Forest Europe growing life

State of Europe's Forests 2025

35 YEARS TOGETHER 1990 2025 FOR EUROPE'S FORESTS

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State of Europe's Forests 2025

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State of Europe's Forests 2025

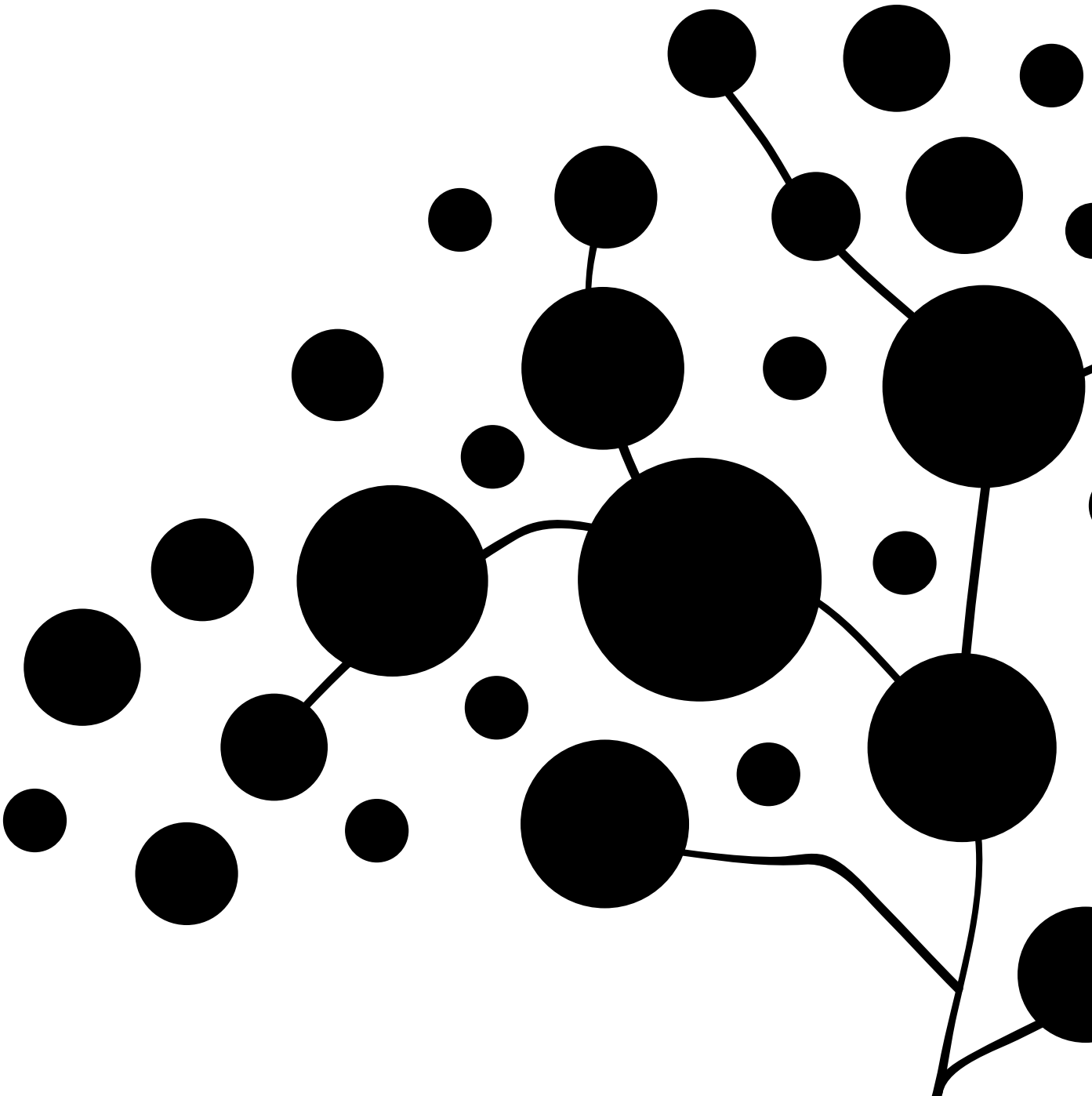


Table of Contents

List of Tables

List of Figures

Foreword

Forests play a vital role in sustaining ecosystems, economies, and cultures across the globe.

They offer essential ecological services, support biodiversity, and are deeply rooted in our shared heritage and future resilience. Most European forests are actively managed and have been shaped by centuries of human interaction. They play a central role in climate mitigation, biodiversity conservation, and the transition to renewable fossil-free materials and energy sources. In this context, forests hold great potential to support the shift toward a sustainable and circular bioeconomy based on renewable resources like forest biomass.

The European forests within the Forest Europe countries, covers 232 million hectares of forests, representing about 35.4% of the total land area. The total growing stock of these forests is estimated at 38.3 billion cubic metres, with approximately 79% located in forests available for wood supply.

Over the last 30 years, the growing stock has increased by almost 1.3% each year. However, from 2015 to 2020 this growth rate slowed down. Potential contributing factors include forest damage often driven by climate-related stressors, increased harvesting levels, and changes in age-class distribution, with a shift toward more mature forest stands.

The forest harvesting in Europe has risen steadily over the past three decades, by 47% from approximately 425 million cubic metres in 1990 to over 625 million cubic metres in 2020. Despite rising harvest levels and a deceleration in the increase of growing stock, harvesting levels in Europe's forests remains below forests growth. In 2020, fellings accounted for 84% of the net annual increment. This trend, combined with the evolving pressures on forest resources, underscores the crucial importance of forests in Europe's bioeconomy and highlights the need to manage trade-offs carefully.

Today, forests face unprecedented challenges from climate change, extreme weather events, and shifting geopolitical conditions. Addressing this complex reality requires proactive adaptation and innovation,

grounded in sound science and based on shared, robust data. These efforts must be adapted to national and regional conditions, while contributing to shared goals.

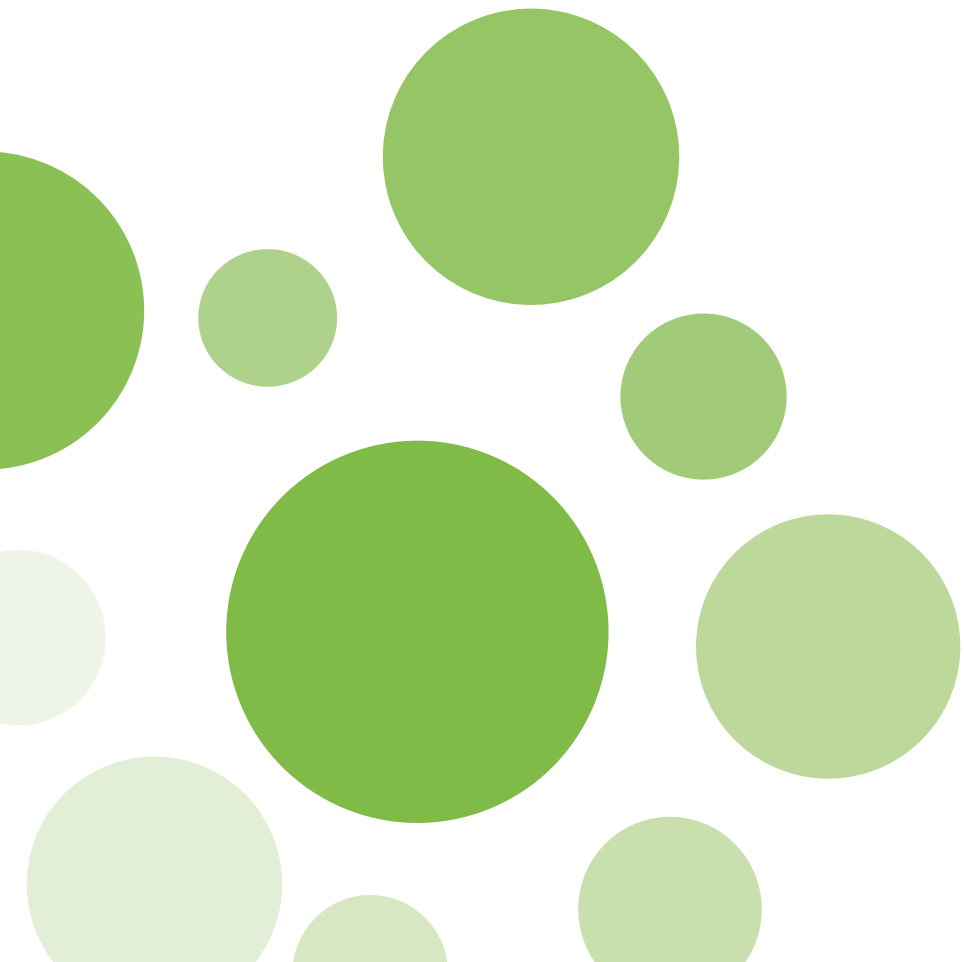
The pan-European criteria and indicators for Sustainable Forest Management, which form the backbone of the State of Europe's Forests report, are key tools for tracking developments and informing policy. After 35 years of forest monitoring, we now have a valuable knowledge base on forest trends across Europe.

I hope this sixth edition of the State of Europe's Forests report supports a constructive, fact-based dialogue and fosters collaboration among countries, policy makers, forest owners and managers, scientists, academia, and other stakeholders within as well as beyond the forest sector. Together, we can ensure that forests continue, now and in the future, to fulfil relevant ecological, economic, and social functions.

Finally, I would like to express my sincere gratitude to the European Forest Institute (EFI), for the production of this report, based on data and information provided by the Forest Europe signatory countries. I would also like to thank all signatories for their contributions, and especially Germany for their support in the preparation of this report.

Let us continue working together to ensure that Europe's forests remain a source of resilience, innovation, and shared prosperity.

Peter Kullgren
Minister of Rural Affairs in Sweden
Chair of Forest Europe 2025–2026



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.

State of Europe's Forests – the flagship of FOREST EUROPE

The State of Europe's Forests (SoEF) Report is the flagship product of FOREST EUROPE, the Ministerial Process on the Protection of Forests in Europe. It has been regularly published since 2003, and provides a comprehensive analysis of status and trends since 1990.

Its purpose is to report on developments towards Sustainable Forest Management (SFM) in Europe, following an agreed definition since the Helsinki conference in 1993. Most importantly, it is a Pan-European endeavour, covering 45 member states with the latest data on forests, in collective action by forestry experts across Europe.

Pan-European reporting is based on a set of Criteria and Indicators (C&I) that have been developed and further refined since the Lisbon conference in 1998, in Vienna in 2003, and in Madrid in 2015. Under the current Swedish chairmanship, a plan for how to revise Forest Europe's criteria and indicators is under development and an analysis of the reporting rates of all indicators will be presented at the next Ministerial Conference.

The SoEF 2025 is a collective activity of FOREST EUROPE signatories, their monitoring and statistical experts, and a joint pan-European data collection of FOREST EUROPE, the United Nations Economic Commission for Europe (UNECE), and the Food and Agriculture Organization of the United Nations (FAO). With a reporting period of every five years, the SoEF provides a regular backbone for gathering all SFM-related information. In addition, quantitative data reported by countries can be publicly accessed under the joint UNECE/FAO pan-European data interface.

FOREST EUROPE is the custodian of SFM in Europe. Regular reviews of its implementation demonstrate that the process has led to a common understanding and definition of SFM, has shaped national policy formulation and participatory processes, and has contributed to a consistent global process for safeguarding SFM.

The SoEF is a central reference for forest-based information for policy makers, scientists, experts, and the broader public. It provides a unique combination of data from national monitoring, inventory and statistical instruments, as well as international data providers. A central element is the collective effort of national correspondents in gathering and processing national reporting data across a variety of different aspects of SFM.

While SFM follows a clear definition along its six criteria, it is a dynamic concept designed to monitor, report, and assess progress and challenges. The SoEF demonstrates how countries are managing their forests along the criteria of (i) forest resources and carbon, (ii) forest health and vitality, (iii) productive functions, (iv) biological diversity in forest ecosystems, (v) protective functions, and (vi) socio-economic functions and conditions. The SoEF 2025 reports on the latest status and trends in this regard.

The state of Europe's forests

Forests are a defining feature of Europe's landscape and play a central role in achieving environmental, economic, and social policy objectives. Covering more than 35% of the continent's land area, forests and other wooded land provide a foundation for biodiversity conservation, climate regulation, renewable materials, and rural development. They support millions of jobs and contribute significantly to the bioeconomy, while also offering recreational, cultural, and health benefits to European citizens.

