	-	-	-
Fraxinus excelsior	-	-	-	-	-	-
Larix decidua	-	1	2	3	3	3
Larix kaempferi	-	-	-	-	-	-
Larix sibirica	-	-	-	-	-	-
Picea abies	-	2	2	2	2	2
Picea sitchensis	-	-	-	-	1	1
Pinus brutia	-	-	-	-	-	-
Pinus canariensis	-	-	-	-	-	-
Pinus cembra	-	-	-	-	-	-
Pinus contorta	-	-	-	-	1	1
Pinus halepensis	-	-	-	-	-	-
Pinus nigra	17	17	18	32	42	43
Pinus pinaster	-	-	-	-	-	-
Pinus pinea	-	-	-	-	-	-
Pinus radiata	-	-	-	-	-	1
Pinus sylvestris	-	-	-	-	-	1
Populus alba	-	-	-	-	-	-
Populus nigra	-	-	-	-	-	-
Prunus avium	-	-	-	-	-	-
Pseudotsuga menziesii	14	14	16	20	69	75
Quercus cerris	-	-	-	-	-	-
Quercus ilex	-	-	-	-	-	-
Quercus petraea	-	-	-	-	-	-
Quercus pubescens	-	-	-	-	-	-
Quercus rubra	2	2	2	6	14	15
Quercus suber	-	-	-	-	-	-
Robinia pseudoacacia	7	7	9	18	20	20
Tilia cordata	-	-	-	-	-	-
Tilia platyphyllos	-	-	-	-	-	-
Ulmus minor	-	-	-	-	-	-
Ulmus pumila	-	-	1	1	1	1

Source: European Forest Genetic Resources Programme, European Forest Institute.

Data Providers: Thomas Geburek (Austria), Alain Servais (Belgium), Dalibor Ballian (Bosnia and Herzegovina), Mariya Belovarska (Bulgaria), Miran Lanšćak (Croatia), Josef Frýdl (Czech Republic), Gunnar Friis Proschowsky (Denmark), Tiit Maaten and Maret Parv (Estonia), Leena Yrjänä (Finland), Monique Guibert (France), Michaela Haverkamp (Germany), Despina Paitaridou (Greece), Sándor Bordács and Boglárka Némethné Kisgyörgy (Hungary), Thröstur Eysteinsson (Iceland), Brian Clifford (Ireland), Maurizio Marchi (Italy), Inga Zariņa (Latvia), Patrick Insinna (Liechtenstein), Darius Raudonius (Lithuania), Thierry PALGEN (Luxembourg), Valeriu Caisin (Moldova), Joukje Buiteveld (Netherlands), Kjersti Bakkebø Fjellstad (Norway), Czesław Kozioł (Poland), Maria Carolina Varela (Portugal), Ecaterina Nicoleta Apostol (Romania), Andrej Pilipovic (Serbia), Roman Longauer (Slovakia), Marjana Westergren and Hojka Kraigher (Slovenia), Eduardo Notivol Paino (Spain), Sanna Black-Samuelsson (Sweden), Rudow Andreas (Switzerland), Gaye Kandemir (Turkey), Svetlana Los (Ukraine), Amanda Campbell (United Kingdom)

Table 33: Ind. 4.6 Genetic resources 1990-2020 - Dynamic conservation and utilisation of forest tree genetic resources (*in situ* and *ex situ* genetic conservation) and populations managed for production of forest reproductive material. Data by selected tree species in 1990, 2000, 2005, 2010, 2015 and 2020 *(Cont.)*

Tree species	Potential for the production of Forest Reproductive Material	
	Number of units	Total number of Countries with at least 1 unit
	1990	2000
Abies alba	5 293	13
Abies cephalonica	13	4
Abies grandis	91	9
Abies pinsapo	6	2
Acer platanoides	1 170	18
Acer pseudoplatanus	3 255	18
Alnus glutinosa	5 111	20
Alnus incana	395	13
Betula pendula	3 269	18
Betula pubescens	239	11
Carpinus betulus	1 536	16
Castanea sativa	536	13
Cedrus atlantica	12	2
Cedrus libani	1	1
Fagus sylvatica	10 417	19
Fraxinus angustifolia	545	9
Fraxinus excelsior	2 359	20
Larix decidua	6 512	18
Larix kaempferi	12	2
Larix sibirica	31	3
Picea abies	12 923	19
Picea sitchensis	95	7
Pinus brutia	7	3
Pinus canariensis	33	1
Pinus cembra	201	5
Pinus contorta	41	4
Pinus halepensis	402	4
Pinus nigra	831	13
Pinus pinaster	371	4
Pinus pinea	126	4
Pinus radiata	75	2
Pinus sylvestris	36 143	21
Populus alba	538	13
Prunus avium	2 350	18
Pseudotsuga menziesii	2 923	17
Quercus cerris	462	9
Quercus ilex	778	4
Quercus petraea	4 423	18
Quercus pubescens	142	7
Quercus robur	7 641	21
Quercus rubra	558	15
Quercus suber	319	3
Robinia pseudoacacia	355	11
Tilia cordata	2 813	19
Tilia platyphyllos	261	12

Source: European Forest Genetic Resources Programme, European Forest Institute.

Data Providers: Thomas Geburek (Austria), Alain Servais (Belgium), Dalibor Ballian (Bosnia and Herzegovina), Mariya Belovarska (Bulgaria), Miran Lanšćak (Croatia), Josef Frýdl (Czech Republic), Gunnar Friis Proschowsky (Denmark), Tiit Maaten and Maret Parv (Estonia), Leena Yrjänä (Finland), Monique Guibert (France), Michaela Haverkamp (Germany), Despina Paitaridou (Greece), Sándor Bordács and Boglárka Némethné Kisgyörgy (Hungary), Thröstur Eysteinsson (Iceland), Brian Clifford (Ireland), Maurizio Marchi (Italy), Inga Zariņa (Latvia), Patrick Insinna (Liechtenstein), Darius Raudonius (Lithuania), Thierry PALGEN (Luxembourg), Valeriu Caisin (Moldova), Joukje Buiteveld (Netherlands), Kjersti Bakkebø Fjellstad (Norway), Czesław Kozioł (Poland), Maria Carolina Varela (Portugal), Ecaterina Nicoleta Apostol (Romania), Andrej Pilipovic (Serbia), Roman Longauer (Slovakia), Marjana Westergren and Hojka Kraigher (Slovenia), Eduardo Notivol Paino (Spain), Sanna Black-Samuelsson (Sweden), Rudow Andreas (Switzerland), Gaye Kandemir (Turkey), Svetlana Los (Ukraine), Amanda Campbell (United Kingdom)

Table 34A: Ind. 4.7 Share of continuous forests and forest patches separated by non-forest land, based on Corine Land Cover classifications in 2000 and 2018.

Country	Number of forest patches (n)		Average forest patch size (ha)		Separated forest patches (%)		Continuous forest (%)	
	2000	2018	2000	2018	2000	2018	2000	2018
Albania	1 528	1424	736.9	777.3	6.5	7.3	93.5	92.7
Andorra	-	-	-	-	-	-	-	-
Austria	4 388	4971	852.8	747.5	5.6	6.1	94.4	93.9
Belarus	-	-	-	-	-	-	-	-
Belgium	1 825	1817	344.1	346.2	19.7	19.9	80.3	80.1
Bosnia and Herzegovina	2 795	2587	969.8	1026.9	5.0	5.2	95.0	94.8
Bulgaria	4 074	4288	1039.4	988.3	7.5	7.6	92.5	92.4
Croatia	2 759	2752	961.6	974.4	6.0	5.7	94.0	94.3
Cyprus	133	142	1386.9	1332.3	5.1	5.0	94.9	95.0
Czech Republic	5 470	5113	507.3	544.5	11.9	11.8	88.1	88.2
Denmark	2 436	2809	192.6	185.6	38.0	39.4	62.0	60.6
Estonia	1 778	1647	1406.6	1535.2	3.5	3.3	96.5	96.7
Finland	7 819	7203	3127.9	3370.6	1.1	1.1	98.9	98.9
France	38 113	38064	408.1	405.2	16.6	16.9	83.4	83.1
Georgia	-	-	-	-	-	-	-	-
Germany	19 987	24788	530.4	445.5	12.7	12.7	87.3	87.3
Greece	3 624	3974	996.8	935.5	6.5	7.1	93.5	92.9
Holy See	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Hungary	4 957	5163	399.6	420.2	16.7	15.6	83.3	84.4
Iceland	490	728	110.4	123.4	68.4	64.5	31.6	35.5
Ireland	4 433	5130	148.3	131.1	51.3	48.5	48.7	51.5
Italy	11 443	11382	780.5	784.0	8.7	8.8	91.3	91.2
Latvia	4 187	3341	777.2	1036.0	6.9	5.1	93.1	94.9
Liechtenstein	13	14	438.1	494.9	7.1	8.4	92.9	91.6
Lithuania	5 035	4599	416.5	490.4	15.3	13.1	84.7	86.9
Luxembourg	242	251	385.9	377.4	13.1	13.9	86.9	86.1
Malta	3	3	70.0	68.7	100.0	100.0	0.0	0.0
Monaco	-	-	-	-	-	-	-	-
Montenegro	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	281	300	3149.3	2880.1	1.2	1.3	98.8	98.7
North Macedonia	1 201	1365	262.9	234.5	27.3	29.8	72.7	70.2
Norway	1 028	934	1243.7	1356.7	3.1	2.8	96.9	97.2
Poland	8 666	8647	1324.1	1325.0	4.4	4.5	95.6	95.5
Portugal	16 461	16583	588.2	619.6	11.8	11.2	88.2	88.8
Republic of Moldova	5 186	6017	670.7	555.7	10.4	11.9	89.6	88.1
Romania	12 382	9760	613.2	777.7	7.5	7.5	92.5	92.5
Russian Federation	-	-	-	-	-	-	-	-
Serbia	4 004	3791	812.0	890.0	8.0	7.3	92.0	92.7
Slovakia	1 395	1396	1558.4	1577.4	3.6	3.7	96.4	96.3
Slovenia	1 142	1159	1035.7	1021.0	4.1	4.4	95.9	95.6
Spain	19 388	43480	709.6	306.2	9.7	12.3	90.3	87.7
Sweden	11 058	10983	2685.4	2687.3	1.2	1.2	98.8	98.8
Switzerland	2 438	2099	517.1	622.7	12.2	11.9	87.8	88.1
Turkey	16 070	16674	1209.4	1156.5	6.8	6.5	93.2	93.6
Ukraine	-	-	-	-	-	-	-	-
United Kingdom	9 676	12223	225.3	199.1	35.7	36.6	64.3	63.4
EU28	197 413	227427	802.8	701.3	8.0	8.3	92.0	91.7
Europe	233 418	263317	856.7	763.0	7.6	7.8	92.4	92.2

Source: Derived from CORINE Land Cover products

Table 34B: Ind. 4.7 Share of forest-patch-size classes in total forest area, based on Corine Land Cover classifications in 2000 and 2018.

Country	Forest patches up to 100 hectares (%)		Forest patches between 101 - 1 000 hectares (%)		Forest patches between 1 001 - 10 000 hectares (%)		Forest patches between 10 001 - 100 000 hectares (%)		Forest patches larger than 100 000 hectares (%)	
	2000	2018	2000	2018	2000	2018	2000	2018	2000	2018
Albania	2.8	3.1	8.9	10.0	13.0	14.5	21.3	29.9	54.0	42.6
Andorra	-	-	-	-	-	-	-	-	-	-
Austria	2.6	2.9	6.9	7.1	10.2	11.0	13.7	19.9	66.6	59.1
Belarus	-	-	-	-	-	-	-	-	-	-
Belgium	8.5	8.5	20.7	20.8	15.6	15.6	11.1	11.0	44.1	44.0
Bosnia and Herzegovina	2.7	2.5	4.3	4.7	6.1	5.1	8.1	10.7	78.9	77.1
Bulgaria	2.8	3.1	8.1	8.2	10.4	10.9	5.7	7.2	73.0	70.7
Croatia	3.0	2.9	9.2	9.3	14.3	14.5	22.6	22.5	51.0	50.7
Cyprus	1.7	2.1	9.1	9.5	12.5	14.3	18.2	15.2	58.4	58.9
Czech Republic	4.8	4.7	15.4	15.2	23.2	23.4	37.9	39.6	18.8	17.0
Denmark	16.2	16.8	45.3	46.1	33.8	32.3	4.7	4.7	0.0	0.0
Estonia	2.2	2.1	4.9	4.5	5.6	5.7	9.0	10.2	78.3	77.4
Finland	0.9	0.9	1.8	1.9	2.1	2.0	1.7	2.0	93.5	93.2
France	7.6	7.6	15.3	15.6	18.0	18.3	18.4	18.5	40.7	39.9
Georgia	-	-	-	-	-	-	-	-	-	-
Germany	5.3	5.5	16.2	14.8	24.8	23.0	21.2	21.3	32.5	35.4
Greece	2.5	2.8	8.6	8.6	13.7	13.4	22.9	30.8	52.4	44.5
Holy See	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hungary	7.6	7.0	16.5	15.0	25.7	23.2	41.8	40.9	8.4	13.9
Iceland	30.3	25.9	51.4	53.8	18.3	20.3	0.0	0.0	0.0	0.0
Ireland	21.9	23.9	48.4	40.0	27.0	29.5	2.7	6.5	0.0	0.0
Italy	3.6	3.7	9.2	9.1	8.9	9.1	12.4	12.4	65.9	65.8
Latvia	3.7	2.8	7.6	5.7	9.5	7.9	8.0	6.7	71.3	76.9
Liechtenstein	4.5	4.0	2.7	4.7	92.8	91.4	0.0	0.0	0.0	0.0
Lithuania	6.5	5.8	17.3	15.5	28.9	27.7	24.3	25.3	23.0	25.6
Luxembourg	6.8	5.9	20.9	20.3	21.1	24.6	51.1	49.2	0.0	0.0
Malta	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Monaco	-	-	-	-	-	-	-	-	-	-
Montenegro	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	0.9	0.9	1.9	2.1	1.3	1.5	0.0	0.0	95.9	95.5
North Macedonia	11.3	12.8	32.5	35.2	28.1	24.6	28.1	27.5	0.0	0.0
Norway	1.9	1.7	2.8	2.7	3.8	3.0	20.0	19.8	71.5	72.8
Poland	2.0	2.0	5.5	5.5	8.8	8.8	17.3	17.3	66.5	66.4
Portugal	4.8	4.7	14.5	13.9	23.4	21.9	24.5	25.9	32.7	33.5
Republic of Moldova	4.4	5.7	14.9	15.7	17.2	16.9	22.3	20.8	41.2	40.9
Romania	3.3	3.3	8.9	8.8	13.2	13.3	9.9	10.7	64.8	63.8
Russian Federation	-	-	-	-	-	-	-	-	-	-
Serbia	3.9	3.5	7.4	6.7	6.8	7.8	10.5	9.9	71.4	72.0
Slovakia	1.9	1.8	4.5	4.4	9.8	11.3	17.4	19.4	66.4	63.1
Slovenia	2.4	2.6	5.8	5.4	4.6	6.1	2.1	0.9	85.1	85.0
Spain	3.7	5.5	12.2	13.1	17.1	16.0	18.4	18.0	48.6	47.5
Sweden	0.8	0.8	1.8	1.8	1.8	1.9	0.9	0.8	94.7	94.7
Switzerland	4.7	4.2	13.8	12.8	19.2	18.2	26.9	33.4	35.4	31.4
Turkey	2.1	2.4	10.8	9.6	15.2	12.2	19.0	16.8	52.9	59.0
Ukraine	-	-	-	-	-	-	-	-	-	-
United Kingdom	14.3	16.8	35.9	32.5	37.0	31.7	12.9	19.0	0.0	0.0
EU28	3.5	3.8	9.1	9.0	11.8	11.6	11.1	11.9	64.5	63.7
Europe	3.3	3.5	8.9	8.7	11.7	11.2	11.9	12.4	64.2	64.2

Source: Derived from CORINE Land Cover products

Table 35: Ind. 4.8 Number of threatened forest tree species, classified according to IUCN Red List categories, compared to the total number of tree species, 2015

Country	Forest (1 000 ha)	Total of taxa	Vulnerable		Endangered		Critically endangered		Extinct in the wild	
		Number	Number	% of total	Number	% of total	Number	% of total	Number	% of total
Albania	785									
Andorra	16	-	-	-	-	-	-	-	-	-
Austria	3 881	51	6	11.8	5	9.8	0	0.0	0	0.0
Belarus	8 634	155	-	-	2	1.3	1	0.6	-	-
Belgium	689	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	88	0	0.0	0	0.0	0	0.0	0	0.0
Croatia	1 922	238	2	0.8	0	0.0	1	0.4	0	0.0
Cyprus	173	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	280	-	-	-	-	-	-	-	-
Denmark	625	31	0	0.0	1	3.2	1	3.2	0	0.0
Estonia	2 421	27	1	3.7	1	3.7	0	0.0	0	0.0
Finland	22 409	-	-	-	-	-	-	-	-	-
France	16 836	-	1	-	2	-	0	-	0	-
Georgia	2 822	-	23	-	9	-	1	-	-	-
Germany	11 419	80	1	1.3	5	6.3	1	1.3	0	0.0
Greece	3 903	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-
Hungary	2 061	53	3	5.7	2	3.8	3	5.7	1	1.9
Iceland	48	5	1	20.0	0	0.0	0	0.0	0	0.0
Ireland	755	-	1	-	-	-	-	-	-	-
Italy	9 297	117	0	0.0	0	0.0	2	1.7	0	0.0
Latvia	3 391	-	1	-	1	-	1	-	0	-
Liechtenstein	7	39	0	0.0	0	0.0	0	0.0	0	0.0
Lithuania	2 187	38	1	2.6	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-	-
Netherlands	365	0.0	0	-	0	-	0	-	0	-
North Macedonia	994	-	-	-	-	-	-	-	-	-
Norway	12 141	-	0	-	0	-	0	-	0	-
Poland	9 420	81	1	1.2	4	4.9	1	1.2	0	0.0
Portugal	3 312	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-
Slovakia	1 922	8	5	62.5	2	25.0	1	12.5	0	0.0
Slovenia	1 248	74	0	0.0	-	-	-	-	1	1.4
Spain	18 551	150	1	0.7	-	-	2	1.3	-	-
Sweden	27 980	35	2	5.7	2	5.7	3	8.6	0	0.0
Switzerland	1 252	46	2	4.3	2	4.3	0	0.0	0	0.0
Turkey	21 630	-	-	-	-	-	-	-	-	-
Ukraine	9 657	8	6	75.0	2	25.0	0	0.0	0	0.0
United Kingdom	3 155	-	4	-	5	-	4	-	0	-
EU28	197 413	227427	802.8	701.3	8.0	8.3	92.0	91.7		
Europe	233 418	263317	856.7	763.0	7.6	7.8	92.4	92.2		

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 36: Ind. 4.8 Number of threatened forest species, according to IUCN Red List categories, 2015

Country	Forest (1 000 ha)	Endangered forest species [number]								
		Birds			Mammals			Other verterbrates		
		Vulnerable	Endagered	Critically endangered	Vulnerable	Endagered	Critically endangered	Vulnerable	Endagered	Critically endangered
Albania	785	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-
Austria	3 881	3	3	8	8	3	5	10	6	2
Belarus	8 634	29	18	10	9	5	1	6	4	3
Belgium	689	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	7	3	2	5	1	2	8	4	5
Croatia	1 922	4	5	4	3	3	1	1	3	0
Cyprus	173	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	-	-	-	-	-	-	-
Denmark	625	3	2	1	6	1	0	0	0	0
Estonia	2 421	6	2	3	1	0	0	1	0	0
Finland	22 409	11	8	3	2	3	0	1	1	0
France	16 836	19	8	2	3	1	2	7	3	0
Georgia	2 822	6	2	1	9	1	2	2	2	-
Germany	11 419	7	3	4	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-
Hungary	2 061	12	8	7	2	2	2	-	-	-
Iceland	48	3	0	0	0	0	0	-	-	-
Ireland	755	-	1	-	-	-	-	-	-	-
Italy	9 297	8	2	0	7	2	2	2	0	0
Latvia	3 391	10	2	7	7	1	1	1	0	1
Liechtenstein	7	-	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-	-
Netherlands	365	0	0	0	0	0	0	0	0	0
North Macedonia	994	-	-	-	-	-	-	-	-	-
Norway	12 141	4	2	1	4	3	3	0	0	0
Poland	9 420	4	2	8	1	7	1	1	1	1
Portugal	3 312	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-
Slovakia	1 922	8	9	3	12	6	2	19	10	1
Slovenia	1 248	20	19	-	10	9	-	22	7	-
Spain	18 551	25	-	19	12	-	5	13	-	19
Sweden	27 980	11	3	1	5	2	5	3	0	0
Switzerland	1 252	15	5	2	13	6	5	8	14	1
Turkey	21 630	-	-	-	-	-	-	-	-	-
Ukraine	9 657	12	6	0	14	6	0	8	4	0
United Kingdom	3 155	4	3	0	0	0	0	0	0	0

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 36: Ind. 4.8 Number of threatened forest species, according to IUCN Red List categories, 2015 (Cont.)