Over the past decades, Europe has seen a net expansion of forest area and an increase in forest biomass. These trends reflect sustained efforts in SFM, including afforestation and natural forest regeneration. As a result, Europe's forests currently store substantial amounts of carbon and continue to function as a net carbon sink, contributing to climate change mitigation. In many regions, forests have also become more diverse in structure and composition, enhancing their capacity to deliver multiple ecosystem services.

However, these positive developments coexist with emerging and intensifying risks. Climate change is increasingly influencing forest ecosystems across Europe, altering growth patterns, species distribution, and disturbance regimes. Extreme weather events such as heatwaves, prolonged droughts, storms, wildfires, and pest outbreaks are becoming more frequent and severe. These disturbances are already causing significant ecological and economic losses and are undermining forest health and stability in several regions.

The impacts of these pressures vary across Europe, reflecting differences in climate, forest types, management practices, and socio-economic conditions. While some forests may benefit from longer growing seasons or increased productivity, others are reaching ecological thresholds beyond which recovery becomes uncertain. This growing variability increases uncertainty for forest managers and policy makers alike, particularly in the context of long-term investments and planning horizons.

At the same time, expectations placed on forests are expanding. Forests are increasingly called upon to support climate neutrality through carbon sequestration, provide renewable materials and energy, protect biodiversity, and maintain ecosystem services such as soil protection and water regulation. These demands may at times compete with one another, highlighting the need for integrated and coherent policy frameworks that recognise trade-offs while maximising synergies.

The SoEF 2025 report offers a comprehensive overview of the condition, management, and use of forest resources across Europe. It is based on harmonised data provided by countries and builds on internationally agreed indicators for sustainable forest management. The report supports evidence-based policy making by tracking long-term trends, identifying emerging challenges, and assessing progress towards international and European commitments related to climate change, biodiversity, and sustainable development.

For policy makers, the findings underline the importance of proactive and adaptive forest governance. Maintaining and enhancing forest resilience will require diversified forest structures, risk-aware management, and long-term strategies that anticipate climate impacts rather than react to them. Policies affecting forests – whether related to climate, energy, agriculture, biodiversity, or rural development – need to be better aligned to avoid unintended consequences and ensure consistent objectives.

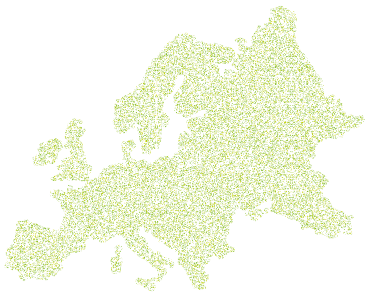
Europe's forests remain a vital asset, but their capacity to continue delivering multiple benefits cannot be assumed. Sustained political commitment, adequate financing, cross-sectoral coordination, and strong monitoring systems are essential to safeguard forest resources. By investing in resilient and multifunctional forests today, policy makers can help ensure that Europe's forests continue to support environmental sustainability, economic prosperity, and societal well-being in the decades to come.

Forest resources and carbon

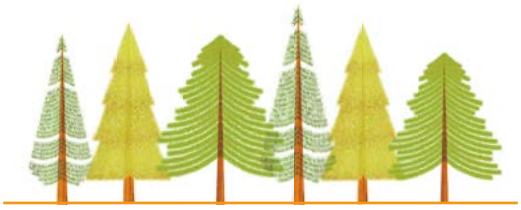
Forest area in Europe still increasing

Forest area amounts to more than 232 million ha in FOREST EUROPE countries and accounts for 35% of the total land area.

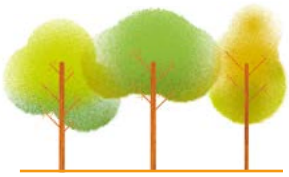
About 43% of European forests are predominantly coniferous, 40% are predominantly broadleaved, and the remainder is mixed, with regional variation. Overall, the share of broadleaved forest increased in the last five years.



Forest cover 35% of Europe's total land area



43%
Coniferous



40%
Broadleaved

17%
Mixed

Growing stock still increasing, but slowing down

The total growing stock of European forests amounts to around 38 300 million m³, of which about 79% is located in forests available for wood supply.

Over the last 30 years, growing stock increased by almost 1.3% per year, but in the last five years only by 0.3%, due to a combination of factors such as slowing down of forest area expansion, the age structure of forests, increasing utilisation rates, and forest damage.

169 m³ /ha

2020

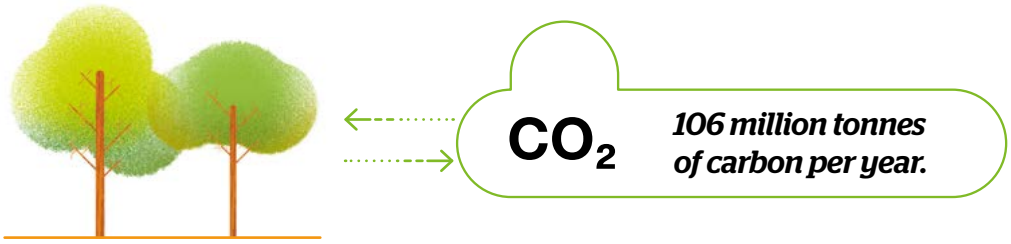
171.5 m³ /ha

2025

Forests are a significant carbon sink in Europe

Carbon stock in forest biomass in Europe is still increasing and represents a significant sink for CO_2 emissions, although the rate of increase is flattening. Between 2010 and 2025, the average annual sequestration of carbon in forest biomass amounted up to 106 million tonnes CO_2.

Carbon stored in biomass per hectare is highest in Central-West and Central-East Europe. However, there is evidence in parts of Europe of a weakening sink function, associated with natural disturbances, climate-related impacts on growth, and changes in harvest levels, with considerable regional variation due to salvage logging.



Integrated forest and climate policies advance, while coordination and financing challenges persist

Policy frameworks across Europe increasingly support the maintenance and development of forest resources and their role in climate mitigation. Effective provision is often constrained by climate-related risks, limited and fragmented financing, competing land-use demands, and the need for stronger cross-sectoral coordination and harmonised forest and carbon data.

Forest health and vitality

Deposition of air pollutants decreased since 1997, soil properties and defoliation show limited change

All three indicators show little change over the past reporting period. Deposition of air pollutants has decreased since 1997, while especially nitrogen and tropospheric ozone are still regionally high. Soil properties appear stable, and increase of defoliation seems to be halted.

Forest damage among the key threats for forests in Europe

Major damage to European forests is caused by fire, windstorms, snow, insects and diseases, wildlife (particularly large ungulates), and grazing by domestic animals. Climate change is intensifying many of these disturbances by increasing storm severity, altering winter conditions, and raising drought and fire risk. These effects vary across Europe, for instance, forest fires dominate in the Mediterranean region, while storms and insects are major damaging agents in Central Europe.

Data quality for reporting forest damage still varies due to diverse monitoring approaches, while currently efforts are undergone to improve reporting on forest damage.

Forest health governance strengthens, but disturbance risks continue to grow

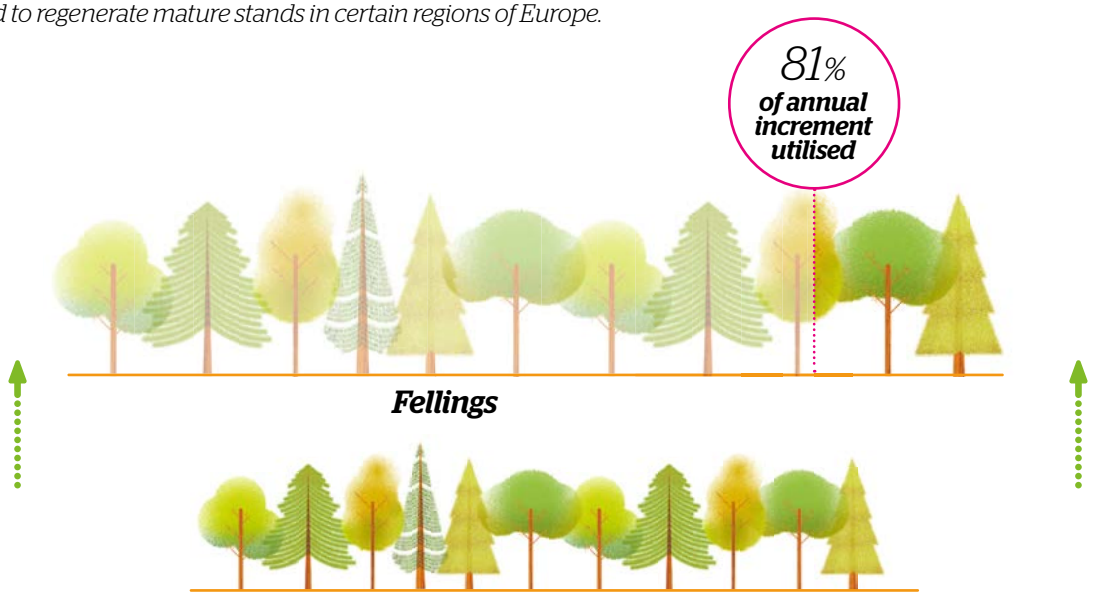
European countries have strengthened policy frameworks, monitoring systems, and preventive measures to maintain forest health and vitality; at the same time, increasing climate-related disturbances, and resource constraints for the implementation of health and monitoring measures continue to pose challenges.

Productive functions

81% of the net annual increment is utilised by fellings

In European forests, wood resources continue to be used sustainably - annual fellings amount to about 81% of the net annual increment.

Between 1990 and 2020, both wood increment and harvest volumes rose substantially, by about 19% and 46% respectively. The utilisation of net annual increment increased from roughly 60% to 81% at the pan-European level, with the highest rates observed in Northern and Central-West Europe, reflecting higher utilisation rates but still sustainable harvest levels across most regions. However, increased cuttings can result from salvage loggings and need to regenerate mature stands in certain regions of Europe.



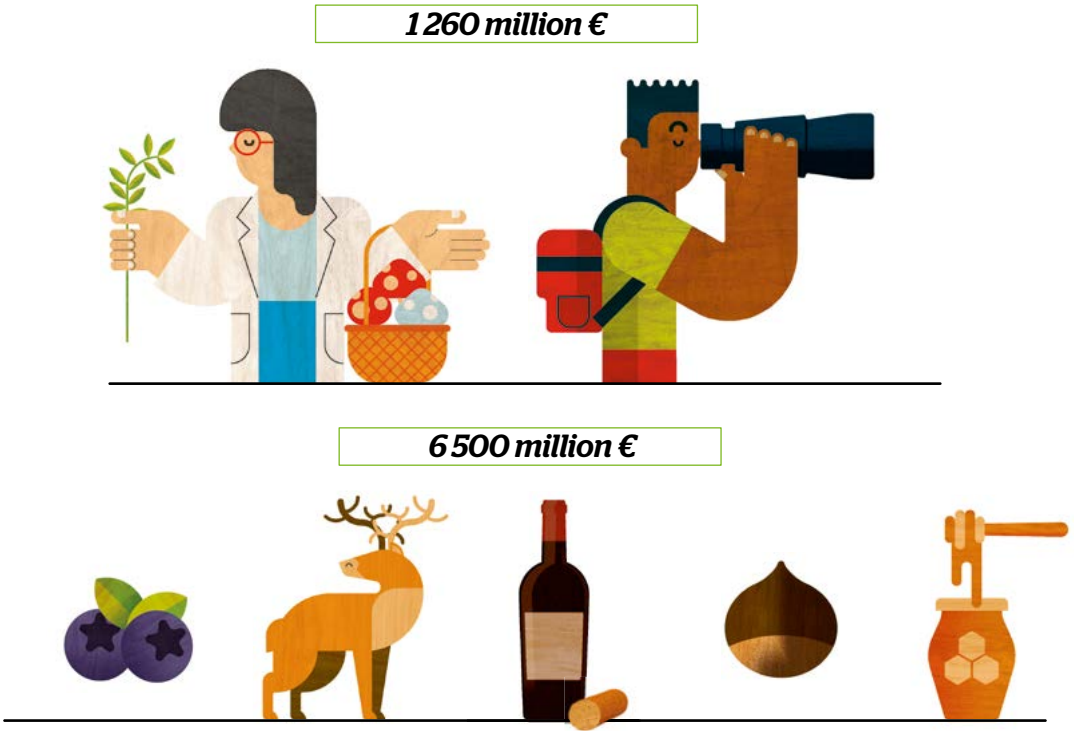
Europe is an essential roundwood producer

Roundwood production in Europe remains the major economic factor in forestry and has reached 626 million m³ per year. North and Central Europe's forests are still the main producers; the countries Sweden, Finland, Germany, France, and Poland account together for 50% of total roundwood production in Europe, with a combined volume of 313 million m³.