Country	Forest (1 000 ha)	Endangered forest species [number]								
		Other invertebrates			Vascular plants			Cryptogams and fungi		
		Vulnerable	Endagered	Critically endangered	Vulnerable	Endagered	Critically endangered	Vulnerable	Endagered	Critically endangered
Albania	785	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-
Austria	3 881	5	1	0	159	86	22	59	21	8
Belarus	8 634	56	13	6	55	51	47	47	30	28
Belgium	689	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	5	1	0	0	0	0	0	0	0
Croatia	1 922	3	4	4	21	6	7	151	68	38
Cyprus	173	-	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	-	-	-	-	-	-	-
Denmark	625	140	73	44	12	6	9	228	208	146
Estonia	2 421	1	1	3	19	10	8	8	10	18
Finland	22 409	288	176	64	19	22	7	245	124	79
France	16 836	2	6	3	437	120	54	-	-	-
Georgia	2 822	2	1	-	12	10	1	-	-	-
Germany	11 419	-	-	-	7	0	0	272	487	525
Greece	3 903	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-
Hungary	2 061	-	-	-	71	110	80	-	-	-
Iceland	48	-	-	-	1	0	0	6	3	5
Ireland	755	7	3	-	7	-	-	2	-	-
Italy	9 297	-	-	-	-	-	-	-	-	-
Latvia	3 391	20	11	15	31	18	27	7	6	15
Liechtenstein	7	-	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-	-
Luxembourg	89	-	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-	-
Netherlands	365	0	0	0	0	0	0	1	0	0
North Macedonia	994	-	-	-	-	-	-	-	-	-
Norway	12 141	307	200	37	38	15	7	274	182	53
Poland	9 420	-	-	-	31	35	32	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-
Slovakia	1 922	403	151	78	115	72	43	49	39	7
Slovenia	1 248	113	99	-	-	-	-	34	47	1
Spain	18 551	10	-	11	34	-	110	-	-	-
Sweden	27 980	202	86	16	25	17	8	325	148	55
Switzerland	1 252	110	84	50	41	16	4	557	386	106
Turkey	21 630	-	-	-	-	-	-	-	-	-
Ukraine	9 657	64	4	0	63	51	0	25	17	0
United Kingdom	3 155	19	26	4	12	11	6	32	15	14

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 37: Ind. 4.9 Area of protected forests by MCPFE Classes, 1990-2020

Country	Forest (1 000 ha)	Forest area (1 000 ha)									
		MCPFE Class 1.1					MCPFE Class 1.2				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	-	8.4	-	-	-	-	55.2	-	-	-
Andorra	16	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Austria	3 899	-	0.0	0.0	0.0	0.0	-	-	-	-	-
Belarus	8 768	-	134.8	134.8	165.8	134.8	-	133.2	137.0	163.6	163.6
Belgium	689	-	-	0.8	11.3	11.3	-	3.8	6.6	6.6	6.6
Bosnia and Herzegovina	2 188	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	47.0	46.0	50.0	58.0	-	61.0	99.0	97.0	77.0	-
Croatia	1 939	22.0	33.0	44.0	44.0	46.6	3.0	7.0	10.0	10.0	8.6
Cyprus	173	0.8	3.4	3.4	3.4	-	2.3	10.6	13.4	13.4	-
Czech Republic	2 677	-	24.5	26.0	27.7	27.8	-	95.7	104.0	99.3	99.3
Denmark	628	0.1	0.1	0.1	0.1	0.1	7.3	7.5	7.5	7.5	17.8
Estonia	2 438	-	96.3	161.4	164.7	169.8	-	43.8	98.8	145.8	162.5
Finland	22 409	-	807.0	1 805.0	1 913.0	1 913.0	-	670.0	910.0	629.0	629.0
France	17 253	-	-	-	0.0	0.0	-	-	100.3	129.0	-
Georgia	2 822	-	-	-	-	-	-	-	-	-	-
Germany	11 419	0.0	0.0	0.0	0.0	0.0	-	91.0	220.0	220.0	220.0
Greece	3 903	139.0	152.0	164.0	164.0	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	0.0	0.0	3.6	3.7	3.7	0.0	0.0	8.9	8.9	8.8
Iceland	51	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Ireland	782	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Italy	9 566	-	238.1	270.5	270.5	270.0	-	1 312.2	1 490.7	1 490.7	1 491.0
Latvia	3 411	4.7	4.7	9.4	8.9	8.4	133.2	152.8	184.8	198.5	200.1
Liechtenstein	7	-	1.3	1.3	1.3	-	-	0.6	0.6	0.6	-
Lithuania	2 201	-	21.0	26.0	26.0	26.0	-	68.0	85.0	87.0	88.0
Luxembourg	89	-	-	1.0	1.3	-	0.0	0.0	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	11.9	11.9	11.9	-	-	31.0	31.0	31.0
Netherlands	370	-	3.0	3.0	3.0	2.9	-	24.0	31.0	33.0	36.4
North Macedonia	1 001	-	-	-	-	-	-	-	-	-	-
Norway	12 180	0.0	0.0	0.0	0.0	0.0	108.0	158.0	430.0	520.0	610.0
Poland	9 483	30.4	51.3	55.6	63.0	72.4	0.0	0.0	0.0	0.0	0.0
Portugal	3 312	22.2	22.2	22.2	22.2	-	0.0	0.0	0.0	0.0	-
Republic of Moldova	387	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Romania	6 929	-	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	0.0	-	-	-	-	0.0	-	-	-
Slovakia	1 926	50.0	60.0	60.0	68.0	68.0	0.0	0.0	0.0	0.0	0.0
Slovenia	1 238	10.4	10.3	9.6	9.6	9.5	59.3	74.1	78.7	77.9	31.5
Spain	18 572	-	-	-	36.0	-	77.4	-	187.5	493.6	-
Sweden	27 980	124.0	169.2	269.7	324.9	360.6	527.1	1 498.3	1 584.0	1 609.7	1 615.6
Switzerland	1 269	-	-	5.2	5.2	5.2	-	-	21.2	34.9	48.6
Turkey	22 220	0.0	0.0	0.0	0.0	0.0	10.6	10.8	11.0	11.6	11.9
Ukraine	9 690	-	-	284.0	290.0	293.0	-	-	229.0	240.0	244.0
United Kingdom	3 190	0.0	0.0	0.0	0.0	0.0	43.0	43.0	43.0	43.0	43.0

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 37: Ind. 4.9 Area of protected forests by MCPFE Classes, 1990-2020 *(Cont.)*

Country	Forest (1 000 ha)	Forest area (1 000 ha)									
		MCPFE Class 1.3					MCPFE Class 2				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	-	47.7	-	-	-	-	29.9	-	-	-
Andorra	16	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Austria	3 899	-	-	-	-	-	-	-	-	-	-
Belarus	8 768	-	443.1	511.1	467.9	467.9	-	628.0	545.6	600.0	597.7
Belgium	689	-	4.5	8.6	8.8	9.0	-	27.2	26.3	26.3	26.3
Bosnia and Herzegovina	2 188	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	0.0	1.0	8.0	22.0	-	23.0	93.0	425.0	546.0	-
Croatia	1 939	138.0	156.0	173.0	214.0	277.0	1.0	3.0	4.0	4.0	2.3
Cyprus	173	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Czech Republic	2 677	-	32.8	32.4	34.0	34.0	-	562.7	588.5	598.5	627.8
Denmark	628	34.2	34.2	34.2	34.2	37.8	0.0	0.0	77.2	77.3	75.3
Estonia	2 438	-	44.5	244.1	224.3	220.7	-	124.8	4.1	4.2	5.9
Finland	22 409	-	534.0	272.0	276.0	276.0	-	579.0	833.0	922.0	922.0
France	17 253	-	-	3 415.3	3 274.0	-	-	-	2 664.4	3 010.0	-
Georgia	2 822	-	-	-	-	-	-	-	-	-	-
Germany	11 419	-	2 048.0	3 086.0	3 086.0	3 086.0	-	4 686.0	5 958.0	5 958.0	5 958.0
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	64.2	149.8	649.2	647.3	646.9	252.1	172.9	210.4	216.3	216.6
Iceland	51	0.4	0.5	0.6	0.6	-	0.0	0.0	0.0	0.0	-
Ireland	782	4.2	6.5	6.5	6.5	6.5	0.0	0.0	0.0	0.0	0.0
Italy	9 566	-	1 323.7	1 503.8	1 503.8	1 505.0	-	-	897.9	897.9	898.0
Latvia	3 411	269.0	260.2	179.2	186.3	190.3	371.0	142.5	159.2	162.6	161.1
Liechtenstein	7	-	0.0	0.0	0.0	-	-	0.2	0.2	0.2	-
Lithuania	2 201	-	71.0	89.0	90.0	92.0	-	136.0	150.0	151.0	148.0
Luxembourg	89	-	-	-	-	-	0.0	0.0	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	120.6	120.6	120.6	0.0	0.0	0.0	0.0	0.0
Netherlands	370	-	23.0	-	-	-	-	33.0	183.0	181.0	177.8
North Macedonia	1 001	-	-	-	-	-	-	-	-	-	-
Norway	12 180	0.0	0.0	0.0	0.0	0.0	53.0	68.0	202.0	242.0	282.0
Poland	9 483	150.8	226.3	243.8	3 016.3	3 019.7	-	1 346.0	1 308.0	451.0	457.2
Portugal	3 312	555.2	577.7	592.4	615.3	-	5.5	6.7	7.7	8.7	-
Republic of Moldova	387	281.3	283.8	308.4	310.6	310.7	44.1	60.6	66.1	75.9	75.9
Romania	6 929	-	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	0.0	-	-	-	-	0.0	-	-	-
Slovakia	1 926	0.0	0.0	477.0	486.0	504.0	582.0	615.0	277.8	285.8	267.8
Slovenia	1 238	-	-	67.8	77.7	60.5	-	51.0	81.1	91.8	143.0
Spain	18 572	1 264.4	-	3 189.7	2 301.6	-	-	-	117.3	1 284.5	-
Sweden	27 980	100.9	121.3	170.6	186.4	189.7	73.7	85.0	92.8	103.7	104.1
Switzerland	1 269	-	-	19.6	31.7	43.8	-	-	222.0	222.0	222.0
Turkey	22 220	2 758.0	2 807.1	2 851.2	3 006.5	3 085.9	1 430.3	1 455.8	1 478.7	1 559.2	1 600.4
Ukraine	9 690	-	-	588.0	606.0	612.0	19.0	22.0	256.0	260.0	261.0
United Kingdom	3 190	247.0	247.0	247.0	247.0	247.0	228.0	228.0	228.0	228.0	228.0

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 38: Ind. 4.9 Area of protected forests and other wooded land by MCPFE Classes, 1990-2020

Country	Forest (1 000 ha)	Forest and other wooded land (1 000 ha)									
		MCPFE Class 1.1					MCPFE Class 1.2				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	-	14.5	-	-	-	-	55.2	-	-	-
Andorra	16	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Austria	3 899	-	0.0	0.0	0.0	0.0	-	28.1	32.2	29.8	33.5
Belarus	8 768	-	134.8	134.8	165.8	134.8	-	133.2	137.0	163.6	163.6
Belgium	689	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 188	1.4	1.4	1.4	2.8	2.8	20.0	20.0	39.8	39.8	39.8
Bulgaria	3 893	47.0	46.0	50.0	58.0	-	61.0	99.0	97.0	77.0	-
Croatia	1 939	25.0	39.0	53.0	53.0	54.0	3.0	7.0	10.0	10.0	12.7
Cyprus	173	0.8	4.8	4.8	4.8	-	7.4	16.7	21.6	21.6	-
Czech Republic	2 677	-	24.5	26.0	27.7	27.8	-	95.7	104.0	99.3	99.3
Denmark	628	-	-	-	-	-	-	-	-	-	-
Estonia	2 438	-	120.1	-	174.3	179.8	-	51.0	-	153.7	170.4
Finland	22 409	-	1 000.0	2 101.0	2 221.0	2 221.0	-	796.0	1 093.0	705.0	705.0
France	17 253	-	-	-	-	-	-	-	-	-	-
Georgia	2 822	-	-	-	-	-	-	-	-	-	-
Germany	11 419	0.0	0.0	0.0	0.0	0.0	-	91.0	220.0	220.0	220.0
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	-	-	-	-	-	-	-	-	-	-
Iceland	51	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Ireland	782	-	-	-	-	-	-	-	-	-	-
Italy	9 566	-	-	297.7	297.7	297.7	-	-	1 649.3	1 649.3	1 649.3
Latvia	3 411	-	-	-		-	-	-	-	-	-
Liechtenstein	7	-	1.3	1.3	1.3	-	-	0.6	0.6	0.6	-
Lithuania	2 201	-	21.0	26.0	26.0	26.0	-	68.0	85.0	87.0	88.0
Luxembourg	89	-	0.2	-	-	-	0.0	0.0	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	14.1	14.1	14.1	-	-	36.8	36.8	36.8
Netherlands	370	-	3.0	3.0	3.0	2.9	-	24.0	31.0	33.0	36.4
North Macedonia	1 001	-	-	-	10.7	-	-	-	-	115.7	-
Norway	12 180	0.0	0.0	0.0	0.0	0.0	175.0	229.0	635.0	758.0	881.0
Poland	9 483	30.4	51.3	55.6	63.0	72.4	0.0	0.0	0.0	0.0	0.0
Portugal	3 312	22.2	22.2	22.2	22.2	-	0.0	0.0	0.0	0.0	-
Republic of Moldova	387	-	-	-	-	-	-	-	-	-	-
Romania	6 929	-	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	11 696.9	12 325.4	12 325.4	-	801.2	4 080.1	4 387.4	4 387.4	-
Serbia	2 720	-	0.0	-	-	-	-	0.0	-	-	-
Slovakia	1 926	61.0	71.0	71.0	79.0	79.0	0.0	0.0	0.0	0.0	0.0
Slovenia	1 238	10.4	10.3	9.6	9.6	9.6	59.3	74.1	99.7	98.9	98.9
Spain	18 572	-	-	-	57.5	-	195.4	-	431.0	946.9	-
Sweden	27 980	127.6	172.8	273.9	329.1	365.0	549.3	1 563.3	1 650.1	1 676.1	1 682.1
Switzerland	1 269	-	-	5.0	4.0	5.0	-	-	26.0	20.0	42.0
Turkey	22 220	0.0	0.0	0.0	0.0	0.0	11.0	11.2	11.4	12.0	12.3
Ukraine	9 690	-	-	-	-	-	-	-	-	-	-
United Kingdom	3 190	-	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 38: Ind. 4.9 Area of protected forests and other wooded land by MCPFE Classes, 1990-2020 *(Cont.)*

Country	Forest (1 000 ha)	Forest and other wooded land (1 000 ha)									
		MCPFE Class 1.3					MCPFE Class 2				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	-	47.7	-	-	-	-	29.9	-	-	-
Andorra	16	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Austria	3 899	-	88.5	259.0	471.8	487.6	-	902.5	367.4	333.2	357.4
Belarus	8 768	-	443.1	511.1	467.9	467.9	-	628.0	545.6	600.0	597.7
Belgium	689	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 188	-	-	-	-	-	0.0	43.2	55.1	55.1	55.1
Bulgaria	3 893	0.0	1.0	8.0	22.0	-	23.0	93.0	425.0	546.0	-
Croatia	1 939	166.0	190.0	212.0	253.0	345.9	1.0	3.0	4.0	4.0	3.0
Cyprus	173	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-
Czech Republic	2 677	-	32.8	32.4	34.0	34.0	-	562.7	588.5	598.5	627.8
Denmark	628	-	-	-	-	-	0.0	0.0	85.8	85.5	83.5
Estonia	2 438	-	45.4	-	238.8	236.0	-	144.5	-	4.5	6.1
Finland	22 409	-	679.0	285.0	293.0	293.0	-	593.0	841.0	1 013.0	1 013.0
France	17 253	-	-	-	-	-	-	-	-	-	-
Georgia	2 822	-	-	-	-	-	-	-	-	-	-
Germany	11 419	-	2 048.0	3 086.0	3 086.0	3 086.0	-	4 686.0	5 958.0	5 958.0	5 958.0
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	-	-	-	652.1	-	-	-	-	219.9	-
Iceland	51	10.0	11.6	13.9	14.8	-	0.0	0.0	0.0	0.0	-
Ireland	782	-	-	-	-	-	-	-	-	-	-
Italy	9 566	-	-	1 699.4	1 699.4	1 699.4	838.0	-	1 059.2	1 059.2	1 059.2
Latvia	3 411	-	-	-	-	-	-	-	-	-	-
Liechtenstein	7	-	0.0	0.0	0.0	-	-	0.2	0.2	0.2	-
Lithuania	2 201	-	71.0	89.0	90.0	92.0	-	136.0	150.0	151.0	148.0
Luxembourg	89	-	-	-	-	-	0.0	0.0	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	141.6	141.6	141.6	0.0	0.0	0.0	0.0	0.0
Netherlands	370	-	23.0	23.0	23.0	-	-	33.0	183.0	181.0	177.8
North Macedonia	1 001	-	-	-	3.4	-	-	-	-	75.8	-
Norway	12 180	0.0	0.0	0.0	0.0	0.0	59.0	81.0	264.0	324.0	384.0
Poland	9 483	150.8	226.3	243.8	3 016.3	3 019.7	-	1 346.0	1 308.0	451.0	457.2
Portugal	3 312	755.5	723.5	704.9	668.7	-	8.4	8.8	9.3	9.4	-
Republic of Moldova	387	-	-	-	-	-	-	-	-	-	-
Romania	6 929	-	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	108.2	93.4	30.3	30.3	-	-	93.1	91.2	91.2	-
Serbia	2 720	-	0.0	-	-	-	-	0.0	-	-	-
Slovakia	1 926	0.0	0.0	488.0	497.0	515.0	593.0	626.0	278.0	286.0	268.0
Slovenia	1 238	-	-	67.8	77.7	77.7	-	51.0	81.1	91.8	91.8
Spain	18 572	2 242.5	-	4 822.5	3 274.0	-	-	-	210.0	2 143.5	-
Sweden	27 980	101.6	122.1	175.0	191.8	195.3	74.7	85.9	93.8	104.7	105.1
Switzerland	1 269	-	-	11.0	23.0	40.0	-	-	-	222.0	222.0
Turkey	22 220	2 857.3	2 905.2	2 947.6	3 105.5	3 185.0	1 481.8	1 506.6	1 528.6	1 610.5	1 651.8
Ukraine	9 690	-	-	-	-	-	-	-	-	-	-
United Kingdom	3 190	-	-	-	-	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 39: Ind. 5 Area of protective forests, 1990-2020

Country	Forest (1 000 ha)	Forest area (1 000 ha) designated to protect:									
		soil, water and other forest ecosystem functions					infrastructure and managed natural resources				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	87	97	176	171	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 899	654	679	707	711	716	-	-	-	-	-
Belarus	8 768	622	1 245	1 257	1 343	1 430	19.8	44.8	31.5	35.0	35.0
Belgium	689	-	179	171	171	171	-	0.0	0.0	0.0	0.0
Bosnia and Herzegovina	2 188	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	430	433	439	360	-	200.0	232.0	144.0	55.0	-
Croatia	1 939	51	66	80	71	242	2.0	2.0	2.0	2.0	2.0
Cyprus	173	0	0	0	0	-	0.0	0.0	0.0	0.0	-
Czech Republic	2 677	-	167	245	252	253	-	176.3	274.6	284.2	285.1
Denmark	628	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Estonia	2 438	153	256	162	137	137	-	0.0	0.0	0.0	0.0
Finland	22 409	-	-	-	-	-	-	-	-	-	-
France	17 253	-	-	-	-	-	-	-	-	-	-
Georgia	2 822	2 752	2 761	2 822	2 822	2 822	-	-	-	-	-
Germany	11 419	-	2 981	4 616	-	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	170	143	176	183	191	60.2	38.3	26.8	24.7	19.1
Iceland	51	10	12	14	15	15	0.0	0.0	0.0	0.0	0.0
Ireland	782	-	-	-	-	-	-	-	-	-	-
Italy	9 566	6 973	7 427	7 889	8 124	8 370	61.0	61.0	61.0	61.0	61.0
Latvia	3 411	51	71	171	206	218	0.0	0.0	0.0	0.0	0.0
Liechtenstein	7	-	-	-	-	-	-	-	-	-	-
Lithuania	2 201	171	178	192	193	135	-	71.0	76.0	78.0	82.0
Luxembourg	89	-	1	1	12	-	0.0	0.0	0.0	0.0	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	106	-	-	-	-	-
Netherlands	370	-	-	5	5	2	-	-	0.0	0.0	0.0
North Macedonia	1 001	-	-	-	-	-	-	-	-	-	-
Norway	12 180	-	-	-	-	-	-	-	-	-	-
Poland	9 483	1 356	2 596	2 814	3 236	3 282	-	-	-	-	-
Portugal	3 312	-	-	-	380	-	-	-	-	-	-
Republic of Moldova	387	27	29	215	222	222	-	-	-	-	2.8
Romania	6 929	1 879	2 485	2 543	2 694	2 705	109.0	166.5	170.4	180.5	181.3
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	162	162	-	-	-	1.0	1.0	-	-
Slovakia	1 926	239	287	310	314	316	-	-	-	-	-
Slovenia	1 238	-	74	249	300	300	-	0.1	0.3	0.3	0.3
Spain	18 572	3 260	4 329	4 609	4 643	4 648	0.0	0.0	0.0	0.0	0.0
Sweden	27 980	-	-	-	-	-	-	-	-	-	-
Switzerland	1 269	-	8	13	16	18	-	539.0	542.4	543.1	543.9
Turkey	22 220	7 794	7 946	8 430	8 561	8 806	17.6	17.9	18.6	19.2	19.7
Ukraine	9 690	2 782	2 228	2 394	2 435	2 507	-	731.0	697.0	702.0	723.0
United Kingdom	3 190	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 40: Ind. 5 Area of protective forests and other wooded land, 1990-2020

Country	Forest (1 000 ha)	Forest and other wooded land (1 000 ha) designated to protect:									
		soil, water and other forest ecosystem functions					infrastructure and managed natural resources				
	2020	1990	2000	2010	2015	2020	1990	2000	2010	2015	2020
Albania	785	-	134	212	206	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 899	746	773	818	817	818	-	165.0	377.7	385.0	772.0
Belarus	8 768	622	1 245	1 257	1 343	1 430	19.8	44.8	31.5	35.0	35.0
Belgium	689	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 188	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 893	430	538	439	360	-	200.0	232.0	144.0	55.0	-
Croatia	1 939	56	94	133	124	319	2.0	2.0	2.0	2.0	2.0
Cyprus	173	0	0	0	0	-	0.0	0.0	0.0	0.0	-
Czech Republic	2 677	-	167	245	252	253	-	176.3	274.6	284.2	285.1
Denmark	628	-	-	-	-	-	-	-	-	-	-
Estonia	2 438	-	276	-	151	153	-	0.0	0.0	0.0	0.0
Finland	22 409	-	-	-	-	-	-	-	-	-	-
France	17 253	-	-	-	-	-	-	-	-	-	-
Georgia	2 822	-	-	-	-	-	-	-	-	-	-
Germany	11 419	-	2 981	4 616	5 500	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 053	-	-	-	-	-	-	-	-	-	-
Iceland	51	138	146	155	159	163	0.0	0.0	0.0	0.0	0.0
Ireland	782	-	-	-	-	-	-	-	-	-	-
Italy	9 566	7 958	8 486	9 020	9 288	-	61.0	61.0	61.0	61.0	-
Latvia	3 411	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0
Liechtenstein	7	-	-	-	-	-	-	-	-	-	-
Lithuania	2 201	171	178	192	193	135	-	71.0	76.0	78.0	82.0
Luxembourg	89	-	1	1	-	-	0.0	0.0	0.0	0.0	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	152	-	-	-	-	0.0
Netherlands	370	-	-	5	5	2	-	-	0.0	0.0	0.0
North Macedonia	1 001	-	-	-	-	-	-	-	-	-	-
Norway	12 180	-	-	-	-	-	-	-	-	-	-
Poland	9 483	1 356	2 596	2 814	3 236	3 282	-	-	-	-	-
Portugal	3 312	-	-	-	380	-	-	-	-	-	-
Republic of Moldova	387	-	-	-	-	-	-	-	-	-	-
Romania	6 929	-	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	64 079	70 386	74 948	74 948	-	84 865	99 573	71 343	71 343	-
Serbia	2 720	-	179	-	-	-	-	1.5	-	-	-
Slovakia	1 926	259	307	331	335	336	-	-	-	-	-
Slovenia	1 238	-	-	-	-	-	-	-	-	-	-
Spain	18 572	5 383	6 510	6 601	6 659	6 660	0.0	0.0	0.0	0.0	0.0
Sweden	27 980	-	-	-	-	-	-	-	-	-	-
Switzerland	1 269	-	13	17	18	20	-	552.7	554.4	554.3	554.2
Turkey	22 220	8 070	8 227	8 715	8 842	9 088	18.2	18.5	19.2	19.8	20.3
Ukraine	9 690	2 898	2 385	2 429	2 414	2 533	-	731.0	697.0	702.0	723.0
United Kingdom	3 190	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 41: Ind. 6.1 Ownership of forests, 1990-2015