Non-wood goods and forest services

Non-wood goods and forest services represent essential ecosystem services and 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. Social and biospheric services (e.g., for nature protection) dominate the marketed services of forest ecosystems. It is important to recognise the diversity of legal conditions for the use, harvest, and marketing of non-wood goods and forest services across Europe.

The true value of forest goods and services remains obscured by different definitions, distinctions between marketed and non-marketed values, and unclear trade patterns, although reporting and response rates have improved compared to previous reports. Nonetheless, the reported values for goods (6 500 million €) and forest services (1 260 million €) are significant.



Forest production policies develop alongside evolving market and climate conditions

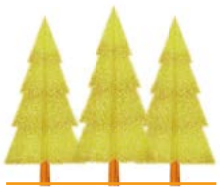
Policy frameworks, management planning and support measures across Europe increasingly promote the productive functions of forests and their contribution to the bioeconomy, while climate-related impacts, fragmented ownership, workforce and skills gaps, as well as uneven access to finance and markets continue to shape implementation outcomes.

Biological diversity in forest ecosystems

In the wake of climate change: tree species composition becomes more diverse

In the last 15 years, European forests have become more diverse in tree species composition, reflecting both management responses and natural dynamics linked to climate change adaptation. Forests are composed of two or more tree species on almost 70% of the forest area. About 30% of forest stands contain only a single tree species, mainly coniferous, although this also depends on natural growing conditions across Europe.

70%
2 or more species



30%
single tree species

The majority of European forest is naturally regenerated

About 74% of the total forest area in Europe originates from natural regeneration or natural expansion, of which 2% is coppiced. Afforestation and regeneration by planting and/or seeding account for 26%.

74%
natural regeneration or expansion

Degree of natural and semi-natural forests stable

In 2025, 95.4% of European forests are classified as semi-natural. Forest plantations as defined for pan-European reporting represent 2.4%, while forests without significant human intervention account for 2.2% of forests in Europe.

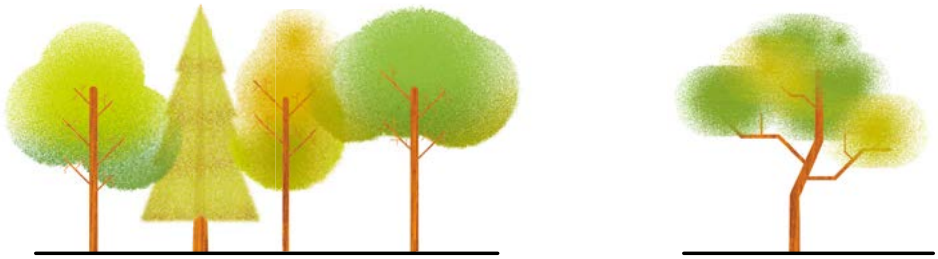
The area of semi-natural forest, forest plantations, and forests undisturbed by man has increased over the 35-year period 1990–2025, reflecting the expansion of total forest area.

95.4%
semi-natural

2.4%
plantations

Introduced tree species – small share but in a new light towards climate change

Introduced tree species account for about 3.7% of the forest area in Europe. Despite their relatively small share, they may be regionally or nationally significant. Their future potential might be re-evaluated in the context of climate change adaptation and mitigation depending on site suitability and risk assessment (e.g., invasiveness and biodiversity impacts).

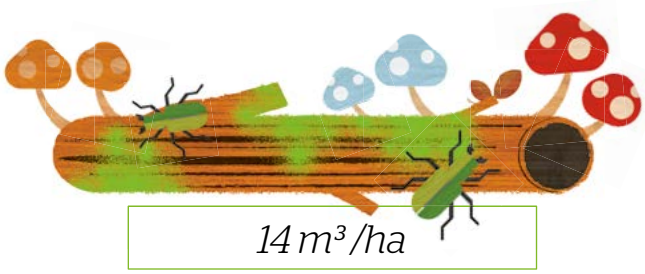


96.3%
native

3.7%
introduced

Deadwood continuously increasing

Over the last 20 years, the amount of deadwood has increased in all European regions. More frequent disturbances resulting from changing climatic conditions, as well as more nature-oriented forest management practices, may be contributing factors. The average volume of deadwood has increased significantly and in 2020 reached 14 m³/ha, equivalent to more than 8.6% of the average growing stock density of European forests.

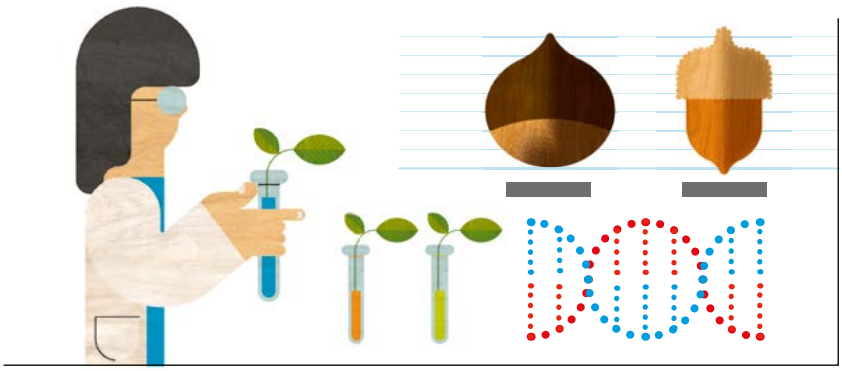


14 m³/ha

2020

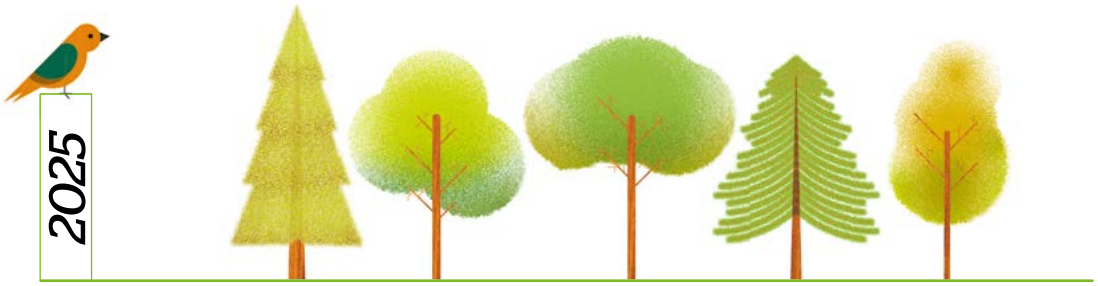
Genetic conservation units are growing in number

The total number of conserved native species populations has risen from 495 across 53 species in 1990 to 5 177 across 116 species in 36 countries in 2025. To enhance the informativeness and robustness of the indicator on the conservation and use of forest tree genetic resources (FGR), the EUFORGEN Programme released a revised version in 2020. EUFORGEN's synthetic radar chart also enables retrospective analysis dating back to the beginning of FGR conservation efforts.



Forest birds

The Common Forest Bird Index has been relatively stable over the long term. Using 1980 as the baseline year (the start of the comparable pan-European bird monitoring), the Common Forest Bird Index is 8% lower overall, but it has increased moderately by 3% since 2020.

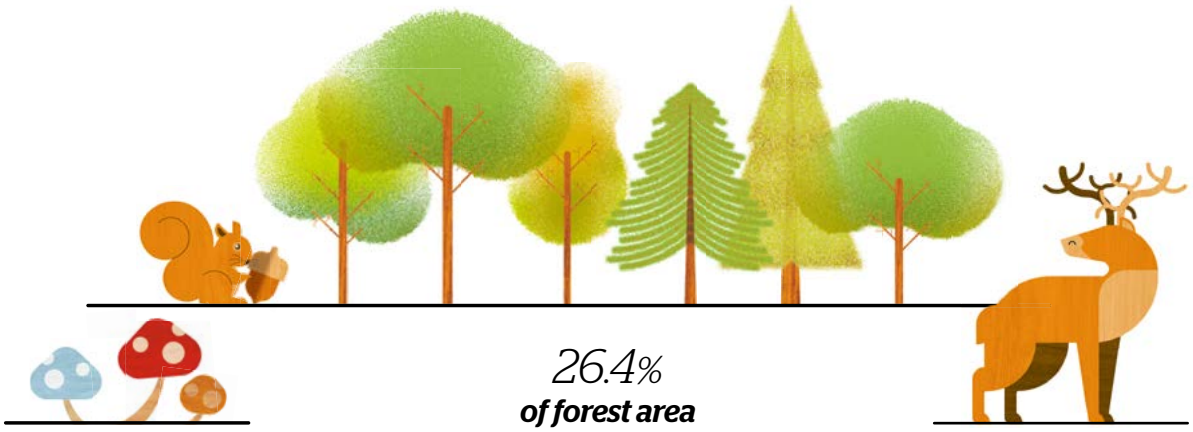


Common Forest Bird Index is 8%
lower overall, but it has increased moderately by 3% since 2020.

Protected forest areas still increasing

In 2025, the reported total protected forest area amounted to 50.4 million ha (26.4% of forest area in reporting countries). About 16.9% (32.2 million ha) of European forests are protected with the primary objective of biodiversity conservation, with management regimes ranging from strict protection to actively managed conservation depending on national categories while 9.5% (18.1 million ha) are protected for landscape conservation and the protection of specific natural elements. These Class 2 areas (landscape conservation and specific natural elements) should not be conflated with areas protected primarily for biodiversity conservation.

Over the past 25 years, forests protected for biodiversity and landscape conservation increased in Europe by approximately 635 000 ha (about 1.8%) annually. In the last five years, the annual increase was about 183 000 ha.



National forest policy frameworks shape forest biodiversity outcomes

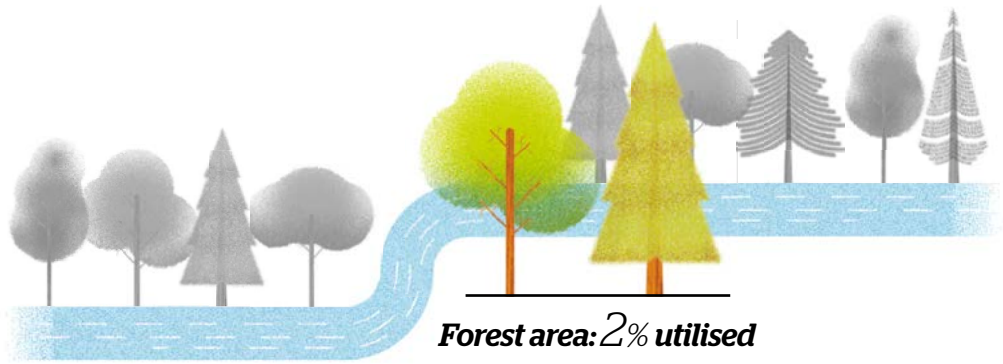
National forest and biodiversity policies across Europe increasingly integrate explicit biodiversity objectives, reflected in protected-area designations, biodiversity-oriented management requirements and targeted incentives; progress in implementation depends on governance capacity, effective monitoring of species and habitats, fair and predictable compensation mechanisms and legal clarity for private owners, as well as the ability to embed conservation requirements within active forest management systems.

Protective functions

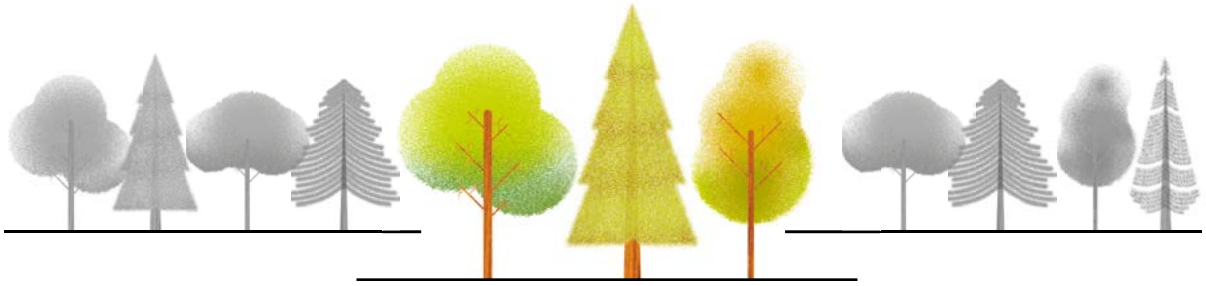
Forests play an important role in protecting ecosystem functions and infrastructure

Protective functions designated for the protection of soil, water, and other ecosystem functions apply to around 40% of European forests. The area of these forests has been increasing since 1990. It is important to note that protective functions are often integrated into multifunctional forestry.