Country	Forest (1 000 ha)	Forest (1 000 ha)							
		Public				Private			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	1 045	1 024	1 014	-	0	7	29	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	874	928	878	904	2 363	2 332	2 527	2 505
Belarus	8 634	7 780	8 273	8 630	8 634	-	-	-	-
Belgium	689	294	290	317	326	383	377	364	363
Bosnia and Herzegovina	2 161	-	1 556	1 547	1 589	-	555	555	571
Bulgaria	3 833	3 327	3 092	3 286	3 365	0	283	451	468
Croatia	1 922	1 400	1 398	1 376	1 366	450	487	544	556
Cyprus	173	106	106	119	-	55	66	54	-
Czech Republic	2 668	-	-	2 037	2 019	-	-	621	650
Denmark	625	140	138	139	150	392	434	433	462
Estonia	2 421	2 206	897	931	1 177	0	951	1 058	1 133
Finland	22 409	6 722	7 209	6 683	6 861	15 153	15 210	15 488	15 397
France	16 836	3 755	3 967	4 275	4 358	10 681	11 322	12 144	12 478
Georgia	2 822	2 752	2 761	2 822	2 822	0	0	0	0
Germany	11 419	5 987	5 993	5 932	5 933	4 606	4 945	5 477	5 486
Greece	3 903	2 557	2 790	2 907	-	742	811	845	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	1 792	1 152	1 170	1 169	9	461	861	864
Iceland	48	6	9	11	11	11	20	34	37
Ireland	755	353	397	392	391	111	234	328	364
Italy	9 297	2 549	2 811	3 032	-	5 041	5 558	5 996	-
Latvia	3 391	3 132	1 749	1 762	1 741	32	1 463	1 605	1 642
Liechtenstein	7	6	6	6	6	1	1	1	1
Lithuania	2 187	1 945	1 562	1 367	1 348	0	458	803	839
Luxembourg	89	40	39	41	41	46	48	48	48
Malta	0	0	0	0	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	381	433	433	-	245	394	394
Netherlands	365	176	178	181	177	169	182	192	188
North Macedonia	994	818	848	880	882	94	109	81	112
Norway	12 141	-	-	1 488	-	-	-	9 642	-
Poland	9 420	7 407	7 535	7 643	7 655	1 475	1 524	1 686	1 765
Portugal	3 312	87	91	94	97	3 312	3 190	3 158	3 215
Republic of Moldova	386	295	315	326	331	0	0	2	3
Romania	6 901	6 371	6 010	4 363	4 249	0	356	2 152	2 306
Russian Federation	809 090	884 094	880 875	882 310	-	0	0	-	-
Serbia	2 720	1 143	1 246	1 382	-	1 170	1 214	1 213	-
Slovakia	1 922	1 902	995	963	926	0	821	776	638
Slovenia	1 248	481	397	315	290	718	836	932	947
Spain	18 551	4 359	4 962	5 370	5 255	9 545	11 206	12 944	13 260
Sweden	27 980	6 628	6 652	6 565	6 224	21 435	21 511	21 508	21 756
Switzerland	1 252	302	319	344	360	851	877	891	892
Turkey	21 630	19 782	20 134	21 072	21 595	1	14	11	36
Ukraine	9 657	9 274	9 503	9 532	9 641	-	7	16	16
United Kingdom	3 155	963	889	868	871	361	410	435	454

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 42: Ind. 6.1 Number of forest holdings by ownership categories, 1990-2015

Country	Forest (1 000 ha)	Number of holdings							
		Public				Private			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	2 767	2 081	1 906	2 123	211 697	168 819	143 725	137 447
Belarus	8 634	117	116	117	118	-	-	-	0
Belgium	689	814	877	938	965	111 000	121 720	132 440	132 095
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	175	382	535	431	0	-	-	-
Croatia	1 922	527	607	681	677	600 000	600 000	600 000	600 000
Cyprus	173	4	4	4	-	-	-	-	-
Czech Republic	2 668	-	-	7 657	7 947	-	-	281 439	291 736
Denmark	625	344	331	152	195	20 219	26 217	23 181	24 638
Estonia	2 421	-	-	-	-	-	-	97 272	112 922
Finland	22 409	-	-	-	-	437 000	447 100	442 236	442 548
France	16 836	16 528	16 753	16 664	16 775	3 676 000	3 483 304	3 313 395	-
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	11 609	9 390	8 591	8 500	325 037	263 542	208 106	200 000
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	2 099	992	1 364	1 422	117	17 519	34 811	38 017
Iceland	48	55	58	261	288	49	187	613	2 185
Ireland	755	-	-	317	317	2 534	11 267	18 083	21 487
Italy	9 297	-	-	-	-	-	-	-	-
Latvia	3 391	-	466	-	-	-	99 606	148 063	135 302
Liechtenstein	7	15	15	-	-	584	584	-	-
Lithuania	2 187	51	51	47	47	0	134 604	244 550	249 109
Luxembourg	89	243	243	243	-	13 080	13 080	13 080	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	18	20	20	-	-	-	-
Netherlands	365	2 992	2 333	2 110	2 061	34 751	29 432	27 727	27 083
North Macedonia	994	31	2	-	-	-	-	-	-
Norway	12 141	-	-	1 339	-	-	-	151 482	-
Poland	9 420	-	-	2 718	-	-	-	1 122 540	-
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	1 826	1 737	-	-	-	-	-
Serbia	2 720	213	207	-	-	500 000	500 000	-	-
Slovakia	1 922	-	165	213	187	0	3 658	6 346	6 732
Slovenia	1 248	-	-	400	180	-	280 735	313 014	286 037
Spain	18 551	-	-	-	-	-	-	-	-
Sweden	27 980	-	-	938	1 006	-	-	237 934	233 543
Switzerland	1 252	-	-	-	-	-	-	-	-
Turkey	21 630	1	1	1	1	123	154	152	446
Ukraine	9 657	607	630	727	727	-	1 435	3 208	3 208
United Kingdom	3 155	-	-	12 320	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 43: Ind. 6.1 Ownership, area and number of holdings of forest in size classes, 2015

Country	Forest (1 000 ha)	Public					
		<10 ha		11 - 500 ha		≥ 500 ha	
		Area (1 000 ha)	Number of holdings	Area (1 000 ha)	Number of holdings	Area (1 000 ha)	Number of holdings
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	4	659	81	1 326	818	138
Belarus	8 634	0	0	0	0	8 634	118
Belgium	689	1	483	45	342	280	140
Bosnia and Herzegovina	2 161	-	-	-	-	-	-
Bulgaria	3 833	0	7	19	85	3 346	339
Croatia	1 922	0	6	34	144	1 332	527
Cyprus	173	-	-	-	-	-	-
Czech Republic	2 668	9	4 217	277	3 401	1 733	329
Denmark	625	1	14	16	149	133	32
Estonia	2 421	-	-	-	-	-	-
Finland	22 409	-	-	-	-	-	-
France	16 836	8	1 575	1 572	13 159	2 777	2 041
Georgia	2 822	-	-	-	-	-	-
Germany	11 419	-	0	-	-	-	-
Greece	3 903	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-
Hungary	2 061	3	783	30	455	1 136	184
Iceland	48	0	169	9	116	2	3
Ireland	755	0	0	25	86	365	231
Italy	9 297	-	-	-	-	-	-
Latvia	3 391	-	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	0	0	0	0	1 348	47
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	0	0	0	0	433	20
Netherlands	365	21	1 802	23	228	133	31
North Macedonia	994	-	-	-	-	-	-
Norway	12 141	-	-	-	-	-	-
Poland	9 420	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-
Slovakia	1 922	-	39	-	96	-	52
Slovenia	1 248	0	0	49	179	241	1
Spain	18 551	-	-	-	-	-	-
Sweden	27 980	0	86	98	460	6 126	460
Switzerland	1 252	-	-	-	-	-	-
Turkey	21 630	-	-	-	-	21 595	1
Ukraine	9 657	-	7	108	116	9 533	604
United Kingdom	3 155	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 43: Ind. 6.1 Ownership, area and number of holdings of forest in size classes, 2015 *(Cont.)*

Country	Forest (1 000 ha)	Private					
		<10 ha		11 - 500 ha		≥ 500 ha	
		Area (1 000 ha)	Number of holdings	Area (1 000 ha)	Number of holdings	Area (1 000 ha)	Number of holdings
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	378	95 881	1 466	41 134	660	432
Belarus	8 634	-	-	-	-	-	-
Belgium	689	128	126 636	220	5 440	15	19
Bosnia and Herzegovina	2 161	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-
Croatia	1 922	532	599 998	0	0	24	2
Cyprus	173	-	-	-	-	-	-
Czech Republic	2 668	289	287 908	140	3 696	221	132
Denmark	625	55	19 009	205	5 516	203	113
Estonia	2 421	258	91 502	559	21 315	317	105
Finland	22 409	-	208 793	-	233 755	-	-
France	16 836	-	-	-	-	-	-
Georgia	2 822	-	-	-	-	-	-
Germany	11 419	-	-	-	-	-	-
Greece	3 903	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-
Hungary	2 061	89	26 144	518	11 768	257	105
Iceland	48	2	1 311	33	871	2	3
Ireland	755	93	14 505	256	6 971	15	11
Italy	9 297	-	-	-	-	-	-
Latvia	3 391	366	106 365	903	28 787	373	150
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	468	236 090	306	12 975	65	44
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-
Netherlands	365	56	26 221	44	823	87	40
North Macedonia	994	-	-	-	-	-	-
Norway	12 141	-	-	-	-	-	-
Poland	9 420	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-
Slovakia	1 922	-	3 492	-	2 980	-	260
Slovenia	1 248	442	267 812	436	18 205	70	23
Spain	18 551	-	-	-	-	-	-
Sweden	27 980	449	84 292	11 528	146 783	9 779	2 468
Switzerland	1 252	-	-	-	-	-	-
Turkey	21 630	36	446	-	-	-	-
Ukraine	9 657	16	3 208	-	-	-	-
United Kingdom	3 155	-	-	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 44: Ind. 6.2 Contribution of forest sector to GVA, 2000-2015

Country	Forest (1 000 ha)	Gross Value Added					
		Forestry (ISIC/NACE 02)					
		Million EUR			% of total GVA		
	2015	2000	2010	2015	2000	2010	2015
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	861	1 080	1 220	0.45	0.41	0.40
Belarus	8 634	61	192	283	0.50	0.50	0.60
Belgium	689	100	87	93	0.04	0.03	0.03
Bosnia and Herzegovina	2 161	-	107	144	-	0.97	1.16
Bulgaria	3 833	53	194	210	0.42	0.58	0.54
Croatia	1 922	129	203	212	0.65	0.53	0.56
Cyprus	173	2	17	14	0.02	0.10	0.090
Czech Republic	2 668	505	832	1 073	0.83	0.59	0.71
Denmark	625	129	214	310	0.08	0.10	0.13
Estonia	2 421	96	152	227	1.74	1.18	1.27
Finland	22 409	2 239	2 750	3 318	1.88	1.68	1.83
France	16 836	2 001	2 368	3 393	0.15	0.12	0.15
Georgia	2 822	-	27	34	-	0.30	0.32
Germany	11 419	1 723	1 613	2 501	0.09	0.07	0.09
Greece	3 903	53	49	73	0.04	0.02	0.05
Holy See	0	-	-	-	-	-	-
Hungary	2 061	142	182	214	0.32	0.22	0.23
Iceland	48	1	1	0	0.01	0.010	0.00
Ireland	755	51	144	8	0.05	0.09	0.00
Italy	9 297	748	1 123	1 229	0.07	0.08	0.08
Latvia	3 391	164	511	360	1.55	2.28	1.68
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	70	140	159	0.59	0.55	0.47
Luxembourg	89	19	12	14	0.09	0.03	0.03
Malta	0	-	-	-	0.00	0.00	0.00
Monaco	0	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-
Netherlands	365	66	104	111	0.02	0.02	0.02
North Macedonia	994	-	-	-	-	-	-
Norway	12 141	585	695	577	0.36	0.24	0.19
Poland	9 420	-	1 039	1 329	-	0.33	0.35
Portugal	3 312	647	657	882	0.58	0.43	0.56
Republic of Moldova	386	-	11	14	-	0.00	0.00
Romania	6 901	80	267	648	0.24	0.22	0.40
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	64	80	90	0.68	0.32	0.32
Slovakia	1 922	168	454	728	0.84	0.74	1.02
Slovenia	1 248	94	169	203	0.57	0.53	0.60
Spain	18 551	1 443	959	1 092	0.25	0.10	0.11
Sweden	27 980	2 823	3 720	3 936	1.14	1.15	0.99
Switzerland	1 252	297	281	327	0.11	0.07	0.06
Turkey	21 630	402	883	1 101	0.14	0.15	0.14
Ukraine	9 657	-	-	-	-	-	-
United Kingdom	3 155	462	456	926	0.03	0.03	0.04

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 44: Ind. 6.2 Contribution of forest sector to GVA, 2000-2015 *(Cont.)*

Country	Forest (1 000 ha)	Gross Value Added					
		Manufacture of wood and articles in wood (ISIC/NACE 16)					
		Million EUR			% of total GVA		
	2015	2000	2010	2015	2000	2010	2015
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	1 703	2 050	2 292	0.89	0.78	0.75
Belarus	8 634	87	229	311	0.80	0.50	0.60
Belgium	689	674	820	742	0.29	0.25	0.20
Bosnia and Herzegovina	2 161	-	94	122	-	0.86	0.98
Bulgaria	3 833	25	94	132	0.20	0.28	0.34
Croatia	1 922	129	174	236	0.65	0.45	0.63
Cyprus	173	55	66	33	0.56	0.39	0.21
Czech Republic	2 668	480	897	914	0.79	0.63	0.60
Denmark	625	719	523	539	0.47	0.25	0.23
Estonia	2 421	130	286	480	2.35	2.22	2.68
Finland	22 409	1 411	1 235	1 195	1.18	0.75	0.66
France	16 836	3 068	2 864	3 054	0.23	0.14	0.14
Georgia	2 822	-	-	-	-	-	-
Germany	11 419	7 407	6 177	7 230	0.39	0.27	0.26
Greece	3 903	303	243	53	0.24	0.12	0.03
Holy See	0	-	-	-	-	-	-
Hungary	2 061	218	224	240	0.50	0.27	0.26
Iceland	48	-	-	-	-	-	-
Ireland	755	374	164	192	0.39	0.11	0.08
Italy	9 297	6 195	5 622	4 598	0.56	0.39	0.31
Latvia	3 391	320	647	566	3.01	2.88	2.65
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	151	317	477	1.27	1.26	1.42
Luxembourg	89	38	48	40	0.18	0.13	0.08
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-
Netherlands	365	960	878	923	0.24	0.15	0.15
North Macedonia	994	-	-	-	-	-	-
Norway	12 141	683	876	919	0.42	0.30	0.30
Poland	9 420	-	2 157	2 712	-	0.68	0.71
Portugal	3 312	983	783	952	0.88	0.52	0.61
Republic of Moldova	386	8	9	14	0.00	0.00	0.00
Romania	6 901	262	1 655	981	0.78	1.34	0.61
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	58	86	123	0.62	0.35	0.44
Slovakia	1 922	148	640	798	0.74	1.04	1.12
Slovenia	1 248	162	203	270	0.98	0.64	0.80
Spain	18 551	2 524	2 270	1 926	0.43	0.23	0.20
Sweden	27 980	1 779	2 089	2 420	0.72	0.65	0.61
Switzerland	1 252	1 554	2 334	2 910	0.55	0.55	0.49
Turkey	21 630	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-
United Kingdom	3 155	3 305	2 612	3 936	0.21	0.16	0.17

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 44: Ind. 6.2 Contribution of forest sector to GVA, 2000-2015 *(Cont.)*

Country	Forest (1 000 ha)	Gross Value Added					
		Manufacture of paper and paper products (ISIC/NACE 17)					
		Million EUR			% of total GVA		
	2015	2000	2010	2015	2000	2010	2015
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	1 783	1 695	1 903	0.94	0.64	0.62
Belarus	8 634	25	86	83	0.20	0.20	0.20
Belgium	689	1 248	906	1 063	0.54	0.28	0.29
Bosnia and Herzegovina	2 161	-	27	55	-	0.24	0.45
Bulgaria	3 833	19	115	147	0.15	0.35	0.38
Croatia	1 922	95	101	114	0.48	0.26	0.30
Cyprus	173	18	19	15	0.18	0.11	0.09
Czech Republic	2 668	382	589	663	0.63	0.42	0.44
Denmark	625	557	384	413	0.36	0.18	0.18
Estonia	2 421	19	58	56	0.35	0.45	0.31
Finland	22 409	5 615	3 063	3 124	4.71	1.87	1.73
France	16 836	5 593	4 576	5 081	0.42	0.23	0.23
Georgia	2 822	-	-	-	-	-	-
Germany	11 419	9 812	9 598	11 202	0.51	0.41	0.41
Greece	3 903	303	270	157	0.24	0.14	0.10
Holy See	0	-	-	-	-	-	-
Hungary	2 061	154	292	365	0.35	0.35	0.39
Iceland	48	30	9	12	0.30	0.10	0.10
Ireland	755	272	186	206	0.28	0.12	0.08
Italy	9 297	4 761	4 711	5 133	0.43	0.33	0.35
Latvia	3 391	37	50	36	0.35	0.22	0.17
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	40	105	181	0.34	0.42	0.54
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	6	-	-	0.10	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-
Netherlands	365	1 451	1 580	1 526	0.36	0.28	0.25
North Macedonia	994	-	-	-	-	-	-
Norway	12 141	805	334	286	0.49	0.12	0.09
Poland	9 420	-	1 649	2 497	-	0.52	0.65
Portugal	3 312	866	980	897	0.78	0.65	0.57
Republic of Moldova	386	35	32	28	-	0.00	0.00
Romania	6 901	120	282	236	0.36	0.23	0.15
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	69	105	137	0.74	0.42	0.49
Slovakia	1 922	216	302	337	1.08	0.49	0.47
Slovenia	1 248	135	148	180	0.82	0.47	0.54
Spain	18 551	2 954	3 317	2 949	0.50	0.34	0.30
Sweden	27 980	5 310	3 507	3 947	2.14	1.08	0.99
Switzerland	1 252	911	922	803	0.32	0.22	0.14
Turkey	21 630	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-
United Kingdom	3 155	5 870	4 138	5 369	0.37	0.25	0.23

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 45: Ind. 6.3 Factor income and entrepreneurial income, 1990-2015

Country	Forest (1 000 ha)	Forestry (ISIC/NACE 02) (Million EUR)							
		Factor income				Net operating surplus			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	709	887	932	-	544	671	673
Belarus	8 634	-	-	-	-	66	32	128	41
Belgium	689	-	-	-	53	-	-	-	27
Bosnia and Herzegovina	2 161	-	-	70	346	-	-	2	254
Bulgaria	3 833	-	-	196	249	-	-	133	151
Croatia	1 922	-	-	-	168	-	-	-	27
Cyprus	173	-	-	-	2	-	-	-	- 1
Czech Republic	2 668	-	-	582	790	-	-	351	578
Denmark	625	94	122	112	146	107	140	129	168
Estonia	2 421	-	85	120	184	-	57	70	99
Finland	22 409	2 104	1 853	2 306	2 878	1 607	1 535	1 821	2 387
France	16 836	-	2 050	2 061	2 987	-	1 356	1 122	2 031
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	2 010	2 940	-	-	1 073	1 799
Greece	3 903	-	63	28	55	-	25	- 2	29
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	67	141	182	-	45	41	29
Iceland	48	-	1	1	1	-	1	- 0	- 1
Ireland	755	-	-	-	171	-	-	-	117
Italy	9 297	290	306	406	1 555	-	-	-	-
Latvia	3 391	-	-	687	283	-	-	665	134
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	-	10	18	23	-	- 3	- 5	4
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	452	461	-	-	260	321
Poland	9 420	-	-	-	2 148	-	-	-	105
Portugal	3 312	355	763	574	825	377	984	543	702
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	375	564	-	-	95	241
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	-	183	259	-	-	79	140
Slovenia	1 248	-	72	175	147	-	47	141	111
Spain	18 551	835	863	-	-	575	487	-	-
Sweden	27 980	-	2 372	3 025	3 144	-	1 900	2 335	2 410
Switzerland	1 252	367	217	202	269	68	- 134	- 78	- 85
Turkey	21 630	-	-	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	270	245	781	-	6	4	453

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 46: Ind. 6.4 Investments in forests and forestry, 1990-2015

Country	Forest (1 000 ha)	Forestry (ISIC/NACE 02)							
		Gross fixed capital formation (Million EUR)							
		Planting of trees to provide regular income				Equipment and buildings			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	-	-	-	-	71.11	123.20	122.33
Belarus	8 634	-	-	-	-	-	7.48	43.31	32.34
Belgium	689	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	0.00	-	-	-	14.27	7.16
Bulgaria	3 833	-	-	-	-	-	-	11.60	2.16
Croatia	1 922	-	-	-	-	-	-	-	17.82
Cyprus	173	-	-	0.00	-	-	-	1.38	0.80
Czech Republic	2 668	-	-	-	0.00	-	-	74.14	103.65
Denmark	625	-	-	-	-	30.20	49.00	129.36	153.86
Estonia	2 421	-	-	-	-	-	31.70	32.10	30.30
Finland	22 409	241.46	205.00	305.00	278.00	271.95	111.00	119.00	131.00
France	16 836	-	49.00	0.00	-	-	179.00	183.00	221.00
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	0.00	-	-	-	168.94	286.60
Greece	3 903	-	4.09	2.03	2.09	-	31.03	18.58	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	0.40	0.01	0.30	-	22.45	30.86	39.81
Iceland	48	-	-	-	-	-	-	-	-
Ireland	755	-	-	-	-	-	-	-	-
Italy	9 297	-	-	56.33	15.34	-	-	68.90	56.21
Latvia	3 391	-	-	0.00	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	-	0.36	0.00	-	-	0.59	1.81	2.21
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	0.25	-	-	-	70.04	-
Poland	9 420	-	-	-	-	-	-	-	176.01
Portugal	3 312	61.07	22.99	41.43	44.26	39.51	72.01	49.18	42.92
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-	34.68	59.33
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	-	0.00	-	-	-	30.30	36.28
Slovenia	1 248	-	-	-	-	-	6.21	13.07	15.35
Spain	18 551	-	-	-	-	-	-	-	-
Sweden	27 980	-	-	163.18	182.16	-	-	563.18	467.59
Switzerland	1 252	29.76	23.62	4.63	4.29	78.66	67.26	83.92	131.69
Turkey	21 630	-	-	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	-	0.00	0.00	61.11	72.13	37.21	259.01

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 46: Ind. 6.4 Investments in forests and forestry, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Forestry (ISIC/NACE 02)							
		Gross fixed capital formation (Million EUR)							
		Other gross fixed capital formation				Total			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	40.51	45.35	53.92	-	111.63	168.54	176.25
Belarus	8 634	-	1.99	4.14	4.30	-	9.47	47.45	36.64
Belgium	689	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	0.31	7.77	-	-	14.57	14.93
Bulgaria	3 833	-	-	3.63	0.11	-	-	15.23	2.27
Croatia	1 922	-	-	-	0.21	-	-	-	18.04
Cyprus	173	-	-	0.00	-	-	-	1.38	0.80
Czech Republic	2 668	-	-	6.99	7.98	-	-	81.13	111.64
Denmark	625	2.66	4.82	7.91	12.46	32.87	53.82	137.27	166.32
Estonia	2 421	-	0.90	0.00	1.40	-	32.60	32.20	31.70
Finland	22 409	2.44	1.00	8.00	21.00	515.85	317.00	432.00	430.00
France	16 836	-	294.00	0.00	-	-	522.00	183.00	221.00
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	3.17	5.52	-	-	172.12	292.12
Greece	3 903	-	0.00	-	-	-	35.12	20.61	2.09
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	1.07	1.27	0.52	-	23.92	32.14	40.63
Iceland	48	-	-	-	-	-	-	-	-
Ireland	755	-	-	-	-	-	-	-	-
Italy	9 297	-	-	85.87	67.05	-	-	211.10	138.60
Latvia	3 391	-	-	-	-	-	-	0.00	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	-	1.65	0.00	-	-	2.61	1.81	2.21
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	1.62	1.04	2.01
Norway	12 141	-	-	4.56	-	-	-	74.59	-
Poland	9 420	-	-	-	1.12	-	-	-	177.13
Portugal	3 312	2.07	1.68	1.73	2.14	102.64	96.68	92.34	89.32
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	7.48	21.61	-	-	42.16	80.93
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	-	1.20	2.45	-	-	31.50	38.73
Slovenia	1 248	-	1.16	0.00	0.00	-	7.37	13.07	15.35
Spain	18 551	-	-	-	-	-	-	-	-
Sweden	27 980	-	-	64.12	82.31	-	-	790.48	732.07
Switzerland	1 252	4.92	4.08	13.32	16.16	113.33	94.97	101.87	152.14
Turkey	21 630	-	-	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	-	0.00	-	61.11	72.13	37.21	259.01

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 46: Ind. 6.4 Investments in forests and forestry, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Forestry (ISIC/NACE 02)							
		Fixed capital consumption (Million EUR)				Capital transfers (Million EUR)			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	-	143.88	198.46	215.43	-	12.92	18.10	9.30
Belarus	8 634	-	3.48	5.58	31.01	-	-	-	-
Belgium	689	-	-	-	44.60	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	8.33	10.33	-	-	0.05	0.66
Bulgaria	3 833	-	-	8.52	12.58	-	-	2.95	0.10
Croatia	1 922	-	-	-	16.85	-	-	-	-
Cyprus	173	-	-	-	-	-	-	-	-
Czech Republic	2 668	-	-	92.88	107.56	-	-	18.29	10.19
Denmark	625	38.71	68.94	104.16	142.87	-	-	-	-
Estonia	2 421	-	7.60	27.70	38.20	-	-	1.90	0.80
Finland	22 409	-	386.00	444.00	440.00	-	-	90.58	63.74
France	16 836	-	591.00	200.00	248.00	-	97.00	-	-
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	-	-	218.72	336.80	-	-	-	-
Greece	3 903	-	0.39	27.27	17.53	-	17.01	13.00	9.43
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	32.48	42.17	42.13	-	-	-	-
Iceland	48	-	0.10	0.31	0.42	-	-	-	-
Ireland	755	-	-	-	43.40	-	-	-	-
Italy	9 297	-	-	-	-	-	-	127.97	86.00
Latvia	3 391	-	-	122.22	71.40	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-
Luxembourg	89	-	1.77	2.57	2.27	-	-	0.00	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	-	-	116.98	131.83	-	-	1.62	-
Poland	9 420	-	-	-	151.95	-	-	-	-
Portugal	3 312	133.20	106.97	90.64	95.11	11.11	23.86	6.17	22.86
Republic of Moldova	386	-	-	-	-	-	-	-	-
Romania	6 901	-	-	62.76	60.26	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	-	26.80	23.70	-	-	18.90	39.26
Slovenia	1 248	-	35.18	33.64	73.65	-	-	-	-
Spain	18 551	-	-	-	-	-	-	-	-
Sweden	27 980	-	-	536.09	603.04	-	-	-	-
Switzerland	1 252	95.16	117.21	151.72	183.05	87.62	61.30	38.23	40.18
Turkey	21 630	-	-	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-	-	-
United Kingdom	3 155	-	178.69	174.42	141.90	-	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 47: Ind. 6.5 Employment by age, job characteristics and education, 2015

Country	Forest (1 000 ha)	Employment					
		Forestry (ISIC/NACE 02)					
		Total (1 000 people)	Age group 15-49	Employees	Education (Categories ISCED 1997)		
					0-2	3-4	5-6
			% of total				
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	10.3	66.4	67.8	-	58.1	-
Belarus	8 634	42.0	70.1	100.0	5.0	60.0	35.0
Belgium	689	4.4	-	-	-	-	-
Bosnia and Herzegovina	2 161	-	-	-	-	-	-
Bulgaria	3 833	28.6	-	88.7	40.2	47.3	15.0
Croatia	1 922	15.4	-	95.9	27.1	55.3	17.6
Cyprus	173	0.7	-	100.0	-	-	-
Czech Republic	2 668	12.9	-	100.0	6.5	79.6	13.7
Denmark	625	5.6	-	59.2	-	-	-
Estonia	2 421	7.1	69.5	81.8	23.2	53.1	23.8
Finland	22 409	24.3	54.3	56.0	21.8	46.1	32.1
France	16 836	32.3	-	71.8	20.9	54.0	25.1
Georgia	2 822	1.7	-	-	-	-	-
Germany	11 419	34.4	60.4	79.2	-	64.3	26.7
Greece	3 903	4.9	-	50.7	61.5	40.5	-
Holy See	0	-	-	-	-	-	-
Hungary	2 061	23.1	71.5	90.1	37.3	52.0	10.7
Iceland	48	0.1	-	-	-	-	-
Ireland	755	2.8	-	71.4	-	-	-
Italy	9 297	52.9	47.4	86.6	69.9	26.8	3.3
Latvia	3 391	17.0	-	71.2	24.5	55.7	19.6
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	11.9	-	99.8	-	65.3	-
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-
Netherlands	365	2.1	-	-	-	-	-
North Macedonia	994	3.8	-	79.1	34.8	46.1	24.8
Norway	12 141	3.6	-	67.3	25.2	59.8	19.6
Poland	9 420	75.8	-	84.0	16.8	59.7	23.4
Portugal	3 312	13.5	-	79.0	86.9	-	-
Republic of Moldova	386	4.1	70.2	-	-	1.1	2.5
Romania	6 901	32.8	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-
Slovakia	1 922	20.3	70.0	54.1	9.6	77.6	12.8
Slovenia	1 248	3.6	82.2	85.3	13.8	52.3	36.7
Spain	18 551	25.7	-	87.3	55.0	20.8	23.5
Sweden	27 980	22.5	-	60.5	20.9	59.8	18.8
Switzerland	1 252	12.1	-	93.9	19.6	47.9	32.5
Turkey	21 630	286.5	70.0	-	447.2	458.7	63.5
Ukraine	9 657	61.7	-	-	-	-	-
United Kingdom	3 155	22.9	-	69.6	17.9	51.5	29.7

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 47: Ind. 6.5 Employment by age, job characteristics and education, 2015 *(Cont.)*

Country	Forest (1 000 ha)	Employment					
		Manufacture of wood and articles in wood (ISIC/NACE 16)					
		Total (1 000 people)	Age group 15-49	Employees	Education (Categories ISCED 1997)		
					0-2	3-4	5-6
			% of total				
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	28.4	76.1	91.3	13.6	63.5	22.9
Belarus	8 634	29.5	71.8	100.0	3.4	60.6	36.0
Belgium	689	14.7	-	86.4	26.5	56.2	20.1
Bosnia and Herzegovina	2 161	-	-	-	-	-	-
Bulgaria	3 833	18.3	-	89.3	-	77.1	-
Croatia	1 922	16.7	-	92.6	21.8	74.8	-
Cyprus	173	2.0	-	71.7	35.0	56.7	-
Czech Republic	2 668	45.6	-	73.1	5.3	89.9	4.8
Denmark	625	8.2	-	96.9	-	-	-
Estonia	2 421	18.0	67.1	94.7	23.6	59.1	17.3
Finland	22 409	22.0	57.3	93.2	15.9	59.5	24.5
France	16 836	69.2	-	89.9	22.8	59.9	17.2
Georgia	2 822	-	-	-	-	-	-
Germany	11 419	108.5	65.5	91.9	16.2	69.5	14.3
Greece	3 903	11.2	-	50.9	45.5	42.0	14.7
Holy See	0	-	-	-	-	-	-
Hungary	2 061	22.5	75.5	87.9	23.9	68.2	7.9
Iceland	48	-	-	-	-	-	-
Ireland	755	3.9	-	85.5	-	62.8	-
Italy	9 297	115.3	67.3	68.0	51.4	43.3	5.3
Latvia	3 391	25.1	-	91.5	24.1	64.1	11.7
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	23.1	-	86.3	-	64.8	-
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	1.9	-	81.6	-	81.6	-
Netherlands	365	13.0	-	82.5	43.4	46.5	-
North Macedonia	994	3.2	-	79.2	31.3	62.5	-
Norway	12 141	11.9	-	94.1	25.0	56.7	18.5
Poland	9 420	161.6	-	87.1	11.6	79.7	8.7
Portugal	3 312	33.0	-	86.8	78.5	16.4	-
Republic of Moldova	386	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-
Slovakia	1 922	21.4	72.5	70.2	-	100.0	-
Slovenia	1 248	7.9	71.5	88.2	15.6	69.2	16.0
Spain	18 551	55.7	-	77.2	57.0	22.7	19.3
Sweden	27 980	29.3	-	90.7	24.4	64.6	10.7
Switzerland	1 252	40.3	-	76.9	19.2	67.0	13.7
Turkey	21 630	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-
United Kingdom	3 155	68.6	-	81.0	25.6	54.9	17.4

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 47: Ind. 6.5 Employment by age, job characteristics and education, 2015 *(Cont.)*

Country	Forest (1 000 ha)	Employment					
		Manufacture of paper and paper products (ISIC/NACE 17)					
		Total (1 000 people)	Age group 15-49	Employees	Education (Categories ISCED 1997)		
					0-2	3-4	5-6
			% of total				
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	16.0	72.0	98.9	19.1	62.4	-
Belarus	8 634	12.6	71.1	100.0	2.3	54.3	43.4
Belgium	689	12.1	-	98.6	25.7	52.2	25.7
Bosnia and Herzegovina	2 161	-	-	-	-	-	-
Bulgaria	3 833	7.2	-	98.2	-	83.4	-
Croatia	1 922	4.6	-	97.8	-	79.0	-
Cyprus	173	-	-	-	-	-	-
Czech Republic	2 668	21.7	-	99.7	8.4	83.3	8.3
Denmark	625	4.7	-	99.6	-	-	-
Estonia	2 421	1.8	-	100.0	-	50.5	36.4
Finland	22 409	17.9	64.8	98.9	6.7	64.2	29.1
France	16 836	70.6	-	97.8	21.0	54.4	24.7
Georgia	2 822	-	-	-	-	-	-
Germany	11 419	110.2	66.0	98.5	16.9	66.9	16.0
Greece	3 903	7.3	-	86.8	35.6	42.9	21.9
Holy See	0	-	-	-	-	-	-
Hungary	2 061	11.6	65.1	97.6	17.4	71.3	11.3
Iceland	48	-	-	-	-	-	-
Ireland	755	2.3	-	106.7	-	-	-
Italy	9 297	84.4	74.0	94.7	39.2	52.4	8.5
Latvia	3 391	-	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	4.2	-	110.1	-	-	-
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-
Netherlands	365	17.5	-	98.5	29.6	53.2	16.4
North Macedonia	994	1.4	-	83.7	-	72.1	-
Norway	12 141	2.4	-	100.0	26.4	54.2	25.0
Poland	9 420	65.5	-	96.5	-	75.0	19.0
Portugal	3 312	17.8	-	96.1	48.2	36.6	-
Republic of Moldova	386	-	-	-	-	-	-
Romania	6 901	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-
Slovakia	1 922	11.3	85.0	100.0	-	100.0	-
Slovenia	1 248	4.1	59.2	99.2	12.2	67.5	18.7
Spain	18 551	51.3	-	93.7	39.0	22.0	35.9
Sweden	27 980	25.9	-	99.7	18.1	64.5	17.5
Switzerland	1 252	6.5	-	97.4	25.6	51.8	22.6
Turkey	21 630	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-
United Kingdom	3 155	53.8	-	96.0	28.5	48.9	21.1

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 48: Ind. 6.5 Employment, total and by gender, 1990-2015

Country	Forest (1 000 ha)	Employment									
		Forestry (ISIC/NACE 02)					Manufacture of wood and articles in wood (ISIC/NACE 16)				
		Total (1 000 people)				Male (% of total)	Total (1 000 people)				Male (% of total)
	2015	1990	2000	2010	2015	2015	1990	2000	2010	2015	2015
Albania	785	-	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 881	-	7.64	11.81	10.34	80.2	-	32.21	23.16	28.39	80.6
Belarus	8 634	36.8	33.46	45.85	42.01	82.6	-	75.71	37.60	29.49	67.0
Belgium	689	3.05	-	3.27	4.40	-	19.6	18.23	21.00	14.70	90.5
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	26.05	20.23	28.60	83.9	-	24.00	22.77	18.33	82.0
Croatia	1 922	-	-	11.57	15.37	88.5	-	-	18.40	16.67	84.4
Cyprus	173	-	0.67	0.93	0.70	90.4	-	2.77	2.70	2.00	91.7
Czech Republic	2 668	55.4	30.32	14.71	12.94	85.7	-	64.57	47.60	45.60	83.7
Denmark	625	3.70	3.81	5.56	5.56	83.6	15.26	15.49	9.13	8.16	82.1
Estonia	2 421	9.99	9.17	5.60	7.09	85.8	6.54	19.21	13.70	17.97	76.5
Finland	22 409	36.60	23.00	22.80	24.30	89.3	41.80	32.50	25.70	22.00	84.1
France	16 836	42.76	35.11	31.66	32.33	88.5	107.7	112.43	85.44	69.23	81.6
Georgia	2 822	-	2.12	0.69	1.70	-	-	-	-	-	-
Germany	11 419	64.53	50.53	39.20	34.37	87.8	-	236.47	118.60	108.53	81.7
Greece	3 903	8.4	8.50	5.13	4.93	86.5	28.8	31.73	24.33	11.20	83.6
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	24.3	18.11	16.04	23.13	82.1	-	39.28	22.23	22.47	82.5
Iceland	48	0.12	0.12	0.14	0.12	-	-	-	-	-	-
Ireland	755	2.55	3.10	2.53	2.80	94.6	7.0	8.07	6.07	3.90	85.5
Italy	9 297	49.6	42.54	44.87	52.93	88.6	206.9	181.83	153.85	115.32	85.3
Latvia	3 391	-	21.37	15.83	17.00	86.7	-	20.63	21.37	25.13	78.9
Liechtenstein	7	-	-	-	-	-	-	-	-	-	-
Lithuania	2 187	-	11.40	8.96	11.89	94.5	-	24.00	19.51	23.14	73.6
Luxembourg	89	-	-	0.5	0.6	-	0.7	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	1.60	1.90	78.9
Netherlands	365	2.20	1.70	2.30	2.10	85.7	22.0	21.77	19.60	12.97	87.1
North Macedonia	994	-	-	3.70	3.83	91.3	-	-	3.20	3.20	92.7
Norway	12 141	-	5.33	3.13	3.57	90.6	-	14.90	12.77	11.87	86.2
Poland	9 420	-	-	63.53	75.83	85.8	-	-	174.87	161.57	83.2
Portugal	3 312	3.1	4.0	6.1	8.4	83.0	-	-	26.76	25.20	-
Republic of Moldova	386	6.9	4.69	4.40	4.13	73.9	-	-	-	-	-
Romania	6 901	103.1	49.97	29.99	32.75	87.3	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-	-	-
Slovakia	1 922	36.3	24.40	19.23	20.33	88.4	-	36.23	26.60	21.37	85.3
Slovenia	1 248	-	3.47	3.40	3.63	96.3	-	16.37	10.50	7.90	79.7
Spain	18 551	28.8	34.73	31.97	25.70	91.1	81.2	110.33	72.33	55.70	88.3
Sweden	27 980	-	16.17	23.57	22.47	89.3	-	40.20	34.30	29.27	85.8
Switzerland	1 252	-	4.20	7.80	12.10	69.7	-	41.30	38.57	40.27	89.1
Turkey	21 630	281.8	536.52	396.49	286.46	52.5	-	-	-	-	-
Ukraine	9 657	62.0	104.90	69.80	61.70	-	-	-	-	-	-
United Kingdom	3 155	17.30	15.63	19.60	22.90	76.4	119.7	82.27	69.57	68.63	89.5

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 48: Ind. 6.5 Employment, total and by gender, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Employment				
		Manufacture of paper and paper products (ISIC/NACE 17)				
		Total (1 000 people)				Male (% of total)
	2015	1990	2000	2010	2015	2015
Albania	785	-	-	-	-	-
Andorra	16	-	-	-	-	-
Austria	3 881	-	18.15	17.58	16.01	74.1
Belarus	8 634	-	12.52	12.96	12.60	55.3
Belgium	689	17.3	17.93	14.03	12.07	77.9
Bosnia and Herzegovina	2 161	-	-	-	-	-
Bulgaria	3 833	-	12.35	10.97	7.23	57.1
Croatia	1 922	-	-	6.30	4.60	73.2
Cyprus	173	-	0.90	0.70	-	-
Czech Republic	2 668	-	24.30	23.47	21.70	54.8
Denmark	625	10.27	9.07	5.43	4.69	73.9
Estonia	2 421	2.69	2.03	1.11	1.77	56.4
Finland	22 409	45.60	37.70	20.90	17.90	77.7
France	16 836	108.5	105.66	67.59	70.57	74.9
Georgia	2 822	-	-	-	-	-
Germany	11 419	-	151.40	143.13	110.20	73.0
Greece	3 903	9.4	8.93	8.67	7.30	74.4
Holy See	0	-	-	-	-	-
Hungary	2 061	-	11.64	12.01	11.60	51.3
Iceland	48	-	-	-	-	-
Ireland	755	3.4	3.73	2.60	2.25	-
Italy	9 297	90.0	101.47	88.80	84.38	80.4
Latvia	3 391	-	-	-	-	-
Liechtenstein	7	-	-	-	-	-
Lithuania	2 187	-	-	3.26	4.22	-
Luxembourg	89	-	-	-	-	-
Malta	0	-	-	-	-	-
Monaco	0	-	-	-	-	-
Montenegro	827	-	-	-	-	-
Netherlands	365	27.0	27.50	17.40	17.47	80.3
North Macedonia	994	-	-	1.20	1.43	74.5
Norway	12 141	-	11.13	5.80	2.40	73.6
Poland	9 420	-	-	53.33	65.47	69.3
Portugal	3 312	-	-	10.75	10.83	-
Republic of Moldova	386	-	-	-	-	-
Romania	6 901	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-
Serbia	2 720	-	-	-	-	-
Slovakia	1 922	-	13.73	8.83	11.27	70.7
Slovenia	1 248	-	6.93	4.53	4.10	74.0
Spain	18 551	40.8	50.27	44.37	51.28	77.2
Sweden	27 980	-	41.63	31.60	25.90	79.2
Switzerland	1 252	-	12.03	8.90	6.50	65.1
Turkey	21 630	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-
United Kingdom	3 155	124.3	111.60	61.30	53.77	69.9

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 49: Ind. 6.6 Occupational accidents, 1990-2015

Country	Forest (1 000 ha)	Forestry (ISIC/NACE 02)							
		Fatal occupational accidents							
		Number				Annual rate per 1 000 workers			
	2015	1990	2000	2010	2015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	30	23	25	20	-	1.24	1.21	0.98
Belarus	8 634	-	5	10	4	-	0.16	0.28	0.11
Belgium	689	-	0	0	0	-	0.00	0.00	0.00
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-
Croatia	1 922	-	3	2	1	-	0.34	0.16	0.11
Cyprus	173	-	0	0	-	-	0.00	0.00	-
Czech Republic	2 668	-	6	6	2	-	0.21	0.39	0.12
Denmark	625	5	5	5	5	0.00	0.00	0.00	0.00
Estonia	2 421	-	3	0	0	-	0.30	0.06	0.06
Finland	22 409	2	1	1	1	0.00	0.00	0.00	0.00
France	16 836	9	12	6	5	0.46	0.69	0.36	0.33
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	46	32	43	32	-	-	0.74	0.93
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	4	4	5	-	0.24	0.25	0.21
Iceland	48	-	-	-	-	-	-	-	-
Ireland	755	-	0	1	0	-	0.00	0.43	0.17
Italy	9 297	-	9	7	9	-	0.21	0.16	-
Latvia	3 391	-	-	3	2	-	-	0.19	0.14
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	3	3	-	-	0.31	0.27
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	9	2	0	0	-	0.30	0.10	0.03
Poland	9 420	-	2	2	7	-	0.06	0.09	0.18
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	0	-	-	-	0.00
Romania	6 901	-	30	27	20	-	0.65	0.90	0.63
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	6	1	2	-	0.24	0.05	0.11
Slovenia	1 248	1	1	1	1	0.21	0.40	0.52	0.60
Spain	18 551	-	13	8	3	-	0.37	0.26	0.12
Sweden	27 980	1	5	2	2	0.00	0.30	0.10	0.10
Switzerland	1 252	8	4	3	3	1.00	0.57	0.49	0.50
Turkey	21 630	1	1	1	7	0.01	0.01	0.01	0.02
Ukraine	9 657	-	-	18	12	-	-	0.30	0.20
United Kingdom	3 155	10	4	3	1	0.60	0.20	0.20	0.10

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 49: Ind. 6.6 Occupational accidents, 1990-2015 *(Cont.)*