Forests designated for the protection of infrastructure and managed natural resources account for about 2% of Europe's forest area. Most of these designated forest stands are located in mountainous areas.



Forest area: 2% utilised



Forest and other wood area: 2.6% utilised

Forest protective functions remain important in national policy and governance arrangements

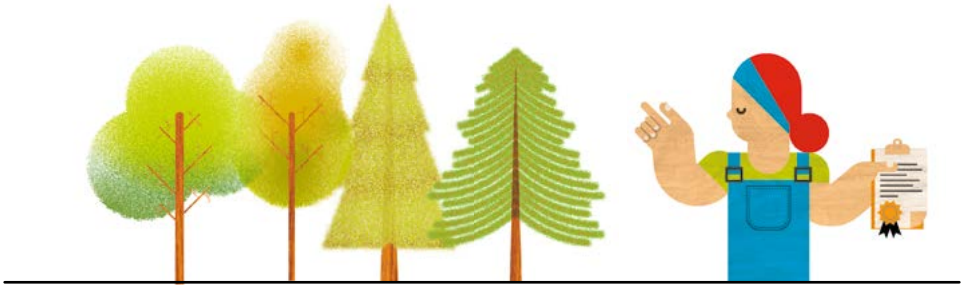
National forest policies across Europe increasingly define and regulate the protective functions of forests through legislation, spatial planning and targeted management measures, supporting soil and water protection and risk reduction; implementation outcomes are influenced by the availability of stable financing, the translation of scientific knowledge into operational guidance, data limitations, and the capacity to adapt protective management to changing climatic and socio-economic conditions.

Socio-economic functions and conditions

Private and public forest ownership are almost balanced

51.2% of Europe's forests are in public ownership and 48.8% in private ownership. Due to afforestation, privatisation, and restitution in Eastern Europe, private forest ownership has slightly increased since the 1990s.

51.2%
Public



48.8%
Private

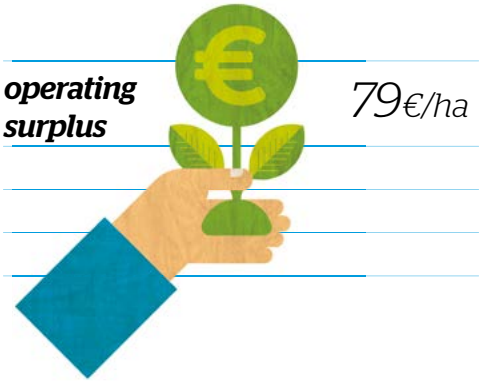
Contribution of the forest sector to GDP steady, but not growing

In 2020, the total gross value added of the forest sector in Europe contributed about 0.83% to the gross domestic product. Overall, the growth of forest sector gross value added is slower than the average growth of European economies which has led to a decline of the forest sector contribution to gross domestic product in Europe in the last 20 years.

0.83 %
Total gross value

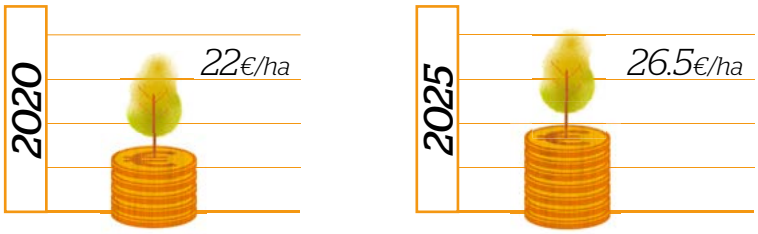
Net revenue in forestry varies across Europe

The average net operating surplus of forest enterprises in Europe was about EUR 79 per hectare of forest in 2020. Factor income, as the sum of labour costs and profit, was about EUR 121 per hectare in 2020, although values vary considerably among European regions.



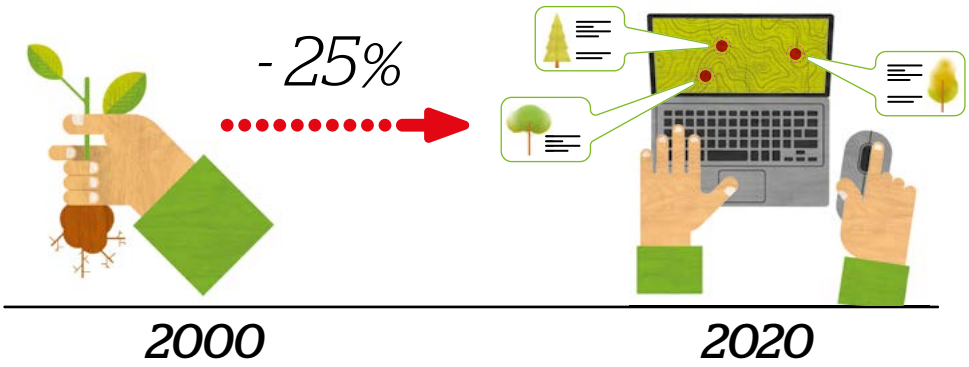
Investments in forestry still moderately growing

Investments in gross fixed capital amounted to about EUR 26.5 per hectare of forest area, totaling more than EUR 4 300 million across reporting countries.



Employment in the forest sector is decreasing

There were more than 2.4 million employees in the forest sector (i.e. forestry, wood manufacturing, and the paper industry) in Europe in 2020. Employment in the forest sector decreased by about 25% between 2000 and 2020. The main factors are economic pressure, mechanisation, and digitalisation of processes and operations.

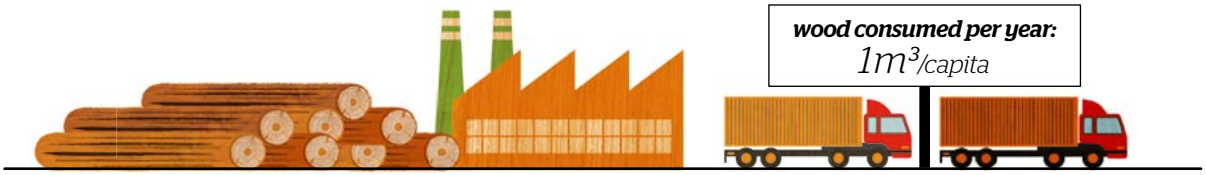


Forest work safety is still on the agenda

Working in forestry remains dangerous, with 169 fatal and 14 5 000 non-fatal accidents reported in Europe in 2020, equivalent to about 17 accidents per 1 000 employees. No significant decrease can be observed. The main reasons include increased salvage logging and the need to address immediate hazards such as forest fires.

Wood consumption still increasing

In Europe, about 1 m³ of wood is consumed per capita annually, ranging from 0.6 m³ in South-East Europe to 1.9 m³ in Northern Europe in 2020. After a decline in the period 2010–2015 due to financial crisis and economic changes, the wood consumption increased again in the consecutive period, but with regional differences. Central-East Europe had the largest increase, while Central-West Europe shows constant decreasing annual rates.



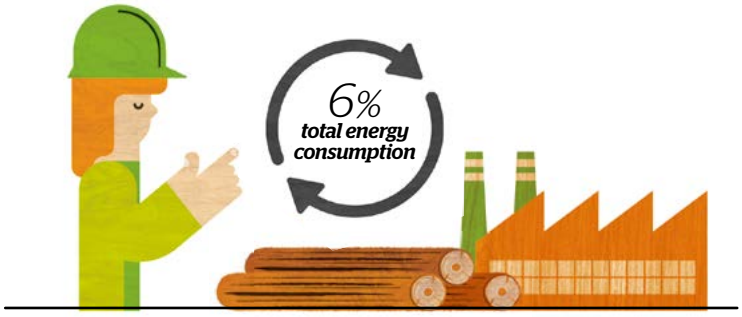
Europe is still a net exporter of wood and paper products

Europe remains a net exporter of primary wood and paper products. The European trade surplus was 64.2 million m³ roundwood equivalent, or EUR 11 100 million in 2020.

While export volume doubled from 1990 to 2005, it stagnated between 2015 and 2020.

Energy from wood remains stable

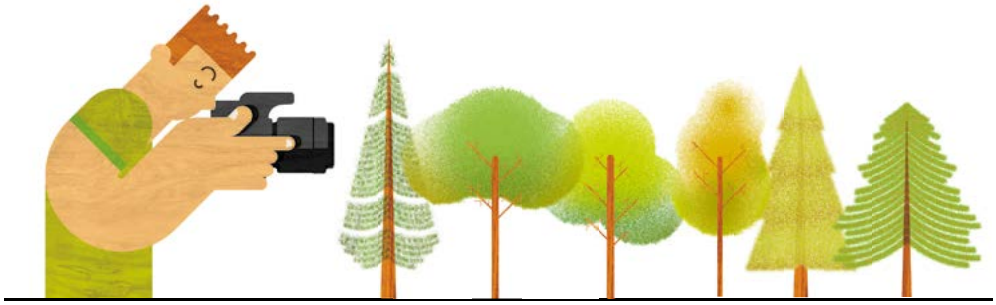
No major changes in wood use for energy have been observed since 2020. Wood, as one of the renewable energy sources, accounts for around 6% of total energy consumption.



Forests open for recreation are unaltered

Approximately 65% of Europe's forests are available for public recreation; in most countries, the share exceeds 90%. About 3.9% of forest and other wooded land is primarily designated or managed for public recreation.

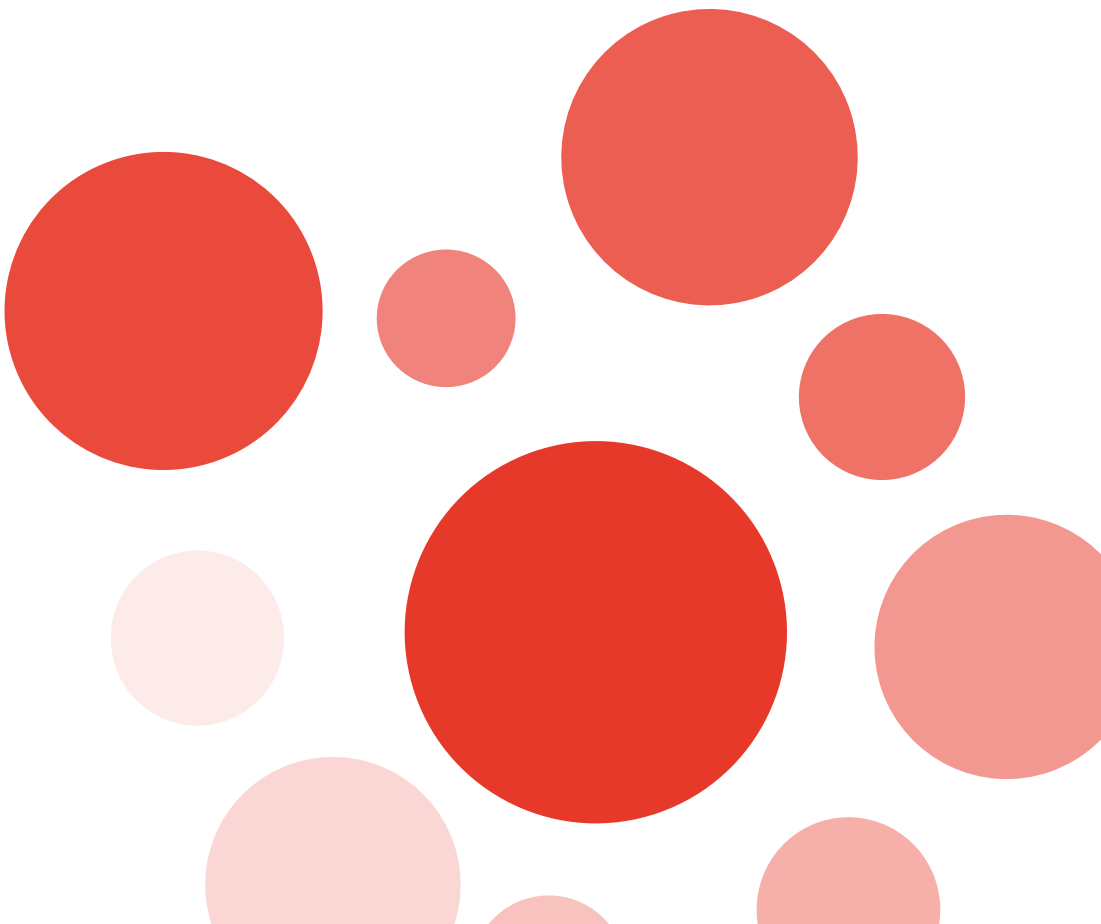
Overall, changes in the availability of forest and other wooded land for public recreation are marginal.