Country	Forest (1 000 ha)	Forestry (ISIC/NACE 02)							
		Non-fatal occupational accidents							
		Number				Annual rate per 1 000 workers			
	2015	1 990	2 000	2 010	2 015	1990	2000	2010	2015
Albania	785	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	4 668	2 015	1 576	1 337	-	109.65	77.48	66.62
Belarus	8 634	-	42	14	25	-	1.40	0.39	0.53
Belgium	689	-	112	50	52	-	56.00	17.84	11.82
Bosnia and Herzegovina	2 161	-	-	-	-	-	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-
Croatia	1 922	-	592	307	237	-	63.79	33.01	25.52
Cyprus	173	-	6	11	-	-	9.25	11.44	-
Czech Republic	2 668	-	1 228	455	276	-	41.20	30.39	21.25
Denmark	625	-	53	46	50	-	0.01	0.01	0.01
Estonia	2 421	-	78	16	22	-	8.40	2.60	3.28
Finland	22 409	2 618	1 020	712	634	82.00	45.00	31.00	26.00
France	16 836	3 601	3 146	1 607	1 429	184.00	181.00	104.00	95.37
Georgia	2 822	-	-	-	-	-	-	-	-
Germany	11 419	13 502	10 847	11 183	9 905	-	-	285.28	288.19
Greece	3 903	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	-	244	133	173	-	13.44	8.19	7.50
Iceland	48	-	-	-	-	-	-	-	-
Ireland	755	-	22	8	-	-	7.65	3.46	-
Italy	9 297	-	3 331	2 339	1 760	-	78.31	52.13	-
Latvia	3 391	-	-	21	25	-	-	1.15	1.49
Liechtenstein	7	-	-	-	-	-	-	-	-
Lithuania	2 187	-	-	28	33	-	-	2.88	2.81
Luxembourg	89	-	-	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-
Netherlands	365	-	-	-	-	-	-	-	-
North Macedonia	994	-	-	-	-	-	-	-	-
Norway	12 141	68	42	12	10	-	7.70	3.40	3.46
Poland	9 420	-	331	281	384	-	11.10	11.60	9.47
Portugal	3 312	-	-	-	-	-	-	-	-
Republic of Moldova	386	-	-	-	0	-	-	-	0.00
Romania	6 901	-	185	68	64	-	4.04	2.31	1.97
Russian Federation	809 090	-	-	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-	-	-
Slovakia	1 922	-	516	90	79	-	21.15	4.67	3.90
Slovenia	1 248	439	211	177	164	76.30	108.03	92.61	74.50
Spain	18 551	-	4 401	3 383	3 000	-	125.94	109.96	116.73
Sweden	27 980	1 197	185	120	103	41.00	9.50	4.30	2.60
Switzerland	1 252	1 843	888	774	606	228.00	131.00	126.00	111.00
Turkey	21 630	4	4	30	79	0.01	0.01	0.08	0.28
Ukraine	9 657	-	-	97	56	-	-	1.40	0.90
United Kingdom	3 155	242	177	155	128	13.90	11.30	7.90	5.60

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 50: Ind. 6.7 Consumption of forest products, 1990-2015

Country	Forest (1 000 ha)	Consumption of forest products							
		1990*	2000*	2010*	2015*	Annual change rate			
						1990-2015		2010-2015	
	2015	m^3 roundwood equivalent (RWE) per 1 000 people				m^3 RWE per 1 000 people	%	m^3 RWE per 1 000 people	%
Albania	785	274	134	348	434	6.97	2.02	17.21	4.52
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	2 296	2 815	3 031	2 956	28.69	1.10	-14.97	-0.50
Belarus	8 634	1 038	660	1 229	1 320	12.26	1.05	18.28	1.45
Belgium	689	1 718	1 643	1 722	1 743	1.12	0.06	4.33	0.25
Bosnia and Herzegovina	2 161	357	449	579	595	10.37	2.25	3.20	0.55
Bulgaria	3 833	387	396	823	807	18.26	3.24	-3.15	-0.39
Croatia	1 922	229	853	1 047	1 020	34.38	6.70	-5.40	-0.52
Cyprus	173	751	541	504	413	-14.69	-2.57	-18.21	-3.91
Czech Republic	2 668	882	989	1 306	1 252	16.07	1.53	-10.87	-0.85
Denmark	625	2 005	2 672	2 007	1 947	-2.52	-0.13	-11.96	-0.60
Estonia	2 421	635	2 495	3 946	4 289	158.88	8.66	68.60	1.68
Finland	22 409	3 189	4 211	3 835	3 687	21.65	0.63	-29.58	-0.78
France	16 836	1 680	1 657	1 380	1 312	-16.01	-1.07	-13.53	-1.00
Georgia	2 822	72	117	267	275	8.85	6.02	1.60	0.59
Germany	11 419	1 418	1 527	1 658	1 689	11.79	0.76	6.26	0.37
Greece	3 903	646	769	686	660	0.61	0.09	-5.31	-0.79
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	595	832	819	821	9.86	1.41	0.50	0.06
Iceland	48	709	967	835	798	3.85	0.51	-7.44	-0.91
Ireland	755	859	1 223	709	640	-9.52	-1.27	-13.91	-2.04
Italy	9 297	973	1 277	1 231	1 167	8.42	0.79	-12.88	-1.07
Latvia	3 391	956	1 894	2 193	2 470	65.86	4.22	55.39	2.41
Liechtenstein	7	1 206	1 042	769	636	-24.79	-2.74	-26.53	-3.72
Lithuania	2 187	116	944	1 836	2 033	83.38	13.28	39.42	2.06
Luxembourg	89	1 849	1 467	2 576	2 147	12.97	0.65	-85.85	-3.58
Malta	0	397	491	420	359	-1.64	-0.43	-12.21	-3.09
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	425	426	980	1 137	30.93	4.37	31.28	3.00
Netherlands	365	1 347	1 440	1 204	1 126	-9.58	-0.77	-15.44	-1.32
North Macedonia	994	192	511	601	585	17.10	4.97	-3.09	-0.52
Norway	12 141	1 881	1 998	2 147	2 004	5.35	0.28	-28.67	-1.37
Poland	9 420	413	637	1 141	1 170	32.90	4.63	5.76	0.50
Portugal	3 312	628	850	803	790	7.06	1.00	-2.42	-0.30
Republic of Moldova	386	24	135	329	372	15.13	12.71	8.48	2.45
Romania	6 901	508	424	680	731	9.71	1.60	10.28	1.47
Russian Federation	809 090	1 135	668	617	625	-22.19	-2.56	1.60	0.26
Serbia	2 720	722	728	1 214	1 357	27.61	2.78	28.59	2.25
Slovakia	1 922	626	877	1 370	1 231	26.30	2.98	-27.81	-2.12
Slovenia	1 248	1 232	1 553	1 965	2 024	34.44	2.18	11.74	0.59
Spain	18 551	844	1 145	813	774	-3.01	-0.37	-7.61	-0.95
Sweden	27 980	2 439	2 945	2 816	2 628	8.20	0.32	-37.69	-1.38
Switzerland	1 252	1 563	1 554	1 432	1 287	-12.01	-0.84	-28.99	-2.11
Turkey	21 630	493	474	633	611	5.14	0.94	-4.44	-0.71
Ukraine	9 657	258	226	404	402	6.27	1.95	-0.40	-0.10
United Kingdom	3 155	1 075	1 210	1 004	947	-5.59	-0.55	-11.37	-1.16

Source: UNECE/FAO TIMBER database, 2019. Based on national reporting from Joint Forest Sector Questionnaire.

**Data for reference years were used as follows:*
1990 - 1992
2000 - average of 1998-2002
2010 - average of 2008-2012
2015 - average of 2013-2017

Table 51: Ind. 6.8 Exports of forest products (volume), 1990-2015

Country	Forest (1 000 ha)	Exports of forest products							
		1990*	2000*	2010*	2015*	Annual change rate			
						1990-2015		2010-2015	
	2015	Million m³ roundwood equivalent (RWE)				Million m³ RWE	%	Million m³ RWE	%
Albania	785	0	0	0	0	0.00	21.03	0.00	0.33
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	19	28	32	32	0.52	2.11	-0.19	-0.60
Belarus	8 634	0	3	4	5	0.19	13.53	0.12	2.72
Belgium	689	18	18	22	21	0.13	0.68	-0.27	-1.26
Bosnia and Herzegovina	2 161	0	0	2	2	0.09	9.66	0.01	0.28
Bulgaria	3 833	1	1	3	3	0.10	6.98	0.05	1.70
Croatia	1 922	1	2	3	3	0.07	3.66	0.04	1.32
Cyprus	173	0	0	0	0	0.00	-11.11	0.00	-3.58
Czech Republic	2 668	4	9	13	13	0.38	4.92	0.10	0.75
Denmark	625	2	2	3	3	0.03	1.42	-0.06	-2.09
Estonia	2 421	1	7	5	5	0.19	9.41	0.09	1.77
Finland	22 409	42	65	59	59	0.75	1.51	-0.08	-0.14
France	16 836	21	29	31	30	0.41	1.64	-0.05	-0.15
Georgia	2 822	0	0	0	0	0.00	1.88	0.00	1.41
Germany	11 419	29	51	82	78	2.14	4.43	-0.81	-1.01
Greece	3 903	0	0	1	1	0.02	3.49	0.01	0.84
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	2	3	4	4	0.10	3.21	0.09	2.27
Iceland	48	0	0	0	0	-0.002	-16.48	0.00	-9.76
Ireland	755	1	2	2	3	0.05	2.91	0.02	0.90
Italy	9 297	5	10	14	14	0.36	4.19	-0.01	-0.09
Latvia	3 391	1	10	10	10	0.41	13.04	0.11	1.14
Liechtenstein	7	0	-	0	0	0.00	-	0.00	-1.98
Lithuania	2 187	0	3	3	4	0.14	9.85	0.07	1.91
Luxembourg	89	1	1	1	1	0.02	1.80	0.00	-0.37
Malta	0	0	-	0	0	0.00	-13.56	0.00	-24.23
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	0	0	0	0	0.002	0.85	0.01	2.43
Netherlands	365	10	13	15	15	0.24	1.97	0.00	0.00
North Macedonia	994	0	0	0	0	0.00	-4.28	0.00	-7.74
Norway	12 141	10	12	9	9	-0.02	-0.26	-0.05	-0.51
Poland	9 420	4	7	12	14	0.41	5.21	0.23	1.75
Portugal	3 312	9	9	12	12	0.15	1.45	0.13	1.07
Republic of Moldova	386	0	0	0	0	0.00	7.16	0.00	0.00
Romania	6 901	1	5	8	10	0.37	10.64	0.25	2.85
Russian Federation	809 090	26	59	77	76	2.19	4.82	-0.25	-0.33
Serbia	2 720	1	1	1	1	0.01	2.00	0.02	1.92
Slovakia	1 922	1	5	7	8	0.29	9.28	0.02	0.28
Slovenia	1 248	2	3	6	6	0.15	4.41	0.03	0.50
Spain	18 551	5	11	19	20	0.62	5.85	0.07	0.39
Sweden	27 980	51	65	73	72	0.91	1.52	-0.20	-0.28
Switzerland	1 252	6	8	6	6	-0.01	-0.11	-0.04	-0.66
Turkey	21 630	0	1	3	3	0.10	10.51	0.02	0.76
Ukraine	9 657	0	3	8	8	0.36	25.28	0.08	0.95
United Kingdom	3 155	5	7	6	6	0.02	0.44	0.02	0.33

Source: UNECE/FAO TIMBER database, 2019. Based on national reporting from Joint Forest Sector Questionnaire.

**Data for reference years were used as follows:*
1990 - 1992
2000 - average of 1998-2002
2010 - average of 2008-2012
2015 - average of 2013-2017

Table 52: Ind. 6.8 Import of forest products (volume), 1990-2015

Country	Forest (1 000 ha)	Imports of forest products							
		1990*	2000*	2010*	2015*	Annual change rate			
						1990-2015		2010-2015	
	2015	Million m³ roundwood equivalent (RWE)				Million m³ RWE	%	Million m³ RWE	%
Albania	785	0	0	0	0	0.02	16.14	0.02	4.40
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	11	17	20	21	0.42	2.83	0.10	0.51
Belarus	8 634	0	1	2	2	0.08	28.41	0.01	0.72
Belgium	689	24	25	28	28	0.19	0.74	-0.03	-0.11
Bosnia and Herzegovina	2 161	0	0	1	1	0.04	14.30	0.00	-0.49
Bulgaria	3 833	0	1	2	2	0.06	9.18	-0.04	-2.24
Croatia	1 922	0	2	2	2	0.06	7.70	-0.02	-1.28
Cyprus	173	1	0	1	0	0.00	-0.62	-0.02	-3.04
Czech Republic	2 668	2	5	9	9	0.32	7.57	0.07	0.78
Denmark	625	9	13	9	8	-0.01	-0.17	-0.09	-1.03
Estonia	2 421	0	1	2	2	0.11	30.63	0.02	0.78
Finland	22 409	8	13	12	11	0.13	1.44	-0.30	-2.58
France	16 836	31	40	39	38	0.28	0.81	-0.30	-0.79
Georgia	2 822	0	0	0	0	0.02	15.59	0.01	3.26
Germany	11 419	59	68	81	79	0.89	1.30	-0.25	-0.31
Greece	3 903	3	5	5	4	0.04	1.03	-0.10	-2.10
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	3	5	5	5	0.09	2.21	0.01	0.10
Iceland	48	0	0	0	0	0.002	0.66	-0.001	-0.21
Ireland	755	2	4	3	2	0.00	-0.09	-0.04	-1.55
Italy	9 297	39	50	49	48	0.38	0.87	-0.20	-0.41
Latvia	3 391	0	1	2	2	0.08	23.47	0.03	2.00
Liechtenstein	7	0	-	-	-	-	-	-	-
Lithuania	2 187	0	1	2	3	0.11	32.79	0.03	1.20
Luxembourg	89	1	1	2	2	0.03	2.42	-0.01	-0.39
Malta	0	0	0	0	0	0.00	0.01	0.00	-1.83
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	0	0	0	0	0.002	2.67	-0.002	-2.45
Netherlands	365	21	26	26	25	0.18	0.78	-0.17	-0.67
North Macedonia	994	0	0	1	1	0.02	6.64	-0.01	-1.64
Norway	12 141	4	7	6	5	0.07	1.67	-0.04	-0.71
Poland	9 420	1	8	20	20	0.85	15.37	0.09	0.46
Portugal	3 312	3	5	5	6	0.13	3.47	0.07	1.34
Republic of Moldova	386	0	0	1	1	0.02	7.03	0.00	0.79
Romania	6 901	0	1	4	4	0.15	10.89	0.05	1.42
Russian Federation	809 090	0	3	8	8	0.33	14.34	0.09	1.22
Serbia	2 720	3	3	3	3	0.00	-0.02	-0.03	-1.27
Slovakia	1 922	0	3	4	4	0.18	15.77	-0.01	-0.20
Slovenia	1 248	1	2	4	4	0.14	5.59	0.03	0.74
Spain	18 551	16	28	23	21	0.22	1.18	-0.33	-1.49
Sweden	27 980	8	15	14	14	0.29	2.82	0.02	0.13
Switzerland	1 252	7	8	7	6	-0.02	-0.28	-0.09	-1.35
Turkey	21 630	2	7	16	17	0.63	9.19	0.14	0.87
Ukraine	9 657	0	2	4	4	0.18	25.88	-0.03	-0.69
United Kingdom	3 155	48	51	44	42	-0.27	-0.58	-0.31	-0.71

Source: UNECE/FAO TIMBER database, 2019. Based on national reporting from Joint Forest Sector Questionnaire.

**Data for reference years were used as follows:*
1990 - 1992
2000 - average of 1998-2002
2010 - average of 2008-2012
2015 - average of 2013-2017

Table 53: Ind. 6.8 Export of forest products (value), 1990-2015

Country	Forest (1 000 ha)	Exports of forest products							
		1990*	2000*	2010*	2015*	Annual change rate			
						1990-2015		2010-2015	
	2015	Million EUR				Million EUR	%	Million EUR	%
Albania	785	1	12	5	5	0.20	9.26	0.09	1.87
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	2 661	4 250	5 125	5 052	103.93	2.83	-14.74	-0.29
Belarus	8 634	17	157	266	319	13.14	13.61	10.57	3.69
Belgium	689	2 510	3 323	3 811	3 554	45.38	1.52	-51.36	-1.39
Bosnia and Herzegovina	2 161	17	0	220	229	9.20	11.97	1.64	0.73
Bulgaria	3 833	48	112	259	292	10.59	8.15	6.62	2.44
Croatia	1 922	147	235	355	367	9.57	4.07	2.42	0.67
Cyprus	173	2	0	0	0	-0.06	-7.42	-0.01	-4.25
Czech Republic	2 668	324	889	1 564	1 619	56.29	7.24	10.93	0.69
Denmark	625	311	356	334	299	-0.54	-0.18	-7.10	-2.22
Estonia	2 421	16	376	502	535	22.55	16.47	6.49	1.26
Finland	22 409	6 494	10 898	9 717	9 742	141.20	1.78	5.02	0.05
France	16 836	3 163	5 479	5 205	5 092	83.87	2.09	-22.60	-0.44
Georgia	2 822	3	4	16	16	0.59	8.35	0.10	0.65
Germany	11 419	4 821	10 490	14 834	14 610	425.62	4.94	-44.76	-0.30
Greece	3 903	65	73	109	111	2.00	2.36	0.34	0.31
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	118	371	659	680	24.45	7.92	4.22	0.63
Iceland	48	9	0	0	0	-0.37	-15.71	-0.002	-0.88
Ireland	755	124	267	318	327	8.85	4.32	1.76	0.55
Italy	9 297	1 415	2 519	3 331	3 262	80.31	3.70	-13.71	-0.42
Latvia	3 391	21	600	830	892	37.83	17.61	12.31	1.44
Liechtenstein	7	0	-	1	0	0.02	-	-0.01	-1.90
Lithuania	2 187	14	200	316	350	14.59	15.00	6.75	2.05
Luxembourg	89	103	175	200	192	3.88	2.76	-1.54	-0.78
Malta	0	2	0	1	1	-0.07	-4.61	-0.05	-5.27
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	9	12	15	15	0.26	2.26	-0.04	-0.24
Netherlands	365	1 634	2 570	3 033	3 029	60.64	2.72	-0.79	-0.03
North Macedonia	994	15	8	7	6	-0.41	-4.05	-0.17	-2.65
Norway	12 141	1 111	1 692	1 308	1 264	6.64	0.56	-8.83	-0.68
Poland	9 420	391	1 012	2 121	2 284	82.33	7.98	32.60	1.49
Portugal	3 312	821	1 265	1 769	1 864	45.35	3.63	19.13	1.06
Republic of Moldova	386	1	1	9	8	0.31	12.24	-0.19	-2.27
Romania	6 901	107	474	1 016	1 187	46.94	11.01	34.16	3.16
Russian Federation	809 090	1 140	3 704	6 537	6 560	235.64	7.91	4.54	0.07
Serbia	2 720	125	164	167	180	2.39	1.60	2.61	1.52
Slovakia	1 922	75	489	1 121	1 083	43.82	12.30	-7.56	-0.68
Slovenia	1 248	240	421	739	744	21.95	5.05	1.08	0.15
Spain	18 551	836	1 997	3 190	3 217	103.55	6.04	5.37	0.17
Sweden	27 980	7 098	9 672	11 480	11 532	192.74	2.13	10.39	0.09
Switzerland	1 252	1 082	1 570	1 093	1 069	-0.55	-0.05	-4.65	-0.43
Turkey	21 630	39	122	477	525	21.12	11.93	9.59	1.93
Ukraine	9 657	5	253	720	765	33.05	24.72	8.96	1.21
United Kingdom	3 155	1 308	2 038	1 488	1 453	6.32	0.46	-7.04	-0.48

Source: UNECE/FAO TIMBER database, 2019. Based on national reporting from Joint Forest Sector Questionnaire.

**Data for reference years were used as follows:*
1990 - 1992
2000 - average of 1998-2002
2010 - average of 2008-2012
2015 - average of 2013-2017

Table 54: Ind. 6.8 Import of forest products (value), 1990-2015

Country	Forest (1 000 ha)	Imports of forest products							
		1990*	2000*	2010*	2015*	Annual change rate			
						1990-2015		2010-2015	
	2015	Million EUR				Million EUR	%	Million EUR	%
Albania	785	2	10	39	50	2.07	14.85	2.02	4.67
Andorra	16	-	-	-	-	-	-	-	-
Austria	3 881	1 287	2 252	2 677	2 742	63.26	3.34	13.04	0.48
Belarus	8 634	1	146	327	362	15.70	29.72	6.90	2.02
Belgium	689	3 015	4 025	4 351	4 294	55.58	1.55	-11.40	-0.26
Bosnia and Herzegovina	2 161	2	1	149	148	6.36	20.68	-0.12	-0.08
Bulgaria	3 833	22	118	302	299	12.05	12.02	-0.68	-0.22
Croatia	1 922	38	269	304	293	11.11	9.35	-2.11	-0.70
Cyprus	173	81	77	111	97	0.66	0.75	-2.82	-2.69
Czech Republic	2 668	192	738	1 342	1 353	50.45	8.85	2.12	0.16
Denmark	625	1 352	1 725	1 352	1 232	-5.22	-0.40	-23.90	-1.83
Estonia	2 421	1	121	310	326	14.13	28.45	3.17	1.00
Finland	22 409	488	915	1 198	1 073	25.46	3.49	-25.00	-2.18
France	16 836	5 048	7 341	7 067	6 868	79.13	1.35	-39.71	-0.57
Georgia	2 822	1	1	53	61	2.62	19.26	1.60	2.83
Germany	11 419	9 224	11 517	13 359	13 290	176.79	1.60	-13.70	-0.10
Greece	3 903	474	783	847	758	12.39	2.07	-17.67	-2.18
Holy See	0	-	-	-	-	-	-	-	-
Hungary	2 061	165	669	907	881	31.11	7.54	-5.24	-0.58
Iceland	48	31	54	49	47	0.66	1.74	-0.51	-1.05
Ireland	755	452	723	589	528	3.31	0.68	-12.13	-2.15
Italy	9 297	5 111	7 193	7 178	7 069	85.15	1.42	-21.80	-0.31
Latvia	3 391	1	96	207	220	9.51	24.70	2.58	1.21
Liechtenstein	7	0	-	-	-	-	-	-	-
Lithuania	2 187	0	130	383	406	17.64	35.12	4.55	1.16
Luxembourg	89	125	167	252	247	5.33	3.03	-0.97	-0.39
Malta	0	32	38	67	65	1.45	3.17	-0.38	-0.58
Monaco	0	-	-	-	-	-	-	-	-
Montenegro	827	9	12	16	15	0.28	2.33	-0.17	-1.06
Netherlands	365	3 440	4 484	4 728	4 541	47.86	1.21	-37.48	-0.81
North Macedonia	994	17	57	83	82	2.84	7.11	-0.10	-0.12
Norway	12 141	527	959	927	910	16.63	2.40	-3.55	-0.39
Poland	9 420	107	1 400	3 092	3 173	133.33	15.88	16.26	0.52
Portugal	3 312	491	945	945	939	19.51	2.86	-1.11	-0.12
Republic of Moldova	386	8	16	73	76	2.95	10.17	0.62	0.84
Romania	6 901	51	216	602	629	25.13	11.56	5.38	0.88
Russian Federation	809 090	55	494	1 906	2 031	85.91	16.95	25.14	1.29
Serbia	2 720	416	548	442	426	0.46	0.11	-3.21	-0.74
Slovakia	1 922	25	312	750	748	31.44	15.92	-0.47	-0.06
Slovenia	1 248	200	341	550	559	15.65	4.58	1.86	0.34
Spain	18 551	2 235	4 217	3 617	3 391	50.23	1.83	-45.24	-1.28
Sweden	27 980	790	1 464	1 729	1 710	40.02	3.42	-3.66	-0.21
Switzerland	1 252	1 517	1 706	1 510	1 455	-2.69	-0.18	-11.05	-0.74
Turkey	21 630	348	1 020	2 608	2 745	104.21	9.39	27.46	1.03
Ukraine	9 657	1	306	801	820	35.58	31.85	3.69	0.46
United Kingdom	3 155	7 029	9 080	7 433	7 324	12.86	0.18	-21.70	-0.29

Source: UNECE/FAO TIMBER database, 2019. Based on national reporting from Joint Forest Sector Questionnaire.

**Data for reference years were used as follows:*
1990 - 1992
2000 - average of 1998-2002
2010 - average of 2008-2012
2015 - average of 2013-2017

Table 55: Ind. 6.9 Total energy production from wood, 2013-2015

Country	Forest (1 000 ha)	2013									
		Total energy supply from wood	Energy from direct wood fibre sources			Energy from coproducts and residues of the wood processing industries		Energy from processed wood-based fuels		Energy from post consumer recovered wood	Energy from unknown/ unspecified sources
			Total	Forests	OWL & other land	Total	Solid residues	Total	Imported		
	2015	1 000 metric tonnes dry matter									
Albania	785	-	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 881	10 325	3 313	2 981	331	6 383	5 201	629	488	-	-
Belarus	8 634	-	-	-	-	-	-	-	-	-	-
Belgium	689	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	647	426	327	99	204	70	17	-	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-	-	-
Croatia	1 922	1 114	900	900	-	79	79	38	6	97	-
Cyprus	173	19	5	1	4	1	1	13	11	-	-
Czech Republic	2 668	4 699	2 586	1 612	800	1 934	870	159	82	20	-
Denmark	625	4 264	2 057	2 057	0	0	0	1 830	1 734	377	0
Estonia	2 421	2 132	1 155	1 124	31	921	796	40	51	16	-
Finland	22 409	19 841	5 830	5 830	-	13 563	3 316	179	58	268	-
France	16 836	24 264	14 133	10 957	2 949	7 409	4 902	914	168	1 808	-
Georgia	2 822	-	-	-	-	-	-	-	-	-	-
Germany	11 419	31 261	15 380	13 031	2 349	6 849	5 016	2 054	775	6 220	758
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	-	1 810	1 810	-	-	-	-	-	-	-
Iceland	48	45	4	4	-	33	33	2	1	6	0
Ireland	755	728	127	125	2	413	413	68	39	120	-
Italy	9 297	-	-	-	-	-	-	-	-	-	-
Latvia	3 391	-	-	-	-	-	-	-	-	-	-
Liechtenstein	7	11	10	10	-	-	-	1	1	-	-
Lithuania	2 187	-	-	-	-	-	-	-	-	-	-
Luxembourg	89	165	85	85	-	77	77	3	4	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-	-	-
Netherlands	365	1 831	429	130	299	124	124	725	748	553	-
North Macedonia	994	235	234	234	-	-	-	1	1	-	-
Norway	12 141	2 392	1 122	1 122	-	775	468	162	87	53	280
Poland	9 420	-	-	-	-	-	-	-	-	-	-
Portugal	3 312	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	782	778	778	-	3	3	1	0	-	-
Romania	6 901	-	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	2 852	2 521	2 197	324	224	224	88	3	19	-
Slovakia	1 922	-	-	-	-	-	-	-	-	-	-
Slovenia	1 248	1 472	1 038	887	151	270	270	137	156	7	20
Spain	18 551	-	-	-	-	-	-	-	-	-	-
Sweden	27 980	25 985	6 243	1 851	-	16 864	2 805	1 997	685	881	-
Switzerland	1 252	2 643	1 543	1 355	189	413	413	211	91	476	-
Turkey	21 630	-	-	-	-	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-	-	-	-	-
United Kingdom	3 155	5 427	1 590	1 130	460	1 860	1 809	1 846	3 153	131	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 55: Ind. 6.9 Total energy production from wood, 2013-2015 *(Cont.)*

Country	Forest (1 000 ha)	2015									
		Total energy supply from wood	Energy from direct wood fibre sources			Energy from coproducts and residues of the wood processing industries		Energy from processed wood-based fuels		Energy from post consumer recovered wood	Energy from unknown/ unspecified sources
			Total	Forests	OWL & other land	Total	Solid residues	Total	Imported		
	2015	1 000 metric tonnes dry matter									
Albania	785	-	-	-	-	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-	-	-	-	-
Austria	3 881	10 569	3 078	2 350	728	6 814	4 811	678	465	-	-
Belarus	8 634	-	-	-	-	-	-	-	-	-	-
Belgium	689	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	2 161	1 459	1 459	1 459	-	-	-	-	1	-	-
Bulgaria	3 833	-	-	-	-	-	-	-	-	-	-
Croatia	1 922	1 914	1 587	1 023	564	204	204	26	13	97	-
Cyprus	173	24	5	3	2	1	1	19	17	-	-
Czech Republic	2 668	5 574	3 493	2 550	804	1 880	1 296	201	73	-	-
Denmark	625	4 602	2 195	2 195	0	0	0	1 914	1 774	493	0
Estonia	2 421	2 200	893	811	82	1 253	1 142	40	21	14	-
Finland	22 409	19 738	4 472	4 472	-	14 648	4 124	186	57	432	-
France	16 836	20 931	12 458	9 815	2 643	6 208	3 745	1 202	392	1 063	-
Georgia	2 822	884	884	305	579	0	0	0	-	-	-
Germany	11 419	26 195	13 481	11 384	2 082	5 548	4 627	1 785	843	5 282	100
Greece	3 903	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-	-	-	-	-
Hungary	2 061	-	3 178	3 178	-	-	-	-	-	-	-
Iceland	48	11	1	1	-	9	9	1	1	-	-
Ireland	755	-	-	-	-	-	-	-	25	-	-
Italy	9 297	-	-	-	-	-	-	-	-	-	-
Latvia	3 391	1 244	268	268	-	900	900	76	122	-	-
Liechtenstein	7	14	12	12	-	-	-	1	1	-	-
Lithuania	2 187	2 549	906	802	104	869	869	92	-	-	682
Luxembourg	89	220	77	77	-	141	141	2	8	-	-
Malta	0	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-	-	-	-	-
Montenegro	827	-	-	-	-	-	-	-	-	-	-
Netherlands	365	2 017	896	173	724	175	175	91	178	855	-
North Macedonia	994	-	-	-	-	-	-	-	-	-	-
Norway	12 141	1 726	761	761	-	491	447	137	113	-	337
Poland	9 420	21 589	21 589	21 589	-	-	-	-	160	-	-
Portugal	3 312	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	386	1 512	1 502	1 502	-	10	10	-	0	-	-
Romania	6 901	-	-	-	-	-	-	-	-	-	-
Russian Federation	809 090	-	-	-	-	-	-	-	-	-	-
Serbia	2 720	2 886	2 479	2 131	348	207	207	182	8	18	-
Slovakia	1 922	2 622	1 089	840	249	1 477	1 041	39	28	17	-
Slovenia	1 248	1 429	842	693	149	332	332	139	168	5	110
Spain	18 551	-	-	-	-	-	-	-	-	-	-
Sweden	27 980	22 480	4 666	4 596	70	15 364	3 780	1 486	349	964	-
Switzerland	1 252	2 056	1 060	899	160	327	327	199	91	471	-
Turkey	21 630	-	-	-	-	-	-	-	-	-	-
Ukraine	9 657	-	-	-	-	-	-	-	-	-	-
United Kingdom	3 155	12 693	3 247	2 218	1 029	2 454	2 451	6 189	5 994	802	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 56: Ind. 6.10 Accessibility for recreation and intensity of use, 2015

Country	Forest (1 000 ha)	Forest and other wooded land					
		Area with access available to the public for recreational purposes			Area primarily designated or managed for public recreation		
		Total (1 000 ha)	% of total	Annual number of visits (million)	Total (1 000 ha)	% of total	Annual number of visits (million)
Albania	785	-	-	-	-	-	-
Andorra	16	-	-	-	-	-	-
Austria	3 881	3 813	95.0	-	48	1.2	-
Belarus	8 634	8 880	96.2	3	1 536	16.6	2
Belgium	689	706	97.7	-	-	-	-
Bosnia and Herzegovina	2 161	2 823	100.0	-	-	-	-
Bulgaria	3 833	3 656	95.4	-	929	24.0	-
Croatia	1 922	2 347	99.0	-	16	0.7	-
Cyprus	173	-	-	-	-	-	-
Czech Republic	2 668	2 668	100.0	233	30	1.1	-
Denmark	625	625	100.0	70	2	3.8	-
Estonia	2 421	2 347	93.1	-	15	0.6	2
Finland	22 409	22 876	99.7	-	530	2.4	-
France	16 836	4 059	23.0	770	-	-	-
Georgia	2 822	2 829	100.0	-	348	12.3	-
Germany	11 419	10 839	95.0	2 000	228	2.0	-
Greece	3 903	-	-	-	-	-	-
Holy See	0	-	-	-	-	-	-
Hungary	2 061	1 857	90.1	-	21	1.0	-
Iceland	48	192	98.7	-	36	18.6	-
Ireland	755	391	51.8	-	21	5.3	-
Italy	9 297	-	-	-	-	-	-
Latvia	3 391	3 214	92.0	-	1 741	49.0	-
Liechtenstein	7	-	-	-	-	-	-
Lithuania	2 187	2 160	99.0	-	65	3.0	-
Luxembourg	89	-	-	-	-	-	-
Malta	0	-	-	-	-	-	-
Monaco	0	-	-	-	-	-	-
Montenegro	827	964	100.0	-	-	-	-
Netherlands	365	310	85.0	154	36	10.0	-
North Macedonia	994	-	-	-	-	-	-
Norway	12 141	14 184	100.0	-	-	-	-
Poland	9 420	7 927	84.0	-	730	9.0	-
Portugal	3 312	-	-	-	-	-	-
Republic of Moldova	386	222	57.3	-	86	22.2	-
Romania	6 901	-	-	-	380	5.4	-
Russian Federation	809 090	-	-	-	-	-	-
Serbia	2 720	-	-	-	-	-	-
Slovakia	1 922	1 865	96.0	-	23	1.2	-
Slovenia	1 248	1 237	99.2	-	28	2.2	-
Spain	18 551	-	-	-	-	-	-
Sweden	27 980	30 344	100.0	200	60	0.2	-
Switzerland	1 252	1 325	100.0	405	17	1.3	-
Turkey	21 630	2 026	9.7	-	1 460	7.0	-
Ukraine	9 657	558	40.0	-	837	60.0	-
United Kingdom	3 155	1 389	45.0	600	-	-	-

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators

Table 57: Country data on forest management plans

Country	Share of forest area with forest management plan or equivalent	Is the FMP:	
		Obligatory?	Registered with an official body?
Denmark	n/a	No	No
Estonia	69	No	Yes
Finland	100	No	Yes
Iceland	100	No	Yes
Latvia	n/a	n/a	n/a
Lithuania	100	Yes	Yes
Norway	49	No	Yes
Sweden	98	No	No
North Europe (reporting countries)	89	Yes 1 No 6	Yes 5 No 2
Austria	100	No	No
Belgium	47	Partially	Yes
France	45	Partially	Yes
Germany	66	Partially	Yes
Ireland	72	No	No
Liechtenstein	n/a	n/a	n/a
Luxembourg	51	Yes	0
Netherlands	"Most"	n/a	n/a
Switzerland	58	Yes	Yes
United Kingdom	60	No	Yes
Central-West Europe (reporting countries)	53	Yes 2, No 3 Partially 3	Yes 5, No 2
Belarus	n/a	n/a	n/a
Czech Republic	100	Yes	Yes
Georgia	13	Yes	Yes
Hungary	100	Yes	Yes
Moldova	100	Yes	Yes
Poland	96	Yes	Yes
Romania	81	Yes	Yes
Slovakia	100	Yes	Yes
Ukraine	92	Yes	Yes
Central-East Europe (reporting countries)	86	Yes 8	Yes 8
Andorra	n/a	n/a	n/a
Holy See	n/a	n/a	n/a
Italy	n/a	No	Yes
Malta	n/a	n/a	n/a
Monaco	n/a	n/a	n/a
Portugal	58	Yes	Yes
Spain	32	Yes	Yes
South-West Europe (reporting countries)	36	Yes 2, No 1	Yes 3, No 0
Albania	n/a	n/a	n/a
Bosnia and Herzegovina	n/a	n/a	n/a
Bulgaria	100	Yes	Yes
Croatia	100	Yes	Yes
Cyprus	80	Yes	Yes
Greece	n/a	n/a	n/a
Montenegro	n/a	n/a	n/a
North Macedonia	n/a	n/a	n/a
Serbia	n/a	n/a	n/a
Slovenia	99	Yes	Yes
Turkey	100	Yes	Yes
South-East Europe (reporting countries)	100	Yes 5, No 0	Yes 5, No 0
EUROPE (reporting countries)	77	Yes 18, No 10, Partially 3	Yes 26, No 4

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European qualitative indicators, reviewed by national correspondents during country profile dialogue

Table 58: Forest certification in Europe, 2015

Country	Area certified	Share of certified forest	Comments
	1 000 ha	%	
Denmark	170	27	
Estonia	1 600	66	Most public forests and 100 thousand ha of private forests are certified by both systems.
Finland	19 576	87	Mostly PEFC, although some forests are dual certified
Iceland	0	0	As native forests are not commercial and there are no exports of forest products, third-party certification schemes were not considered necessary
Latvia			No information was received on certification
Lithuania	1 125	51	Exclusively FSC.
Norway	7 318	60	0.45 million ha are double certified
Sweden	16 973	61	Nearly 9 million ha are certified by both bodies
North Europe*	46 762	69	
Austria	3 100	80	Mostly PEFC.
Belgium	325	47	
France	8 069	48	Mostly PEFC
Germany	8 034	70	Mostly PEFC.
Ireland	440	58	Forests of the State forest agency, Coillte, are certified by both FSC and PEFC, and account for most of the certified area
Liechtenstein			No qualitative information supplied to SoEF 2020
Luxembourg	40	47	The state forests are certified under both FSC and PEFC.
Netherlands	171	47	
Switzerland	638	51	Both FSC and PEFC, and dual certification.
United Kingdom	1 375	44	Most certified land is certified to both FSC and PEFC
Central-West Europe*	22 194	58	
Belarus	8 098	94	
Czechia	1 887	71	Mostly PEFC.
Georgia	0	0	No forests are under third party certification schemes, but preparations are in hand
Hungary	225	11	Exclusively FSC.
Moldova	0	0	There is no third party forest certification scheme active in Moldova
Poland	7 253	77	Many forests are certified to both FSC and PEFC
Romania	2 675	39	Exclusively FSC.
Slovakia	1 379	72	Mostly PEFC
Ukraine	4 300	44	Exclusively FSC.
Central-East Europe*	25 818	72	
Andorra			No information supplied
Italy	876	9	Mostly PEFC.
Malta			No information supplied
Portugal	487	15	A considerable amount is double certified
Spain	2 480	13	Mostly PEFC
South-West Europe*	3 843	12	
Albania			No information supplied
Bosnia and Herzegovina			No information supplied
Bulgaria	1 464	38	Essentially FSC
Croatia	1 789	93	All FSC
Cyprus	0	0	No forests are under third party certification schemes.
Greece			No information supplied
Montenegro			No information supplied
North Macedonia			No information supplied
Serbia			No information supplied
Slovenia	285	23	23% of forests are certified under third party certification schemes (PEFC and FSC, with double certification on state forests).
Turkey	2 367	11	All FSC
South-East Europe*	5 906	20	
Europe*	104 524	52	

** Only data of reporting countries included in regional and European totals*

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European qualitative indicators, reviewed by national correspondents during country profile dialogue

Table 59: Main international commitments signed by country

Country	Main international commitments							
	CBD	UNCCD	UNFCCC	Kyoto Protocol	Paris Agreement	Alpine Convention	Carpathian convention	Other
Albania	-	-	-	-	-	-	-	
Andorra	-	-	-	-	-	-	-	
Austria	x	x	x	x	x	x	o	
Belarus	-	-	-	-	-	-	-	
Belgium	x	x	x	x	x	o	o	
Bosnia and Herzegovina	-	-	-	-	-	-	-	
Bulgaria	x	x	x	x	x	o	o	
Croatia	-	x	x	x	x	-	-	
Cyprus	x	x	x	x	x	-	-	
Czech Republic	x	x	x	x	x	o	x	Convention on European Forest Institute
Denmark	x	x	x	x	x	-	-	
Estonia	x	x	x	x	x	-	-	European Forest Institute
Finland	x	x	x	x	x	o	o	EU climate and energy policy
France	x	x	x	x	x	x	o	
Georgia	x	x	x	x	x	-	-	Aarhus Convention, Bern Convention, CITES
Germany	x	x	x	x	x	x	o	
Greece	-	-	-	-	-	-	-	
Holy See	-	-	-	-	-	-	-	
Hungary	x	x	x	x	x	-	x	
Iceland	x	x	x	x	x	o	o	
Ireland	x	x	x	x	x	o	o	
Italy	x	x	x	x	x	x	o	
Latvia	-	-	-	-	-	-	-	
Liechtenstein	-	-	-	-	-	-	-	
Lithuania	x	x	x	x	x	o	o	
Luxembourg	-	-	-	-	-	-	-	
Malta	-	-	-	-	-	-	-	
Monaco	-	-	-	-	-	-	-	
Montenegro	-	-	-	-	-	-	-	
Netherlands	-	-	-	-	-	-	-	
North Macedonia	x	x	x	x	x	o	o	
Norway	x	x	x	x	x	o	x	
Poland	x	x	x	x	x	o	o	
Portugal	x	x	x	x	x	o	o	
Republic of Moldova	x	x	x	x	x	-	x	
Romania	-	-	-	-	-	-	-	
Russian Federation	-	-	-	-	-	-	-	
Serbia	x	x	x	x	x	-	x	
Slovakia	x	x	x	x	x	x	o	
Slovenia	x	x	x	x	x	-	-	
Spain	x	x	x	x	x	o	o	International Tropical Timber Agreement (ITTA 2006 and ITTO)
Sweden	x	x	x	x	x	x	o	REDD+ (Reduction of Emissions from Deforestation and Forest Degradation); see also comments
Switzerland	-	-	-	-	-	-	-	
Turkey	x	x	x	x	o	o	o	
Ukraine	x	x	x	x	x	o	x	
United Kingdom	x	x	x	x	x	o	o	
European Union	x	x	x	x	x	x		

Source: FOREST EUROPE/UNECE/FAO enquiry on pan-European qualitative indicators

signed (x); not signed (0); not reported (-)

Annexes to Part II

Annex 9: Data tables – Part II (main country trends)

These tables set out the data used as the basis for the country profiles in Part II. The data have been reviewed and approved by national correspondents. There may be some differences between the data in this annex and those in other parts of SoEF 2020, as the review process was completed after processing of data from questionnaires and finalisation of therespective data base. However, the differences are relatively minor, and do not change the overall picture.

The terms and definitions used in these tables are the international ones used elsewhere in SoEF 2020, and may well be different from those used in national publications.

Albania

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Albania National Forest Policy, 2019-2030. Approved by Council of Ministers in 2018.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	87	n/a	47	n/a
2	Proportion of forest and other wooded land under third party certification schemes	%	No forests were certified under third party certification schemes			
3	Formal authority for main forest matters	Y/N	Law Nr 9385 "For forests and forest service" (2005)			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventories in 1969, 1985 and 2004. New inventory under way			
1.1	Forest area as proportion of total land area	%	28.8	28.1	28.3	28.6*
1.1	Forest area annual net change rate	%	n/a	-0.25	0.08	0.12*
1.2	Growing stock per ha on forest	m^3	95	98	67	n/a
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.0	-0.1	n/a
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage (wildlife + fire only)	%	n/a	14.0	25.2	3.2
3.1	Fellings as % of net annual increment on forest available for wood supply	%	233.5	297.2	440.3	n/a
3.2	Total wood removals (estimated, including woodfuel, but probably still underestimates)	1 000 m^3	2 076	447	430	1 180 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	n/a	262	122	37
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	14.3	25.0	18.2
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	n/a	13.0	20.4	18.6
6.5	Employment in forest administration (not including wood processing, pulp and paper or employees of municipalities)	1 000 persons	1 726	1 368	1 028	879
6.9	Energy supply from wood as % of total primary energy supply (2011, 2015)	%	n/a	n/a	10.5	26.0
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated, supplemented by national sources					

Austria

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	A national forest programme has been agreed and is being implemented and monitored			
2	Proportion of forest under a management plan or equivalent instrument	%				100
2	Proportion of forest under third party certification schemes	%				79.5
3	Formal authority for main forest matters	Y/N	Austrian Forestry Act 1975			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventories have been carried out regularly since 1961			
1.1	Forest area as proportion of total land area	%	45.8	46.5	46.8	47.2*
1.1	Forest area annual net change rate	%	n/a	0.16	0.06	0.09*
1.2	Growing stock per ha on forest	m^3	245	278	291	299*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.0	0.5	0.4*
1.4	Carbon stock in harvested wood products	million m.t.	47	53	63	65
2.4	Proportion of area of forest and other wooded land with damage	%	35.5	28.1	25.1	n/a
3.1	Fellings as % of net annual increment on forest available for wood supply	%	68.3	58.0	87.1	87.1
3.2	Total wood removals	1 000 m^3	15 733	13 276	17 831	17 647 (2017)
4.3	Area of forest and other wooded land undisturbed by man	1 000 ha	118	118	118	118
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	25.8	16.5	21.8
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests[1]	%	n/a	23.7	29.9	39.5
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	58	53	55
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	11.7	14.2	15.7	15.6
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

[1] There is some double counting between the two sub-categories of protection forest: see text

Belarus

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Programmes for the development of forestry in Belarus, 2007-2011, 2011-2015 and 2016-2020			
2	Proportion of forest under a management plan or equivalent instrument	%	100	100	100	100
2	Proportion of forest under third party certification schemes	%	0	0	80.2	93.8
3	Formal authority for main forest matters	Y/N	Legislation is based on the Constitution, the Forest Code, acts of the President of the Republic			
5	Existence of national or subnational forest assessment process	Y/N	Data are generated from state forest accounts (1990, 2000) or cadaster (2005, 2010, 2015)			
1.1	Forest area as proportion of total land area	%	37.5	39.9	41.6	43.2*
1.1	Forest area annual net change rate	%	NA	0.63	0.43	0.16*
1.2	Growing stock per ha	m^3	141	162	185	206*
1.4	Annual average change in above ground biomass stock in forest	%	NA	3.9	2.4	1.5*
1.4	Carbon stock in harvested wood products	million m.t.	2.53	2.87	4.12	5.94
2.4	Proportion of forest area with damage	%	n/a	3.1	2.3	2.3
3.1	Fellings as % of net annual increment (forest)	%	n/a	47.8	65.5	73.4
3.2	Total wood removals	1 000 m^3	n/a	10 787	15 473	23 801 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	n/a	135	135	135
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	16.2	15.4	15.6
5.1	Proportion of forest included in MCPFE Class 3- protection forests	%	8.3	15.6	14.9	16.7
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	122	96	84
6.9	Energy supply from wood as % of total primary energy supply	%	n/a	4.5	4.9	5.2
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Belgium

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	A process similar to an NFP is in place which fixes for legislative periods objectives, actions, targets and indicators with periodic evaluation			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument (Flanders and Brussels only)	%				47.5
2	Proportion of forest and other wooded land under third party certification schemes	%				47.1
3	Formal authority for main forest matters	Y/N	The regional governments in Belgium have full authority and competence with respect to forests and nature policy			
5	Existence of national or subnational forest assessment process	Y/N	Regular regional forest inventories			
1.1	Forest area as proportion of total land area	%	22.4	22.0	22.8	22.7*
1.1	Forest area annual net change rate	%	n/a	-0.15	0.34	-0.02*
1.2	Growing stock per ha	m^3	189	236	259	262*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.3	1.5	0.9*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	1
2.4	Proportion of forest area with damage	%	n/a	14.2	6.8	6.4
3.1	Fellings as % of net annual increment on forest available for wood supply	%	89.2	76.9	84.3	98.7
3.2	Total wood removals	1 000 m^3	6 351	2 531	3 996	4 151
4.3	Area of forest undisturbed by man	1 000 ha	0	0	0	0
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	5.3	6.1	7.7
5.1	Proportion of forest included in MCPFE Class 3- protection forests	%	n/a	26.8	24.8	24.8
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	39.8	38.7	38.3	31.1
6.9	Energy supply from wood as % of total primary energy supply (2009)	%	n/a	n/a	1.0	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Bosnia and Herzegovina