65% ***accessible to public***

Policies on wood use, markets and ecosystem services shape socio-economic outcomes from forests

National forest policies across Europe widely address the socio-economic functions of forests through objectives related to ecosystem services, recreation, rural development and employment, supported by legal frameworks, rural development funding and communication measures; implementation outcomes are influenced by ownership fragmentation, administrative complexity, financial constraints, market dynamics and the challenge of reconciling diverse societal expectations regarding forest use.



Acknowledgements

The preparation of the State of Europe's Forests 2025 (SoEF 2025) has been coordinated by the European Forest Institute (EFI), and has been a collaborative effort involving a wide network of experts, institutions and organisations throughout the pan-European region.

The Liaison Unit Sweden and EFI express their sincere appreciation to the national correspondents and data providers from the Signatory countries of FOREST EUROPE. Their dedication to compiling, validating and reviewing national data is fundamental to the accuracy and comprehensiveness of this report. Their sustained engagement over successive reporting cycles continues to ensure the reliability and comparability of pan-European forest information.

Special recognition is extended to the United Nations Economic Commission for Europe (UNECE) Forest and Bioeconomy Section and the Food and Agriculture Organization of the United Nations (FAO) for their close collaboration in the joint FAO/UNECE/FOREST EUROPE data collection on forests and sustainable forest management. The development of the joint UNECE/FAO pan-European data interface, with the financial support of Sweden and Switzerland, and its integration with the FAO's Global Forest Resources Assessment database, has been essential for ensuring consistency, transparency and coherence between regional and global forest reporting frameworks.

We also acknowledge the valuable contributions of international data providers and expert networks, including the UNECE, the European Environment Agency (EEA), Eurostat, the Joint Research Centre (JRC) of the European Commission and other partner organisations. Their analytical input, datasets and methodological cooperation have enriched the content and strengthened the analytical foundation of SoEF 2025.

The structure and concepts of SoEF 2025 follow those of earlier studies on the state of Europe's forests. The SoEF 2025 team recognises the contribution of the hundreds of experts who contributed to earlier reports.

Grateful thanks are extended to the responding FOREST EUROPE national correspondents, who were involved in the review of the draft version of SoEF 2025. Their constructive comments, critical insights and expert recommendations have been instrumental in ensuring the clarity, quality and policy relevance of the final report.

Finally, the publication of SoEF 2025 would have been impossible without the support of FOREST EUROPE Liaison Units Bonn and Sweden, gratefully acknowledged for their coordination, communication and technical support throughout the preparation of SoEF 2025. The financial support of Germany and the GCC countries under the former German presidency, as well as the voluntary contributions from Spain and Austria, have been instrumental in safeguarding this endeavour. Appreciation is also extended to all partner institutions, experts and national teams who contributed to this joint effort to deliver an authoritative and coherent overview of the state and trends of Europe's forests and sustainable forest management.

Introduction

The State of Europe's Forests (SoEF) is the flagship report of FOREST EUROPE, the Ministerial Process on the Protection of Forests in Europe. First published in 2003, the report is produced by FOREST EUROPE member countries and observers and provides comprehensive trend analysis since 1990.

The report tracks progress towards sustainable forest management (SFM) in Europe, based on the definition agreed at the 1993 Helsinki conference. It is a pan-European collaboration bringing together the latest forest data from 45 FOREST EUROPE member states and forestry experts across Europe.

The pan-European reporting is based on a set of Criteria & Indicators (C&I) that have been developed and refined since the Ministerial conferences in Lisbon (1998), Vienna (2003) and Madrid (2015). To meet evolving information needs and new monitoring and reporting requirements, an analysis of the reporting rates of the C&I has been carried out under the Swedish Chairmanship to highlight information gaps.

SoEF 2025 is produced collaboratively by FOREST EUROPE member states and their monitoring and statistical experts through joint data collection by FOREST EUROPE, UNECE and FAO. With its five-year reporting cycle, SoEF provides a consistent framework for compiling SFM-related information. All the data is publicly accessible via the joint UNECE/FAO pan-European data interface (https://fra-data.fao.org/assessments/panEuropean/).

FOREST EUROPE serves as the custodian of SFM in Europe. Implementation reviews show this process has created a shared SFM definition and understanding, shaped national policies and participatory processes, and contributed to a consistent global approach to sustainable forest management.

The SoEF is a key reference source for forest-based information for policy makers, scientists, experts and the broader public. It brings together data from national monitoring systems, forest inventories and statistical sources, as well as international data providers. This broad involvement of experts, scientists and public authorities makes the SoEF a reliable and widely trusted reference.

While SFM is based on a clear definition and six criteria, it is a dynamic concept that is designed to monitor, report and assess progress and challenges over time. The SoEF shows how countries are managing their forests across these six criteria: (i) forest resources and carbon, (ii) forest health and vitality, (iii) productive functions, (iv) biological diversity in forest ecosystems, (v) protective functions, and (vi) socio-economic functions and conditions. The SoEF 2025 presents the most recent forest-related developments in the FOREST EUROPE signatory countries.

Data was collected through the joint FOREST EUROPE/UNECE/FAO Questionnaire, complemented with information from international data providers such as the European Forest Genetic Resources Programme (EUFORGEN), EUROSTAT, International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests), the Joint Research Centre of the European Commission (JRC), the Pan-European Common Bird Monitoring Scheme (PECBMS), and the United Nations Economic Commission for Europe (UNECE). Data collection for this edition took place primarily between 2023 and 2025, with additional updates in 2025/2026, where available.

To allow regional analysis, FOREST EUROPE signatory countries are grouped into five sub-regions *(Figure A)*.

SoEF 2025 captures a period of significant change for European forests. In recent years, climate change has intensified disturbances – including droughts, storms, wildfires and pest outbreaks – resulting in extensive forest damage and increased volumes of salvage logging. At the same time, more attention is being given to forest restoration, adaptive management and nature-based solutions

as key tools for improving forest resilience and supporting biodiversity.

Global and regional policy developments also shape the background of this report. The 2030 Agenda for Sustainable Development, the Paris Agreement on Climate Change, and the Kunming-Montreal Global Biodiversity Framework all highlight the central role of forests in achieving environmental and socio-economic goals. In the European Union, the European Green Deal, the EU Forest Strategy for 2030, and the EU Biodiversity Strategy have strengthened the policy focus on sustainable forest management, and the role forests play in climate neutrality and the circular bioeconomy.

The report has also been prepared under exceptional geopolitical circumstances. Russia's war against Ukraine has disrupted cooperation, trade flows and data exchange in parts of the region. Beyond its human and economic consequences, the conflict has affected forest resources, infrastructure and cross-border environmental collaboration, highlighting the importance of stable institutions and strong regional solidarity.

The report is structured around the pan-European Criteria and Indicators for Sustainable Forest Management (SFM). They provide the framework for monitoring, assessing and reporting progress. First adopted in Lisbon in 1998 and revised in 2003 and 2015, the current set – endorsed at the Seventh Ministerial Conference in Madrid (2015) – combines qualitative and quantitative indicators under six criteria, supported by an overarching policy and governance framework.

The State of Europe's Forests 2025 provides policy makers, stakeholders and the public with harmonised, evidence-based information on Europe's forests and their management. By highlighting both progress and challenges, the report supports informed decision-making and guides the development of European and global forest-related policies towards sustainability, resilience and shared responsibility.