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	No information supplied for SoEF 2020			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				n/a
2	Proportion of forest and other wooded land under third party certification schemes	%				n/a
3	Formal authority for main forest matters	Y/N	No information supplied for SoEF 2020			
5	Existence of national or subnational forest assessment process	Y/N	Data supplied by national statistical agency			
1.1	Forest and other wooded land area as proportion of total land area	%	n/a	54.6 (2002)	54.3	54.9 (2017)
1.1	Forest and other wooded land area annual net change rate	%	n/a	n/a	-0.07	0.16 (2017)
1.2	Growing stock per ha on forest (public forests only)	m^3	n/a	n/a	222.4	229.9 (2017)
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.1	0.0	0.0*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	0.3	1.2	n/a	n/a
3.1	Fellings as % of net annual increment (public forests only)	%	n/a	n/a	38.8	42.7
3.2	Total wood removals (public forests only)	1 000 m^3	n/a	4 281	3 615	4 086 (2018)
4.3	Area of forest and other wooded land undisturbed by man	1 000 ha	1.43	1.43	1.43	2.81
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	0.8	2.3	3.5	4.0
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	n/a	n/a	n/a	n/a
6.5	Employment in forestry (ISIC/NACE 02)	1 000 persons	n/a	n/a	11.13 (2015)	11.91 (2017)
6.9	Energy supply from wood as % of total primary energy supply (2011, 2013 and 2015)	%	n/a	3.5	4.8	8.8
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators)) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

Bulgaria

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes. The National Strategy for development of the forest sector in the Republic of Bulgaria 2013-2020			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				100
2	Proportion of forest and other wooded land under third party certification schemes	%				34
3	Formal authority for main forest matters	Y/N	Forest Law, published in 2011, with most recent amendment 2018			
5	Existence of national or subnational forest assessment process	Y/N	10 year inventory cycle, with annual reporting of area and harvest, five-yearly general update			
1.1	Forest area as proportion of total land area	%	30.6	31.1	34.4	35.9*
1.1	Forest area annual net change rate	%	NA	0.14	1.07	0.42*
1.2	Growing stock per ha	m^3	122	156	173	197*
1.4	Annual average change in above ground biomass stock in forest	%	NA	2.9	1.3	1.5*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	5.2	7.4	3.1	3.8
3.1	Fellings as % of net annual increment (forest)	%	34.9	27.7	48.5	60.0
3.2	Total wood removals	1 000 m^3	4 089	4 784	5 668	6 198 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	157	270	597	704
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	3.8	6.9	15.4	18.2
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	18.2	22.1	15.5	10.8
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	62.40	53.97	54.17
6.9	Energy supply from wood as % of total primary energy supply (2011)	%	n/a	n/a	5.0	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

Croatia

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, national level, leading to Master Forest Management Plan for Republic of Croatia 2016-2025			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				100
2	Proportion of forest and other wooded land under third party certification schemes	%				92
3	Formal authority for main forest matters	Y/N	Forest Law 2018			
5	Existence of national or subnational forest assessment process	Y/N	Stand inventory by state forest enterprise			
1.1	Forest area as proportion of total land area	%	33.1	33.7	34.3	34.7*
1.1	Forest area annual net change rate	%	n/a	0.19	0.18	0.10*
1.2	Growing stock per ha on forest	m^3	168	191	213	220*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.1	0.1	0.4*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage	%	0.0	4.7	5.8	3.5
3.1	Fellings as % of net annual increment on forest available for wood supply	%	59.3	52.9	67.0	71.5
3.2	Total wood removals	1 000 m^3	n/a	n/a	4 430	5 754 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	6.73	6.73	6.73	6.73
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	9.2	10.4	11.3	16.3
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	2.6	4.1	5.4	12.5
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	n/a	36.27	36.63
6.9	Energy supply from wood as % of total primary energy supply (2013 and 2015)	%	n/a	n/a	6.4	11.0
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Cyprus

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	No NFP, although there is a platform for stakeholder participation (Forest Consultative Board). Forest Policy Statement 2013			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	Forest management plans are obligatory and registered with an official body. No information on area under FMP supplied for SoEF 2020			
2	Proportion of forest and other wooded land under third party certification schemes	%				0.0
3	Formal authority for main forest matters	Y/N	Department of Forests Forest Law 2012			
5	Existence of national or subnational forest assessment process	Y/N	Information not supplied for SoEF 2020			
1.1	Forest area as proportion of total land area	%	17.4	18.6	18.7	18.7*
1.1	Forest area annual net change rate	%	n/a	0.63	0.07	-0.01*
1.2	Growing stock per ha on forest	m^3	46	46	57	64*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.7	2.3	n/a
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage	%	n/a	n/a	1.4	n/a
3.1	Fellings as % of net annual increment on forest available for wood supply	%	110.8	57.6	19.9	n/a
3.2	Total wood removals	1 000 m^3	n/a	n/a	n/a	16 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	13.24	13.24	13.24	n/a
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	2.3	5.6	6.8	n/a
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	0.0	0.0	0.0	0.0
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	4.33	4.33	n/a
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	0.1	0.2	0.3	0.6
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Czech Republic

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	A National Forest Programme for the period to 2013 was issued in 2008			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				100.0
2	Proportion of forest and other wooded land under third party certification schemes	%				70.5
3	Formal authority for main forest matters	Y/N	Forest Act, enacted in 1995, amended most recently in 2019			
5	Existence of national or subnational forest assessment process	Y/N	A forest monitoring system is in place and a report on SFM has been issued			
1.1	Forest area as proportion of total land area	%	34.1	34.2	34.4	34.7*
1.1	Forest area annual net change rate	%	n/a	0.03	0.08	0.07*
1.2	Growing stock per ha	m^3	237	265	284	295*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.3	0.8	0.5*
1.4	Carbon stock in harvested wood products	million m.t.	35	37	41	42
2.4	Proportion of area of forest and other wooded land with damage	%	1.9	1.0	1.4	1.4
3.1	Fellings as % of net annual increment on forest available for wood supply	%	73.1	82.3	83.1	84.1
3.2	Total wood removals	1 000 m^3	13 332	14 441	16 736	19 387 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	9.99	9.99	9.99	9.99
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	27.1	28.3	29.5
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	n/a	6.7	10.3	10.7
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	119.19	85.77	80.24
6.9	Energy supply from wood as % of total primary energy supply (2009, 2011, 2015)	%	n/a	4.4	4.6	6.4
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2018, unless otherwise indicated.					

Denmark

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, at national level. A new NFP process was published in 2018, setting out long term objectives			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	Forest management plans are not compulsory, and are not registered			
2	Proportion of forest under third party certification schemes	%				30
3	Formal authority for main forest matters	Y/N	Forest Act, enacted by Parliament in 2004, and last amended in 2019			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory since 2002			
1.1	Forest area as proportion of total land area	%	12.5	13.5	13.8	15.0*
1.1	Forest area annual net change rate	%	n/a	0.76	0.26	0.72*
1.2	Growing stock per ha	m^3	124	160	199	211
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.7	0.9	1.4*
1.4	Carbon stock in harvested wood products (from domestic production)	million m.t.	5	5	5	5
2.4	Proportion of area of FOWL with damage	%	n/a	2.8	5.2	5.2
3.1	Fellings as % of net annual increment on forest available for wood supply	%	106.0	104.7	61.4	67.0
3.2	Total wood removals	1 000 m^3	2 018	3 672	2 655	3 902
4.3	Area of forest undisturbed by man	1 000 ha	n/a	n/a	28	21
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	7.8	7.3	20.3	20.8
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	0.0	0.0	0.0	0.0
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	29.23	28.37	24.00	23.00
6.9	Energy supply from wood as % of total primary energy supply	%	7.0	8.2	10.0	15.5
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

Estonia

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Forest Policy adopted in 1997. Forestry development plans have been compiled for 2001-2010 and 2011-2020. The process to develop a forest strategy to 2030 was launched in 2019.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				68.9
2	Proportion of forest and other wooded land under third party certification schemes	%				65.6
3	Formal authority for main forest matters	Y/N	Forest Act 2006			
5	Existence of national or subnational forest assessment process	Y/N	First inventory 100 years ago. Since 2000, there has been a continuous national forest inventory			
1.1	Forest area as proportion of total land area	%	48.7	49.4	51.5	53.8*
1.1	Forest area annual net change rate	%	n/a	0.15	0.43	0.44*
1.2	Growing stock per ha	m^3	178	191	195	203*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.8	0.7	0.8*
1.4	Carbon stock in harvested wood products	million m.t.	6	6	8	9
2.4	Proportion of forest area with damage (understated: see text)	%	n/a	0.8	0.6	0.4
3.1	Fellings as % of net annual increment on forest available for wood supply	%	35.8	99.0	67.1	82.9
3.2	Total wood removals	1 000 m^3	2 341	9 205	7 490	9 948 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	40	57	59	52
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	13.8	21.8	22.9
5.1	Proportion of forest included in MCPFE Class 3- protection forests	%	6.9	11.4	6.9	5.6
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	19.22	30.41	20.41	26.83
6.9	Energy supply from wood as % of total primary energy supply (2009, 2011 and 2015)	%	n/a	18.1	17.1	19.6
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Finland

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Regularly revised national level NFP, and regional NFPs			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				100.0
2	Proportion of forest and other wooded land under third party certification schemes	%				87.4
3	Formal authority for main forest matters	Y/N	Forest Act, enacted by Parliament, at national level, 1996, amended most recently 2014			
5	Existence of national or subnational forest assessment process	Y/N	Continuous national forest inventory			
1.1	Forest area as proportion of total land area	%	72.0	73.9	73.2	73.7*
1.1	Forest area annual net change rate	%	n/a	0.26	-0.09	0.08*
1.2	Growing stock per ha	m^3	86	93	105	109*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.2	0.9	1.2*
1.4	Carbon stock in harvested wood products	million m.t.	72	85	94	97
2.4	Proportion of forest area with damage	%	n/a	n/a	0.2	0.1
3.1	Fellings as % of net annual increment on forest available for wood supply	%	68.6	81.1	68.5	80.4
3.2	Total industrial roundwood removals	1 000 m^3	43 230	54 262	50 952	63 279 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	n/a	n/a	234	203
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	13.2	18.8	18.3
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	n/a	3.1	0.9	1.1
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	124	93	69	64
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	25.1	22.2	25.8	29.3
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

France

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, at national level. New NFP for the period 2016-2026			
2	Proportion of forest under a management plan or equivalent instrument	%				45.2
2	Proportion of forest and other wooded land under third party certification schemes	%				46.8
3	Formal authority for main forest matters	Y/N	Forest Code and LAAF (Loi d'Avenir pour l'Alimentation, l'Agriculture et la Forêt), enacted in 2016			
5	Existence of national or subnational forest assessment process	Y/N	Continuous inventory process			
1.1	Forest area as proportion of total land area	%	26.4	27.9	30.0	31.5*
1.1	Forest area annual net change rate	%	n/a	0.6	0.7	0.5*
1.2	Growing stock per ha	m^3	144	147	161	177*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.8	1.7	1.4*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage (wildlife damage not included)	%	n/a	n/a	n/a	0.2
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	n/a	51.2	60.0
3.2	Total wood removals	1 000 m^3	62 600	65 600	55 700	51 200 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	n/a	n/a	n/a	n/a
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	37.6	37.2
5.1	Proportion of forest land included in MCPFE Class 3- protective forests	%	n/a	n/a	5.5	6.8
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	259	253	185	172
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	3.7	4.0	3.8	4.1
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

Georgia

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, an NFP process at national level was launched in 2013.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				13
2	Proportion of forest and other wooded land under third party certification schemes	%				0.0
3	Formal authority for main forest matters	Y/N	A new National Forest Code has been elaborated, which has been handed over by the government to the Parliament for approval, which is expected in 2019.			
5	Existence of national or subnational forest assessment process	Y/N	No systematic inventory since 1990. The first NFI is expected for 2020			
1.1	Forest area as proportion of total land area	%	39.6	39.7	40.6	40.6*
1.1	Forest area annual net change rate	%	NA	0.03	0.22	0.00*
1.2	Growing stock per ha	m^3	153	161	161	161*
1.4	Annual average change in above ground biomass stock in forest	%	NA	n/a	0.5	0.0*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	n/a	n/a	n/a	0.9
3.1	Fellings as % of net annual increment	%	Data only available on gross annual increment			
3.2	Total wood removals	1 000 m^3	343	432	799	577 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	500.00	500.00	500.00	500.00
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	n/a	9.5
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	n/a	n/a	n/a	99.8
6.5	Employment in forestry (ISIC/NACE 02)	1 000 persons	n/a	2.12	0.69	1.70
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	n/a	n/a	n/a	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

Germany

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, at national level, leading to Forest Strategy 2020 and Charter for Wood 2.0			
2	Proportion of forest under a management plan or equivalent instrument	%				66.4
2	Proportion of forest and other wooded land under third party certification schemes	%				78.2
3	Formal authority for main forest matters	Y/N	Federal Forest Law (Bundeswaldgesetz) enacted 1975, revised most recently 2017. Most legislation is at sub-national level.			
5	Existence of national or subnational forest assessment process	Y/N	Regular national forest inventory			
1.1	Forest area as proportion of total land area	%	32.3	32.5	32.7	32.7*
1.1	Forest area annual net change rate	%	n/a	0.05	0.05	0.01*
1.2	Growing stock per ha	m^3	249	298	317	321*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.0	0.7	1.0*
1.4	Carbon stock in harvested wood products	million m.t.	279	279	279	283
2.4	Proportion of forest area with damage, except human induced	%	n/a	1.4	1.4	1.2
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	76.8	80.3	76.5
3.2	Total wood removals	1 000 m^3	84 707	53 710	54 418	53 491 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	60.1	81.2	81.1
5.1	Proportion of forest included in MCPFE Class 3 - protective forests	%	n/a	26.3	40.5	n/a
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	438.40	300.93	253.10
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	3.4	3.3	4.4	4.1
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Greece

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, national level			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	39,5 (2009-2018)			
2	Proportion of forest and other wooded land under third party certification schemes	%	No certification schemes in force. Initiatives for the development of a national system in hand			
3	Formal authority for main forest matters	Y/N	General Directorate of Forests and Forest Environment / Ministry of Environment and Energy, and Forest Services in each of the 7 Decentralised Administrations			
5	Existence of national or subnational forest assessment process	Y/N	NFI 1992. Forest maps completed for 54% of territory.			
1.1	Forest area as proportion of total land area	%	25.6	27.9	30.3	30.3*
1.1	Forest area annual net change rate	%	n/a	0.88	0.81	0.00*
1.2	Growing stock per ha on forest	m^3	47	47	47	n/a
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.9	0.8	n/a
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage by fire	%	0.8	0.8	0.5	0.3 (2010-2018)
3.1	Fellings as % of net annual increment on forest available for wood supply	%	81.5	n/a	n/a	n/a
3.2	Total wood removals	1 000 m^3	2 492	2 245	1 048	1 432 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	n/a	n/a
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	n/a	n/a	n/a	n/a
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	46.52	49.17	38.13	23.43
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	n/a	n/a	n/a	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Hungary

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	National level NFP, resulting in National Forest Strategy 2016-2030, approved in 2016			
2	Proportion of forest under a management plan or equivalent instrument	%				100
2	Proportion of forest under third party certification schemes	%				11.0
3	Formal authority for main forest matters	Y/N	Act no. XXXVII/2009. on Forests, Protection of Forests and Forest Management, enacted by Parliament in 2009			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory and stand-wise inventory.			
1.1	Forest area as proportion of total land area	%	20.0	21.2	22.6	22.7*
1.1	Forest area annual net change rate	%	NA	0.58	0.63	0.03*
1.2	Growing stock per ha	m^3	160	170	175	193*
1.4	Annual average change in above ground biomass stock in forest	%	NA	1.1	0.9	0.9*
1.4	Carbon stock in harvested wood products	million m.t.	10	10	10	10
2.4	Proportion of forest area with damage	%	8.2	7.2	6.4	2.9
3.1	Fellings as % of net annual increment on forest available for wood supply	%	78.1	78.8	66.6	66.3
3.2	Total wood removals	1 000 m^3	5 493	5 419	5 740	5 689 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	0	0	0	0
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	17.4	16.8	42.6	42.7
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	12.7	9.4	9.9	10.2
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	69.03	50.28	57.20
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015) (Direct from forest only)	%	2.0	2.5	2.8	2.4
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Iceland

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Not yet. A new Forest Act provides for an NFP, which would be implemented by the Forest Service.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				100
2	Proportion of forest and other wooded land under third party certification schemes	%				11.0
3	Formal authority for main forest matters	Y/N	A new Forest Act was approved in May 2019			
5	Existence of national or subnational forest assessment process	Y/N	A national forest inventory covered the period 2005-2017			
1.1	Forest area as proportion of total land area	%	0.2	0.3	0.4	0.5*
1.1	Forest area annual net change rate	%	n/a	5.74	4.12	1.40*
1.2	Growing stock per ha	m^3	3	3	7	16*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.4	5.1	5.7*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage	%	0.0	0.0	1.4	0.0
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	3.4	12.6	12.8
3.2	Total wood removals	1 000 m^3	n/a	0	4	4 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	7.2	7.3	7.7	7.7
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	95.1	88.6	82.9	81.1
6.5	Employment in forestry (ISIC/NACE 02) only	1 000 persons	0.12	0.12	0.14	0.12
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	n/a	n/a	0.1	0.1
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Ireland

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, national level, leading to a forestry strategy 2014-2020			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				69.7
2	Proportion of forest and other wooded land under third party certification schemes	%				56.3
3	Formal authority for main forest matters	Y/N	Forestry Act 2014			
5	Existence of national or subnational forest assessment process	Y/N	National Forest Inventory, 2006, 2012 and 2017, as well as managerial records			
1.1	Forest area as proportion of total land area	%	6.7	9.2	10.5	11.4*
1.1	Forest area annual net change rate	%	n/a	3.16	1.34	0.82*
1.2	Growing stock per ha	m^3	n/a	n/a	131	155*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	3.4	2.3	2.1*
1.4	Carbon stock in harvested wood products	million m.t.	2	4	6	7
2.4	Proportion of forest area with damage	%	n/a	n/a	4.8	7.3
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	n/a	52.2	64.5
3.2	Total wood removals	1 000 m^3	1 625	2 673	2 618	3 542 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	n/a	n/a	n/a	n/a
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	0.9	1.0	0.9	0.8
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	n/a	n/a	n/a	n/a
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	12.90	14.90	11.20	8.95
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	0.6	1.0	1.1	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Italy

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	The national NFP expires in 2019, and is being replaced. The new NFP will have a validity of 20 years.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	Management plans are used, but are not compulsory. No data supplied on area covered.			
2	Proportion of forest and other wooded land under third party certification schemes	%				9.2
3	Formal authority for main forest matters	Y/N	The national forest law of 2001 was revised in 2018 to provide a reference base for the definition of regional laws. Regional authorities have major forest policy responsibilities.			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory in 1995 and 2005. The 3rd NFI is under way			
1.1	Forest area as proportion of total land area	%	25.8	28.5	30.7	32.5*
1.1	Forest area annual net change rate	%	n/a	0.98	0.76	0.58*
1.2	Growing stock per ha on forest	m^3	113	128	142	145*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.2	1.8	1.5*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage (2005 only)	%	n/a	n/a	21.4	n/a
3.1	Fellings as % of net annual increment on forest available for wood supply	%	48.0	47.5	39.2	n/a
3.2	Total wood removals	1 000 m^3	7 972	9 329	7 844	6 053 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	93.00	93.00	93.00	93.00
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	43.6	41.2
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	87.9	85.3	84.2	n/a
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	346.50	325.83	287.53	252.63
6.9	Energy supply from wood as % of total primary energy supply (2009 and 2011)	%	n/a	1.5	1.5	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

Latvia

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	NFP formal process			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	No information received on FMPs for SoEF 2020			
2	Proportion of forest and other wooded land under third party certification schemes	%	No information received on certification for SoEF 2020			
3	Formal authority for main forest matters	Y/N	Latvian Forest Policy was adopted in 1998 at national level			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory covers years from 2008 to 2020			
1.1	Forest area as proportion of total land area	%	51.0	52.1	54.2	54.9*
1.1	Forest area annual net change rate	%	NA	0.21	0.40	0.11*
1.2	Growing stock per ha	m^3	139	166	190	197*
1.4	Annual average change in above ground biomass stock in forest	%	NA	2.0	1.8	0.5*
1.4	Carbon stock in harvested wood products	million m.t.	12	15	20	23
2.4	Proportion of forest area with damage	%	0.0	0.1	0.1	0.0
3.1	Fellings as % of net annual increment on forest	%	32.1	87.8	65.2	71.9
3.2	Total wood removals	1 000 m^3	n/a	14 304	12 534	12 896 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	15.26	15.26	14.92	16.98
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	24.5	17.3	15.8	16.4
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	1.6	2.2	5.1	6.4
6.5	Employment in forestry and wood processing (ISIC/NACE 02, 16)	1 000 persons	n/a	42.00	37.20	42.13
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	n/a	n/a	n/a	14.1
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Liechtenstein

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	No information supplied to SoEF 2020 on NFPs			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	No information supplied to SoEF 2020 on FMPs			
2	Proportion of forest and other wooded land under third party certification schemes	%	No information supplied to SoEF 2020 on certification			
3	Formal authority for main forest matters	Y/N	No information supplied to SoEF 2020 on forest laws			
5	Existence of national or subnational forest assessment process	Y/N	No information supplied to SoEF 2020 on forest inventories			
1.1	Forest area as proportion of total land area	%	38.1	38.1	38.8	38.9*
1.1	Forest area annual net change rate	%	n/a	0.00	0.16	0.00*
1.2	Growing stock per ha on forest	m^3	270	287	282	379
1.4	Annual average change in above ground biomass stock in forest	%	n/a	n/a	0.0	n/a
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage (biotic and fire only)	%	n/a	27.9	25.8	n/a
3.1	Fellings as % of net annual increment on forest available for wood supply	%	73.6	81.9	97.6	n/a
3.2	Total wood removals	1 000 m^3	n/a	24	24	8 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	1.50	1.70	1.70	n/a
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	29.6	30.4	n/a
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	n/a	n/a	n/a	n/a
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	n/a	n/a	n/a
6.9	Energy supply from wood as % of total primary energy supply (2018)	%	n/a	n/a	n/a	30.7
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Lithuania