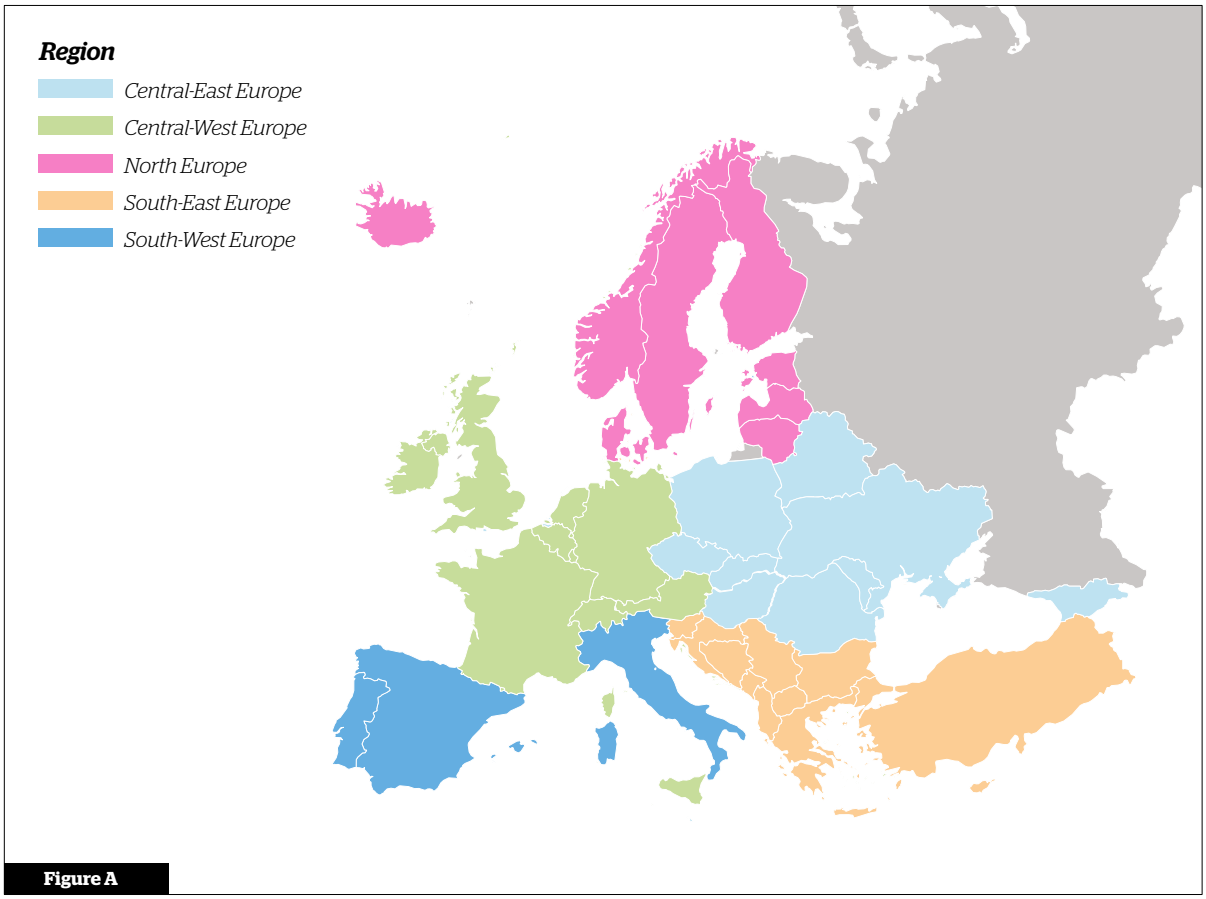
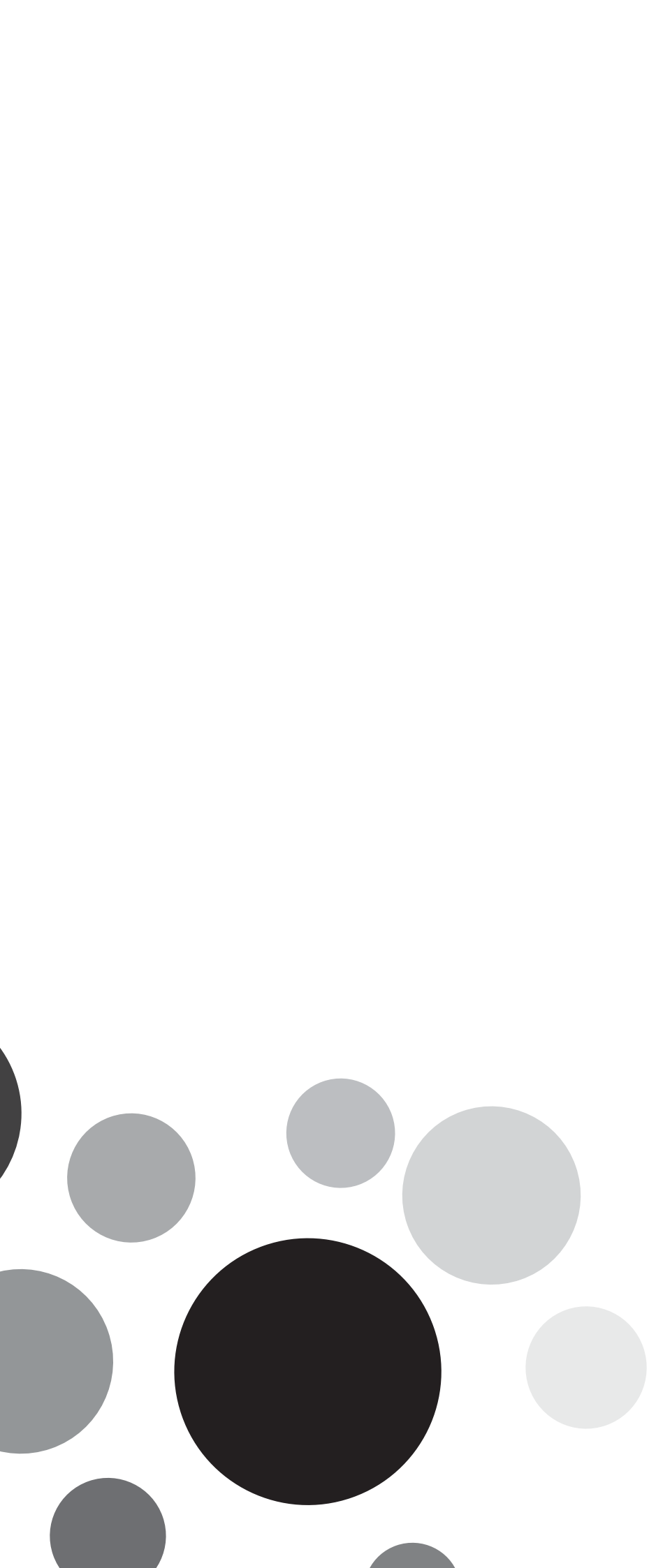
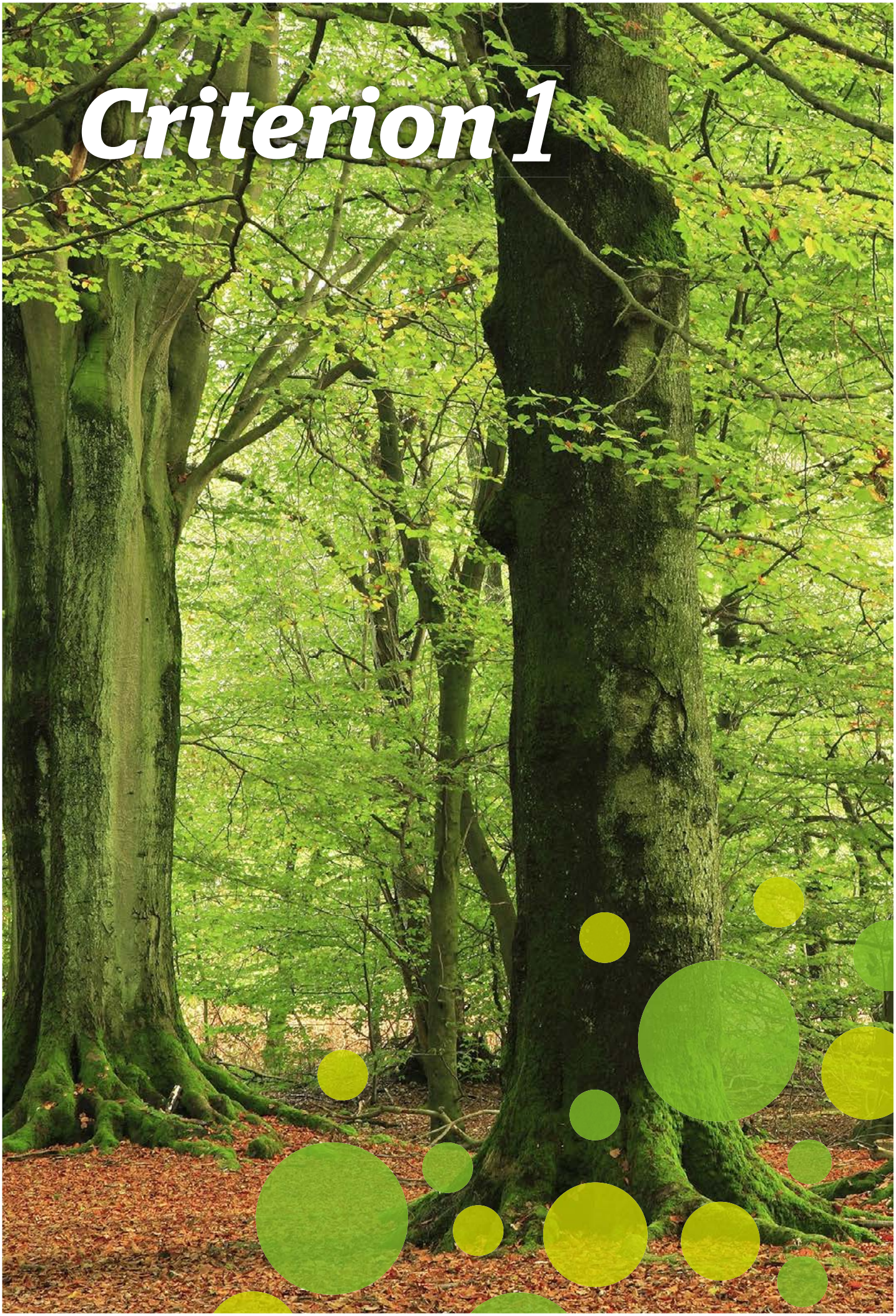


Figure A



Criterion 1



Criterion 1:

Maintenance** and **Appropriate Enhancement** of **Forest Resources** and their **Contribution** to **Global Carbon Cycles

Forest resources are crucial biological, physical and socio-economic assets. Maintaining and enhancing these resources is central to sustainable forest management. Forests can act as carbon sinks by storing carbon in biomass, deadwood, litter and soil, and as harvested wood products. This significantly contributes to the global carbon cycle.

Maintaining forest area, increasing growing stock and ensuring effective regeneration all support long-term carbon sequestration. Further improvements to carbon storage and resilience can be achieved by enhancing species diversity and structural complexity. Accurate monitoring of carbon pools and forest dynamics informs climate-related forest strategies. By maintaining these functions, forests can contribute to climate change mitigation while supporting biodiversity and other ecosystem services.

Forest resources are assessed in terms of:

1) **area,**
2) **growing stock,**
3) **age structure and diameter distribution and**
4) **changes in carbon stock.**

The final part of this chapter covers policies, institutions and related instruments that support the enhancement of forest resources and their contribution to the global carbon cycle.

Indicator 1.1 *Forest area*

Why it is important

Forest area indicates the extent to which the land is covered by forests. A stable or increasing forest area is one of the indicators used to assess the sustainability of forest resources. A decline in forest area may suggest a change in land use resulting from factors such as urbanisation, agricultural expansion or infrastructure projects. Monitoring forest area helps to assess the long-term availability of forests for ecological, economic and social functions. In addition to forest area, "other wooded land" (OWL) refers to land that does not meet the definition of forest but has lower tree cover. As "other wooded land" is close to the forest threshold, reported changes may reflect real land cover dynamics or shifts in national classification and mapping approaches.

How it is defined

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

Key finding

- Forest area in Europe continues to expand, but the pace of expansion has slowed across all regions over the past two decades. Forest area in Europe increased from 230 million hectares (ha) in 2020 to more than 232 million ha in 2025, i.e. 35.4% of total land area. A further 25 million ha (3.8% of total land area) is classified as OWL in 2025. Since 1990, there has been an increase of forest area of about 11%.

- About 43% of European forests are predominantly coniferous, 40% are predominantly broadleaved and the remainder is mixed forest. While regional state and trends differ, the overall share of broadleaved forests has increased over the past five years.

- Forest resources in Europe show strong regional contrasts, with Northern Europe dominating in forest cover with mostly coniferous species and high forest area per capita, while Central-West and Central-East Europe have the lowest forest shares and per-capita availability. Southern regions are characterised by higher proportions of broadleaved forests and lower shares of forest available for wood supply.

Box 1.1-1: Difference between forests and OWL

In FOREST EUROPE reporting, "forest" and "other wooded land" (OWL) are distinct land categories. OWL usually comprises areas with sparse tree cover and/or significant shrub components that do not fulfil the criteria for being classified as a forest, yet which still contribute to the functioning of the landscape (e.g., grazing landscapes, scrub/woodland mosaics and semi-open formations).

In practice, two aspects matter:

- Measurement sensitivity: OWL is more difficult to monitor consistently because it falls near the threshold value for canopy cover. International assessments highlight the recurring difficulty of reliably measuring tree canopy cover in the 5–10% range, which can affect trend signals.

- Category boundaries and reclassification: Earlier SoEF editions documented that part of the significant reduction in OWL between 2015 and 2020 reflected the reclassification of sparse woody vegetation as forest in certain countries, notably Türkiye, rather than rapid land cover change.

Status

Forest area data and information from desk studies was received from 45 countries in Europe in 2025.

Forests cover 232 million ha in Europe, which is 35.4% of Europe's land area. However, the forest area is unequally distributed across Europe and there are significant differences in the percentage of forest in different European countries. The majority (69%) of the countries have between 30% and 45% of their land area covered with forests *(Figure 1.1-1)*. Large forest areas are typical of 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 68.6%. 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 with the lowest share of forest land (28.3% and 28%). Other countries with very low forest cover are Malta and Iceland (1.5% and 0.6% respectively).

Around 43% of the forest in Europe is dominated by coniferous trees and 40% by broadleaved trees. Mixed stands cover 17% of Europe's forest area *(Figure 1.1-2)*. North Europe has the larger share of stands dominated by coniferous trees (65.9%) with boreal forests predominating. Finland and Sweden have the highest percentage of coniferous trees (71.4% and 76.7% respectively). Other parts of Europe have a greater share of broadleaved-dominated stands. The South-West Europe region has the highest share of broadleaved stands (60.1%). Sixteen European countries report coverage of more than 60% of broadleaved trees. The Republic of Moldova, Hungary and Serbia have the highest percentage of broadleaved trees (100%, 88.9% and 88% respectively). Central-West Europe has the highest share of mixed forests, representing 25.3% of the forests.

The area of forest available for wood supply (FAWS) in Europe amounts to 172 million ha in 2025 *(Table 1.1-1)*. This corresponds to 74% of the forest area of countries reporting on FAWS. Central-West Europe has the highest share at about 91%. In Central-East Europe and North Europe less than 80% (62.8% and 76.4%, respectively) are FAWS. South-East Europe is the region with the lowest share of FAWS (57.2% of the reported forest area). As flagged in earlier SoEF editions, FAWS shares can shift not only with area change, but also with changes in protection status, management restrictions, and how countries apply the FAWS definition in practice.

The highest forest area per capita *(Table 1.1-2)* is found in North Europe (2.11 ha per capita), which has by far the lowest population density in rural areas (4.15 people per km²). The highest levels of forest area per capita are in Finland (4.06 ha per capita), Sweden (2.66 ha per capita), Norway (2.22 ha per capita), Latvia (1.84 ha per capita) and Estonia (1.81 ha per capita). The Central-West Europe region has the lowest forested area per capita (0.15 ha per capita). The United Kingdom and the Netherlands have less than 0.05 ha forest area per capita.

Table 1.1-1: *Area of forest and OWL, by region, 2025*

Region	Forest		FAWS		Other wooded land	
	1 000 ha	*% of land area*	*1 000 ha*	*% of forest area*	*1 000 ha*	*% of land area*
North Europe	71 419.7	53.9	54 531.8	76.4	5 590.5	4.2
Central-West Europe	39 692.7	28.3	36 119.1	91.0	1 086.3	0.8
Central-East Europe	45 984.6	28.0	28 867.6	62.8	781.6	0.5
South-West Europe	31 936.1	35.8	27 680.1	86.7	13 145.6	14.7
South-East Europe	43 320.4	33.2	24 761.6	57.2	4 435.9	3.4
EU-27	***161 840.8***	***39.9***	***137 381.9***	***84.9***	***19 903.5***	***4.9***
Europe	***232 353.4***	***35.4***	***171 960.2***	***74.0***	***25 039.8***	***3.8***

Note: Data coverage as % of regional forest area as represented by received reports: 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) 100%, EU-27 100%, Europe 100%.

Table 1.1-2: *Forest area per capita, by region, 2025*

Region	Forest area
	ha per capita
North Europe	2.11
Central-West Europe	0.15
Central-East Europe	0.25
South-West Europe	0.27
South-East Europe	0.31
EU-27	***0.35***
Europe	***0.31***

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

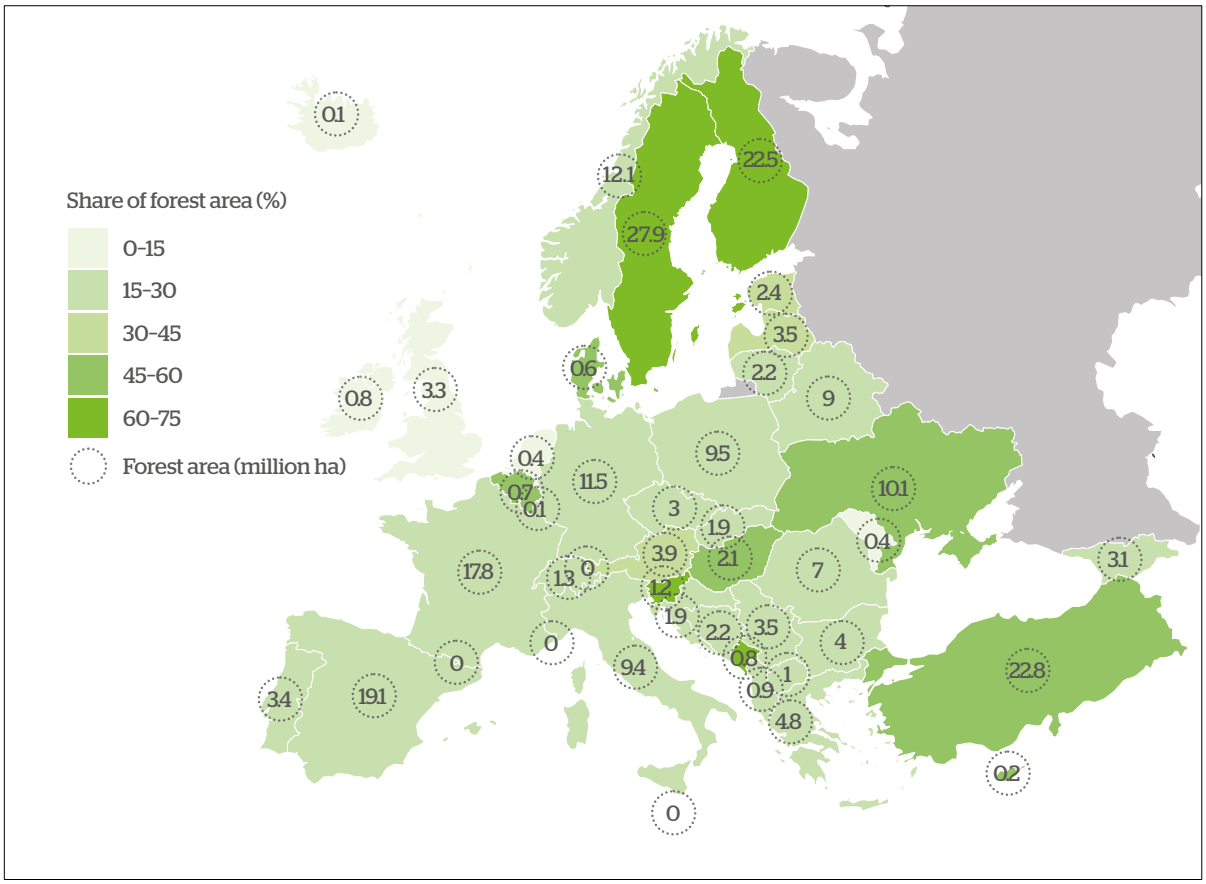


Figure 1.1-1: *Forest area (in million ha) and share of forest area in total land area, by country, 2025*

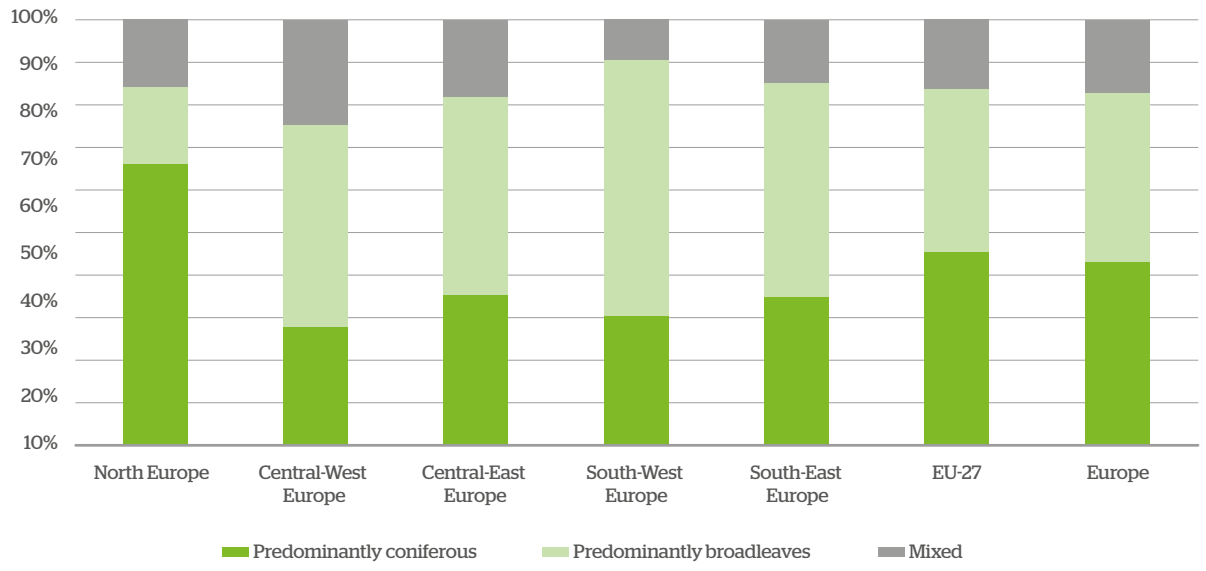


Figure 1.1-2: *Forest area by forest types, by region, 2025*

Trends

Europe's forest area grew by 23.3 million ha over the past 35 years. Between 1990 to 2025 , Europe's forest area increased by an average of 665 000 ha (0.32%) per year. These forest area net changes reflect the combined results of afforestation, natural forest expansion and deforestation. Overall, all European regions experience continuous forest area gains over the last 35-years, although the pace of expansion is decreasing.

With an annual increase of 199 600 ha (0.8%) over the last 35 years, forest expansion was highest in South-West Europe, followed by South-East Europe at 184 000 ha (0.5%) and Central-West Europe at 133 500 ha (0.4%) per year *(Figure 1.1-3 and Table 1.1-3)*.

The total forest area expansion for the period 1990-2025 was highest in Spain at 149 000 ha per year, France at 96 000 ha per year, and Türkiye at 86 000 ha per year. The annual rate of change expressed as a percentage of the total forest area was highest for Iceland (6.9%), Ireland (2.3%), Serbia (1.4%) and Spain (1.1%) for the period 1990–2025, and for Iceland (1.7%), Ireland (1%) and Serbia (1.2%) for the period 2020–2025. However, in the period 2020–2025 there was a net decrease in forest area for North Macedonia (-1.6%), Norway (-0.1%), Republic of Moldova (-0.8%) and Cyprus (-0.5%).

The trend for FAWS differs slightly from the general forest area increase. In North Europe, FAWS decreased by an average of 127 000 ha per year during 1990–2025 *(Table 1.1-4)*, with greater losses during 1990–2010 than 2010–2025. All other regions reported FAWS increases in both periods. Central-East Europe was the only region where annual increases accelerated in 2010–2025 compared to 1990–2010. Across Europe, nine countries reported a FAWS decrease during 1990–2025. FAWS decreases may result from expanded environmental restrictions (such as protected areas), economic constraints, or social restrictions, while FAWS increases generally reflect overall forest area expansion. In light of the long-term decline in forest area in Northern Europe alongside continued gains in forest area, it is useful to interpret FAWS trends as an availability/constraint signal rather than as a simple reflection of forest expansion.

Table 1.1-3: *Forest area and annual change in forest area, by region 1990–2025*

Region	2025	2020	2010	2000	1990	2020–2025	2010–2020	2000–2010	1990–2000	1990–2025
	1 000 ha					*%*				
North Europe	71 420	71 367	70 978	70 911	70 028	0.01	0.05	0.01	0.13	0.06
Central-West Europe	39 693	39 093	37 861	36 380	35 019	0.31	0.33	0.41	0.39	0.38
Central-East Europe	45 985	45 521	44 341	43 279	42 219	0.20	0.27	0.25	0.25	0.25
South-West Europe	31 936	31 695	30 865	28 829	24 951	0.15	0.27	0.71	1.55	0.80
South-East Europe	43 320	42 479	39 433	37 470	36 868	0.40	0.77	0.52	0.16	0.50
EU-27	***161 840***	***160 801***	***156 674***	***152 203***	***145 853***	***0.13***	***0.26***	***0.29***	***0.44***	***0.31***
Europe	***232 353***	***230 156***	***223 478***	***216 868***	***209 085***	***0.19***	***0.30***	***0.30***	***0.37***	***0.32***

Note: Data coverage as % of total regional forest area: 100%. For those countries for particular year not reporting the last available information was used.

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

Region	2025	2020	2010	2000	1990	2020–2025	2010–2020	2000–2010	1990–2025
	1 000 ha					*%*			
North Europe	54 532	54 754	55 545	57 017	58 989	-0.08	-0.14	-0.26	-0.22
Central-West Europe	36 119	35 756	35 166	34 163	32 695	0.20	0.17	0.29	0.30
Central-East Europe	35 443	33 212	32 739	33 217	31 432	1.34	0.14	-0.14	0.36
South-West Europe	27 680	27 601	27 213	26 687	26 049	0.06	0.14	0.20	0.18
South-East Europe	24 762	23 052	21 695	20 599	20 181	1.48	0.63	0.53	0.65
EU-27	***137 382***	***135 418***	***125 733***	***105 277***	***105 595***	***0.29***	***0.77***	***1.94***	***0.86***
Europe	***178 535***	***174 374***	***172 358***	***171 683***	***169 346***	***0.48***	***0.12***	***0.04***	***0.16***

Note: Data coverage as % of regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 99.9%, S-EE 95%, EU-27 99.9%, Europe 99% for those countries years not reporting the last available information was used.