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, at national level, resulting in National Forestry Sector Development Programme for 2012-2020, approved by the Government			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	100	100	100	100
2	Proportion of forest and other wooded land under third party certification schemes	%				51.1
3	Formal authority for main forest matters	Y/N	Law on Forests, 1995, enacted by Parliament, most recently amended in 2018			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory and stand wise inventory			
1.1	Forest area as proportion of total land area	%	31.0	32.2	34.6	35.1*
1.1	Forest area annual net change rate	%	n/a	0.38	0.72	0.14*
1.2	Growing stock per ha	m^3	212	223	226	254*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.8	0.8	1.3*
1.4	Carbon stock in harvested wood products	million m.t.	7	9	12	14
2.4	Proportion of area of forest and other wooded land with damage	%	4.0	5.8	2.3	0.5
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	n/a	78.3	70.3
3.2	Total wood removals	1 000 m^3	n/a	5 500	7 097	6 795 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	20.00	21.00	26.00	26.54
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	14.7	16.1	16.1
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	n/a	12.3	12.4	9.9
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	n/a	31.72	39.26
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	7.5	10.8	12.5	16.8
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Luxembourg

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, national level, 2004. Stakeholders are involved in the revision of Forest Code which is under way.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				50.7
2	Proportion of forest and other wooded land under third party certification schemes	%				47
3	Formal authority for main forest matters	Y/N	Forest Code under revision, draft submitted to Parliament in 2018			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory since 2000			
1.1	Forest area as proportion of total land area	%	35.4	35.3	35.7	35.7*
1.1	Forest area annual net change rate	%	n/a	-0.03	0.11	0.00*
1.2	Growing stock per ha	m^3	n/a	238	299	299*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.4	0.0	n/a
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	No information supplied to SoEF 2020			
3.1	Fellings as % of net annual increment	%	n/a	60	n/a	65
3.2	Total wood removals	1 000 m^3	n/a	n/a	450	500
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	n/a
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	n/a	1.4
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	n/a	1.4	1.4	n/a
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	n/a	0.40	n/a
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011)	%	1.7	2.0	1.7	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Malta

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	No information supplied			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	No information supplie			0.0
2	Proportion of forest and other wooded land under third party certification schemes	%	No information supplied			0.0
3	Formal authority for main forest matters	Y/N	No information supplied			
5	Existence of national or subnational forest assessment process	Y/N	No information supplied			
1.1	Forest area as proportion of total land area	%	1.1	1.1	1.1	1.1*
1.1	Forest area annual net change rate	%	n/a	0.00	0.00	0.09*
1.2	Growing stock per ha	m^3	231	231	231	n/a
1.4	Annual average change in above ground biomass stock in forest	%	n/a	n/a	n/a	n/a
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	n/a	n/a	n/a	n/a
3.1	Fellings as % of net annual increment	%	n/a	n/a	n/a	n/a
3.2	Total wood removals	1 000 m^3	n/a	0	0	0
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	n/a	n/a
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	n/a	n/a	n/a	n/a
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	n/a	n/a	n/a
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	n/a	n/a	n/a	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

Republic of Moldova

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, at national level, leading to the Strategy for Sustainable Development of the forest sector of the Republic of Moldova. 2001			
2	Proportion of forest under a management plan or equivalent instrument	%	100	84	90	92
2	Proportion of forest and other wooded land under third party certification schemes	%				0
3	Formal authority for main forest matters	Y/N	Forest Code (Codul Silvic) was enacted in 1996, last amended 2017			
5	Existence of national or subnational forest assessment process	Y/N	Stand inventories and managerial records			
1.1	Forest area as proportion of total land area	%	9.9	10.5	11.4	11.8*
1.1	Forest area annual net change rate	%	n/a	0.57	0.84	0.32*
1.2	Growing stock per ha	m^3	142	134	123	120*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.6	1.4	0.3*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage (insects & diseases only)	%	n/a	39.5	6.6	19.5
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	27.0	24.6	n/a
3.2	Total wood removals	1 000 m^3	n/a	321	352	1 343 (2016)
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	91.7	91.7	42.6	41.9
5.1	Proportion of forest included in MCPFE Class 3- protection forests	%	8.3	8.3	57.4	58.1
6.5	Employment in forestry (ISIC/NACE 02)	1 000 persons	6.87	4.69	4.40	4.13
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	n/a	n/a	n/a	21.6
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated.					

The Netherlands

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	No NFP, but forest strategy in place			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	Assumed that most forest area is covered by a forest management plan			
2	Proportion of forest and other wooded land under third party certification schemes	%				47
3	Formal authority for main forest matters	Y/N	Forest Code (Codul Silvic) was enacted in 1996, last amended 2017			
5	Existence of national or subnational forest assessment process	Y/N	Stand inventories and managerial records			
1.1	Forest area as proportion of total land area	%	10.2	10.7	11.1	11.0*
1.1	Forest area annual net change rate	%	n/a	0.43	0.37	-0.11*
1.2	Growing stock per ha	m^3	152	170	203	224*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.6	1.9	1.4*
1.4	Carbon stock in harvested wood products	million m.t.	2	2	2	2
2.4	Proportion of forest area with damage	%	n/a	n/a	n/a	n/a
3.1	Fellings as % of net annual increment on forests available for wood supply	%	58.0	60.8	47.3	47.6
3.2	Total wood removals	1 000 m^3	1 420	1 039	1 081	3 114 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	23.1	64.3	65.0
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	n/a	n/a	1.2	0.5
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	51.15	50.97	39.30	32.53
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	0.8	n/a	1.3	1.3
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated.					

Norway

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, national level. Several parallel processes. White Paper to Parliament on forest policy 2017			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				49.3
2	Proportion of forest and other wooded land under third party certification schemes	%				60.1
3	Formal authority for main forest matters	Y/N	Forestry Act 2005, most recent amendment 2015			
5	Existence of national or subnational forest assessment process	Y/N	Regular national forest inventory			
1.1	Forest area as proportion of total land area	%	33.2	33.2	33.1	33.4*
1.1	Forest area annual net change rate	%	n/a	-0.02	-0.01	0.06*
1.2	Growing stock per ha on forest	m^3	65	74	88	101*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.3	1.7	1.2*
1.4	Carbon stock in harvested wood products	million m.t.	27	29	30	29
2.4	Proportion of forest area with damage	%	n/a	n/a	n/a	n/a
3.1	Fellings as % of net annual increment on forest available for wood supply	%	64.5	50.1	54.7	59.7
3.2	Total wood removals	1 000 m^3	12 881	10 164	11 480	12 466 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	200.00	200.00	200.00	200.00*
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	1.7	2.2	6.4	8.8
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	38.0	38.1	38.1	37.8
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	31.37	21.70	17.83
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	2.1	3.2	4.6	2.8
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Poland

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	NFP process started 2012, and is under development			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	95.0			
2	Proportion of forest and other wooded land under third party certification schemes	%				77.0
3	Formal authority for main forest matters	Y/N	Forestry Act, 1991. National Forest Policy, 1997			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory, stand-wise inventory, management records, remote sensing			
1.1	Forest area as proportion of total land area	%	29.0	29.6	30.5	31.0*
1.1	Forest area annual net change rate	%	n/a	0.20	0.29	0.16*
1.2	Growing stock on forest	m^3	167	192	254	288*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.6	3.5	1.5*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	n/a	n/a	2.2	3.9
3.1	Fellings as % of net annual increment	%	n/a	n/a	n/a	n/a
3.2	Total wood removals	1 000 m^3	20 023	28 271	36 550	45 312 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	17.9	17.2	37.4
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	n/a	28.7	30.2	34.6
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	n/a	291.73	302.87
6.9	Energy supply from wood as % of total primary energy supply (2011, 2015)	%	n/a	n/a	2.0	11.0
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Portugal

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	The national level NFP is a continuous process, and has resulted in the National Forest Strategy, starting year 2006, updated 2015.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	Forest Management Plans are obligatory in public areas and, in private areas if above the threshold defined for each Regional Forest Planning programme. 58% of total forest area (2015) is under a management plan or equivalent instrument			
2	Proportion of forest and other wooded land under third party certification schemes	%				15.3
3	Formal authority for main forest matters	Y/N	Forest Policy Act 1996 and National Forest Strategy 2015. The Institute for Nature Conservation and Forests is both the National Forest authority and the Authority for Nature Conservation and biodiversity			
5	Existence of national or subnational forest assessment process	Y/N	NFI provides information on forests in the country. The main results of the sixth cycle with data for 2015 were published in June 2019.			
1.1	Forest area as proportion of total land area	%	37.5	36.5	35.4	36
1.1	Forest area annual net change rate	%	n/a	-0.28	-0.31	0.36
1.2	Growing stock per ha on forest available for wood supply	m^3	166	163	154	n/a
1.4	Annual average change in above ground biomass stock in forest	%	n/a	n/a	n/a	n/a
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage	%	14.4	10.0	8.9	n/a
3.1	Fellings as % of net annual increment on forest available for wood supply	%	74.6	66.4	75.4 (2005)	n/a
3.2	Total wood removals	1 000 m^3	11 205	10 831	9 648	13 564 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	n/a	24.10	24.10	n/a
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	34.7	33.4 (2005)	21.8
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	n/a	n/a	n/a	7.7
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/ NACE 02, 16, 17)	1 000 persons		102.10	72.23	71.28 (2017)
6.9	Energy supply from wood as % of total primary energy supply	%	n/a	n/a	n/a	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Romania

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, national level, under the Ministry responsible for forestry			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	99.5	93.0	84.3	80.4*
2	Proportion of forest and other wooded land under third party certification schemes	%	0	0	13.2	38.5*
3	Formal authority for main forest matters	Y/N	Forest Code 2008, most recent amendment 2018			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory, supplemented by stand-wise inventory			
1.1	Forest area as proportion of total land area	%	27.7	27.7	28.3	30.1*
1.1	Forest area annual net change rate	%	n/a	-0.01	0.23	0.62*
1.2	Growing stock per ha on forest	m^3	212	211	211	340*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.0	0.2	7.6*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	n/a	n/a	13.5	3.5
3.1	Fellings as % of net annual increment on forest available for wood supply	%	54.0	49.3	60.2	43.9
3.2	Total wood removals	1 000 m^3	12 608	13 148	13 112	14 697 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	127.70	127.70	127.70	165.23
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	n/a	7.8
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	31.2	41.7	41.7	41.7
6.5	Employment in forestry (ISIC/NACE 02)	1 000 persons	103.07	49.97	29.99	32.75
6.9	Energy supply from wood as % of total primary energy supply (2011)	%	n/a	n/a	10.1	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Serbia

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	A national forest programme was prepared in 2008, but has not been adopted.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	87	74	47	42
2	Proportion of forest and other wooded land under third party certification schemes	%	0	0	15.1	42.8
3	Formal authority for main forest matters	Y/N	Directorate of Forests, under the Ministry of Agriculture, Forestry and Water Management. Law on Forests, amended most recently 2015			
5	Existence of national or subnational forest assessment process	Y/N	National Forest Inventory completed 2008. Next inventory currently ongoing			
1.1	Forest area as proportion of total land area	%	26.4	28.1	29.3	31.1*
1.1	Forest area annual net change rate	%	n/a	0.62	0.98	0.03*
1.2	Growing stock per ha on forest	m^3	102	102	153	154*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.3	5.5	0.3*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage (biotic, abiotic and fire only)	%	0.1	3.5	0.8	0.5
3.1	Fellings as % of net annual increment on forest available for wood supply	%	60.2	54.8	84.1	87.7 (2018)
3.2	Total wood removals	1 000 m^3	3 684	3 354	7 636	7 959 (2018)
4.3	Area of forest undisturbed by man	1 000 ha	1.00	1.00	1.00	n/a
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity (2000, 2005)	%	n/a	9.6	16.7	22.0
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests (2000, 2005)	%	7.9	9.7	20.3	21.9
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	58.5	53.3	36.6	35.5
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2010 and 2015)	%	7.2	10.0	13.6	16.1
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators). "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated; (national sources include WISDOM Serbia, (FAO, Rome, 2015); University of Belgrade-Faculty of Forestry database; Statistical office of the Republic of Serbia; Ministry of agricultural, forestry and water management-Forest Directorate);					

Slovakia

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	National level NFP, approved 2007, leading to National Action Plan 2014-2020			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				100.0
2	Proportion of forest and other wooded land under third party certification schemes	%				71.6
3	Formal authority for main forest matters	Y/N	Forest Act, enacted 2005, most recent amendment 2018			
5	Existence of national or subnational forest assessment process	Y/N	Regular stand inventory and National forest inventory			
1.1	Forest area as proportion of total land area	%	39.6	39.5	39.9	40.1
1.1	Forest area annual net change rate	%	n/a	-0.01	0.09	0.04
1.2	Growing stock per ha on forest	m^3	211	241	270	279
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.8	1.4	0.6
1.4	Carbon stock in harvested wood products	million m.t.	14	15	21	22
2.4	Proportion of area of forest and other wooded land with damage	%	1.9	0.9	1.1	0.8
3.1	Fellings as % of net annual increment on forest available for wood suply	%	56.9	54.8	81.4	78.9
3.2	Total wood removals	1 000 m^3	5 276	6 163	9 599	9 361 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	10.58	10.58	10.58	10.58
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	34.0	36.3	43.2	44.3
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	13.5	16.0	17.1	17.3
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	74.37	54.67	52.97
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	5.0	4.9	7.6	7.7
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Slovenia

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, national level, 2007, which is the basis for operational programmes			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				100.0
2	Proportion of forest and other wooded land under third party certification schemes	%				24
3	Formal authority for main forest matters	Y/N	Forest Act, enacted 1993, latest amendments 2016			
5	Existence of national or subnational forest assessment process	Y/N	National forest inventory, permanent sampling plots for forest management planning, stand-wise inventory			
1.1	Forest area as proportion of total land area	%	59.0	61.2	61.9	61.5*
1.1	Forest area annual net change rate	%	n/a	0.37	0.11	-0.07*
1.2	Growing stock per ha on forest	m^3	230	270	326	335*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.0	2.1	0.3*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land with damage	%	n/a	0.1	0.1	0.4
3.1	Fellings as % of net annual increment on forest available for wood supply	%	34.8	34.7	37.1	61.3
3.2	Total wood removals	1 000 m^3	2 099	2 253	2 945	4 509 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	49.00	53.00	49.00	33.60
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	20.3	22.0
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	n/a	6.0	20.0	24.2
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	26.77	18.43	15.63
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	3.3	6.5	7.8	10.5
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Spain

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, at national and subnational level. Spanish Forestry Plan 2002-2032			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				31.8
2	Proportion of forest and other wooded land under third party certification schemes	%				13.4
3	Formal authority for main forest matters	Y/N	Forestry Law of 2003 was modified in 2006 and 2015			
5	Existence of national or subnational forest assessment process	Y/N	National Forest Inventory, combined with cartographic information.			
1.1	Forest area as proportion of total land area	%	27.8	34.2	37.1	37.2*
1.1	Forest area annual net change rate	%	n/a	2.09	0.82	0.01*
1.2	Growing stock per ha on forest	m^3	40	53	56	60*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	n/a	n/a	0.5*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of area of forest and other wooded land damaged by fire	%	0.8	0.7	0.2	0.4
3.1	Fellings as % of net annual increment on forest available for wood supply	%	61.8	52.6	55.5	n/a
3.2	Total wood removals	1 000 m^3	15 590	14 321	16 089	17 566 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	9.4	n/a	19.7	23.0
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	20.7	23.7	23.7	23.8
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	150.75	195.33	148.67	132.68
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	n/a	n/a	n/a	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Sweden

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	A NFP process was established in 2014 and the government launched the National Forest Programme in May 2018.			
2	Proportion of forest under a management plan or equivalent instrument	%				97.9
2	Proportion of forest under third party certification schemes	%				63.0
3	Formal authority for main forest matters	Y/N	Forestry Act, enacted 1979, most recent major amendment 2014			
5	Existence of national or subnational forest assessment process	Y/N	A continuous national forest inventory, supplemented as necessary by ad hoc studies			
1.1	Forest area as proportion of total land area	%	68.9	69.1	68.9	68.7*
1.1	Forest area annual net change rate	%	n/a	0.04	-0.03	-0.03*
1.2	Growing stock per ha on forest available for wood supply	m^3	114	124	134	139*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	0.0	1.0	0.9*
1.4	Carbon stock in harvested wood products	million m.t.	123	123	147	156
2.4	Proportion of forest area with damage	%	n/a	n/a	7.9	9.4
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	n/a	84.7	91.3
3.2	Total wood removals	1 000 m^3	53 700	63 400	72 200	72 800 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	n/a	n/a	2366	2249
4.9	Proportion of forest and other wooded land included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	2.8	6.4	7.2	7.7
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	n/a	n/a	18.0	16.4
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	98.00	89.47	77.63
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	22.5	25.9	23.7	23.9
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated					

Switzerland

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes, at national level. The Swiss Forest Policy 2020, published 2013, replaces the first Swiss NFP of 2004			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				57.0
2	Proportion of forest and other wooded land under third party certification schemes	%				51.1
3	Formal authority for main forest matters	Y/N	Federal Forest Act 1991, most recent amendment 2017			
5	Existence of national or subnational forest assessment process	Y/N	Regular national forest inventory			
1.1	Forest area as proportion of total land area	%	29.2	30.3	31.2	32.1
1.1	Forest area annual net change rate	%	n/a	0.36	0.32	0.28
1.2	Growing stock per ha on forest	m^3	342	348	348	354
1.4	Annual average change in above ground biomass stock in forest	%	n/a	n/a	0.5	0.5
1.4	Carbon stock in harvested wood products	million m.t.	15	16	17	18
2.4	Proportion of forest area with damage	%	n/a	0.4	0.4	0.5
3.1	Fellings as % of net annual increment on forest available for wood supply	%	n/a	94.1	84.0	79.9
3.2	Total wood removals	1 000 m^3	7 192	10 581	6 029	4 688
4.3	Area of forest undisturbed by man	1 000 ha	42.86	42.86	42.86	42.86
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	21.7	25.2
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protective forests	%	n/a	44.8	43.7	42.7
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	n/a	57.53	55.27	58.87
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	1.8	4.0	4.2	4.0
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated.					

Turkey

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	Yes. Turkey National Forest Program 2004			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%	Since the 1940s, all forests in Turkey have been under a management plan, which is compulsory and is registered with an official body.			
2	Proportion of forest and other wooded land under third party certification schemes	%				10.7
3	Formal authority for main forest matters	Y/N	The regulatory framework for forestry is in the Constitution			
5	Existence of national or subnational forest assessment process	Y/N	The ENVANIS data base collects and processes data from forest management plans as the plans are renewed			
1.1	Forest area as proportion of total land area	%	25.7	26.2	27.4	28.9*
1.1	Forest area annual net change rate	%	n/a	0.18	0.45	0.53*
1.2	Growing stock per ha on forest	m^3	44	58	65	74*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	1.0	2.4	2.0*
1.4	Carbon stock in harvested wood products	million m.t.	12	18	25	28
2.4	Proportion of area of forest and other wooded land with damage	%	0.6	0.7	1.4	1.6
3.1	Fellings as % of net annual increment on forest available for wood supply	%	23.9	22.3	32.0	38.1
3.2	Total wood removals	1 000 m^3	18 726	15 191	19 763	19 881 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	0	0	0	0
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	21.2	21.2	20.6	21.1
5.1	Proportion of forest included in MCPFE Class 3- protective forests	%	39.5	39.5	40.1	39.7
6.5	Employment in forestry (ISIC/NACE 02 only)	1 000 persons	281.7	536.5	396.5	286.5
6.9	Energy supply from wood as % of total primary energy supply (2011)	%	n/a	n/a	3.8	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015, or forecasts for the year 2020, prepared in 2019 (marked with "*"), unless otherwise indicated.					

Ukraine

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	A target oriented state program Forests of Ukraine was completed in 2015. A new programme is being prepared.			
2	Proportion of forest and other wooded land under a management plan or equivalent instrument	%				99.1
2	Proportion of forest and other wooded land under third party certification schemes	%				44.4
3	Formal authority for main forest matters	Y/N	Forest Code enacted 2006, latest amendment 2018			
5	Existence of national or subnational forest assessment process	Y/N	Surveys and stand-wise inventories. A national forest inventory is under preparation			
1.1	Forest area as proportion of total land area	%	16.0	16.4	16.5	16.7*
1.1	Forest area annual net change rate	%	n/a	0.25	0.04	0.15*
1.2	Growing stock per ha on forest	m^3	152	198	220	235*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.9	1.5	0.8*
1.4	Carbon stock in harvested wood products	million m.t.	n/a	n/a	n/a	n/a
2.4	Proportion of forest area with damage	%	0.1	0.1	0.2	0.3
3.1	Fellings as % of net annual change in growing stock on forest	%	n/a	32.2	49.7	59.5
3.2	Total wood removals	1 000 m^3	n/a	11 262	16 146	18 914 (2017)
4.3	Area of forest undisturbed by man	1 000 ha	59	59	59	59
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	n/a	n/a	14.2	14.6
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	n/a	32.6	32.7	33.5
6.5	Employment in forestry (ISIC/NACE 02)	1 000 persons	62.00	104.90	69.80	61.70
6.9	Energy supply from wood as % of total primary energy supply (2011)	%	n/a	n/a	1.0	n/a
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), prepared in 2019, unless otherwise indicated.					

United Kingdom

		Unit	1990	2000	2010	Most Recent
1	Existence of NFP	Y/N	UK Forestry Standard and Guidelines, with country-level (sub-national) strategies and programmes			
2	Proportion of forest under a management plan or equivalent instrument	%				59
2	Proportion of forest under third party certification schemes	%				43
3	Formal authority for main forest matters	Y/N	UK Forestry Standard updated 2017. Specific legislation for England, Scotland, Wales and Northern Ireland			
5	Existence of national or subnational forest assessment process	Y/N	First full cycle of national forest inventory (for Great Britain)			
1.1	Forest area as proportion of total land area	%	11.5	12.2	12.6	13.2*
1.1	Forest area annual net change rate	%	n/a	0.62	0.35	0.42*
1.2	Growing stock per ha on forest	m^3	133	164	195	212*
1.4	Annual average change in above ground biomass stock in forest	%	n/a	2.5	1.9	1.4*
1.4	Carbon stock in harvested wood products	million m.t.	65	80	101	109
2.4	Proportion of forest area with damage	%	n/a	n/a	n/a	n/a
3.1	Fellings as % of net annual increment on forest available for wood supply	%	40.9	45.9	50.7	62.9
3.2	Total wood removals	1 000 m^3	6 354	7 791	9 571	10 934
4.3	Area of forest undisturbed by man	1 000 ha	0.00	0.00	0.00	0.00
4.9	Proportion of forest included in MCPFE classes 1 and 2 - forests protected for biodiversity	%	18.6	17.5	16.9	16.2
5.1	Proportion of forest and other wooded land included in MCPFE Class 3- protection forests	%	None specifically designated, although many do actually have protection functions			
6.5	Employment in forest sector: forestry, wood processing, pulp and paper (ISIC/NACE 02, 16, 17)	1 000 persons	261.2	209.5	150.5	145.3
6.9	Energy supply from wood as % of total primary energy supply (2007, 2009, 2011 and 2015)	%	0.2	0.5	1.0	3.0
	Source: National reply to pan-European enquiries (quantitative and qualitative indicators) "Most recent" data are data for the year 2015 or forecasts for the year 2020 (marked with "*"), submitted in early 2019, unless otherwise indicated.					

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