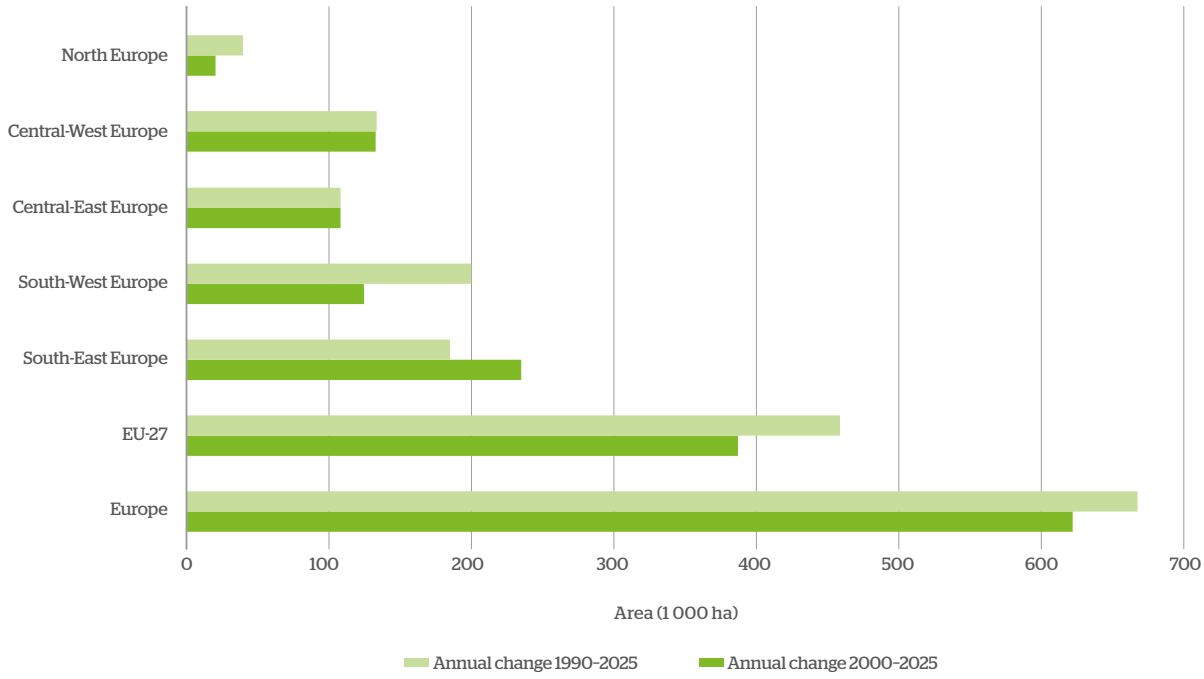


Figure 1.1-3: *Annual change in forest area, by region, 1990–2025 and 2000–2025*

Note: Data coverage as % of regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 99.9%, S-EE 95%, EU-27 99.9%, Europe 99%.

Indicator 1. 2 *Growing stock*

Why it is important

Growing stock refers to the total volume of living trees in a forest, usually measured in cubic metres (m^3). Its significance lies in our understanding of forests' capacity to provide wood and other ecosystem services over time. The potential growing stock varies across Europe, reflecting site productivity, climate, species composition, and management history.

Changes in growing stock can result from shifts in the composition of tree species, the age structure of forests, and forest density. Changes in growing stock can also be an early indicator of forest health, as a decline may result from ecological imbalances and/or degradation of forest soils. An increase in growing stock indicates that tree growth exceeds wood removal and tree mortality. A declining trend may indicate an ageing forest or suggest the presence of disturbances such as wildfires, storms or pest outbreaks, drought, poor management or other pressures.

Analysing growing stock helps to assess both forest productivity and the impact of management practices. This information is essential for evaluating the availability of raw materials for the forest-based economy while safeguarding ecological functions and informs carbon stock estimates. Therefore, growing stock is a central indicator for assessing forest condition and sustainable forest management. Maintaining or enhancing it ensures the forest's long-term resilience, productivity, and capacity for carbon sequestration.

Earlier SoEF editions also emphasised that apparent changes can reflect both real forest dynamics and methodological shifts in national forest inventory systems; interpretation should therefore consider changes in definitions, sampling, and reporting coverage.

How it is defined

Growing stock on forest and OWL, classified by forest type and availability for wood supply.

Key findings

- The total growing stock of European forests is 38.3 billion m^3, of which about 79% is in forests available for wood supply.
- The average growing stock in Europe amounts to 165 m^3/ha and ranges from about 89 m^3/ha in South-West Europe to 261 m^3/ha in Central-East Europe.
- The growing stock increased by almost 1.3% each year between 1990 and 2025, but the pace has slowed down across all European regions. In the last five years, growing stock increased by 0.3% each year. Overall, Europe's growing stock is now around 45% higher than in 1990, but recent increments contribute less to the total increase than in earlier decades.
- Over the period 1990 to 2025 growing stock of broadleaved species increased at a faster annual rate (around 2%–4%) than that of coniferous species (around 1%–2%). This continues the long-standing shift already highlighted in earlier SoEF editions, but with clearer implications for future harvest potential and resilience planning.
- The growing stock indicator is a key indicator with an almost 100% reporting rate.

Status

The total growing stock of Europe's forests amounts to 38.3 billion m^3, of which 30.2 billion m^3 or roughly 79% are located in FAWS *(Table 1.2-1)*. Within FAWS, 29.6% of the growing stock is found in the Central-West Europe, 30.4% in the Central- East Europe and 25% in the North Europe region. When considered relative to population, Europe's forest contain 56 m^3 of total growing stock per capita. Northern Europe has by far the largest growing stock per capita at approximately 270 m^3/inhabitant, highlighting the regions substantial socio-economic potential of forest resource potential. In the remaining regions per capita values range from around 24 and 87 m^3.

The total reported growing stock on OWL amounts to 166 million m^3. Given OWL's typically lower tree cover, the reported volumes per hectare are expected to be far below those of a forest. However, when interpreting the data, it is important to consider how OWL is defined and inventoried nationally.

The average growing stock density *(Table 1.2-1)* in European forests is 165 m^3/ha. The highest values are in the Central-East Europe region with 261 m^3/ha and the Central-West Europe region with 238 m^3/ha; the South-West Europe region has the lowest density with 89 m^3/ha. The variation between countries is high. The highest growing stock densities are in Luxembourg (390 m^3/ha), Switzerland (347 m^3/ha), Romania (340 m^3/ha), Czechia (330 m^3/ha) and Germany (320 m^3/ha), while Iceland (18 m^3/ha), Greece (45 m^3/ha) and Portugal (46 m^3/ha) report the lowest.

The growing stock density on European OWL is 6.6 m^3/ha *(Table 1.2-1)*. Variations in growing stock density can be attributed to ecological conditions that support tree growth such as site quality or climate as well as forest protection measures and management practices, as well as terrain conditions that limit harvesting opportunities in some locations. As growing stock is derived from national inventory systems, sudden changes may also reflect updated methods (e.g., revised plots, models or definitions) rather than abrupt ecological change, an issue that has been highlighted in earlier SoEF cycles.

Conifers account for 48.1% 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, except for the North European region where 68% of growing stock is coniferous. Six main tree species represent 81.4% of growing stock: pine, spruce, fir, beech, oak and birch. Pine (26.3%) and spruce (20.3%) account for the largest proportions, followed by beech (13.3%) and oak (10.8%). The share of birch is 5.3% and fir 5.4% *(Figure 1.2-1)*.

Of the total growing stock in Europe's forests, 78.7% is located in FAWS *(Table 1.2-1)*. The highest percentage is reported for the Central-West Europe region (94.5%), the lowest for South-East Europe (70.7%). Particularly low percentages are reported for Georgia (13.5%), Cyprus (31%) and Türkiye (50%).

Observations show that there is a tendency of slightly decreasing FAWS slightly in North Europe, no common trend in Central Europe, stable in East Europe apart from the Ukraine due to war-related destruction, and a remarkable increase in Türkiye for South East Europe. Other differences can also occur due to varying definitions of FAWS in different countries.

Table 1.2-1: *Total growing stock on forest, forest available for wood supply and OWL, by region, 2025*

Region	Forest			FAWS		Other wooded land	
	million m³	m³/ha	m³/ capita	million m³	Proportion to total growing stock (%)	million m³	m³/ha
North Europe	9 125	127.8	269.6	7 538	82.6	41	7.4
Central-West Europe	9 441	237.9	34.6	8 919	94.5	3	2.5
Central-East Europe	11 989	260.7	86.8	9 176	76.5	34	44.0
South-West Europe	2 828	88.6	24.0	2 498	88.3	14	1.1
South-East Europe	4 942	114.1	39.7	3 493	70.7	74	16.7
EU-27	***27 894***	***172.4***	***40.6***	***24 204***	***86.8***	***60***	***3.0***
Europe	***38 326***	***164.9***	***55.8***	***30 176***	***78.7***	***166***	***6.6***

Note: Data coverage on forest as % of regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 100%, S-EE 99.9%, EU-100%, Europe 99.9%

Data coverage on forest available for wood supply as % of regional forest area: NE 100%, C-WE 100%, C-EE 58.5%, S-WE 99.9%, S-EE 96%, EU-97%, Europe 88%.

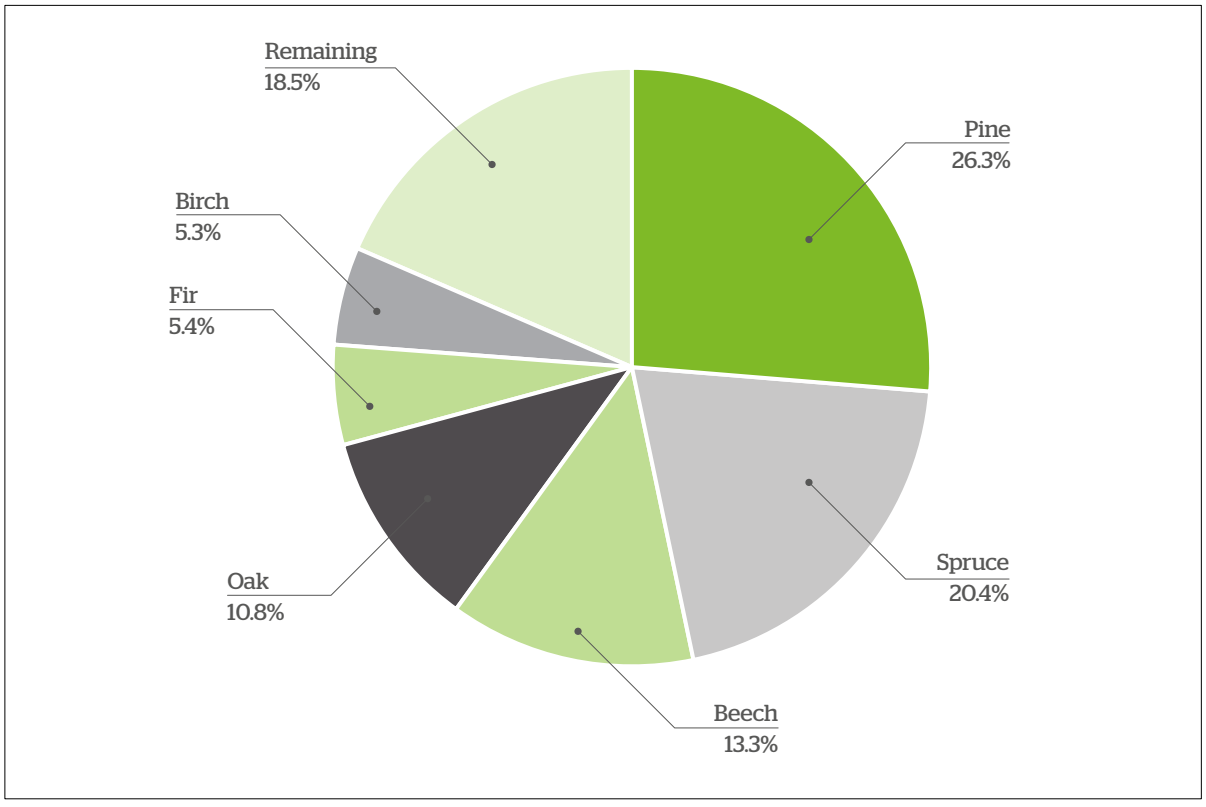


Figure 1.2-1: *Europe's growing stock by main tree species, 2025*

Trends

Over the last 35 years (1990–2025), growing stock in Europe increased by 11.9 billion m^3, averaging 339 million m^3 per year – an annual rate of 1.28% *(Table 1.2-2)*. Growing stock increased across all regions, though the rate of accumulation is slowing. Analysis by tree species reveals that broadleaved growing stock accumulated faster than coniferous (around 2%–4% annually compared to 1%–2%, respectively).

In absolute terms, the increase was highest in Central-East Europe at 3.9 billion m^3, followed by Central-West Europe (2.6 billion m^3) and North Europe (2 billion m^3). In percentage terms, South-West Europe had the highest average annual growth rate at 2.30%, while Central-West (1.1%) and North Europe (0.8%) had the lowest *(Table 1.2-2)*.

This growing stock increase reflects several factors, including forest area expansion in all regions, particularly in South-West Europe.

Growing stock increased more rapidly than forest area during 1990–2025, indicating rising growing stock density across all European regions. The changing age structure – with increasing areas of intermediate and mature stands – is another key factor (see indicator 1.3).

Growing stock accumulation over 35 years results from the difference between additions and removals. Additions include new stem volume from tree growth and forest area expansion. Losses occur through harvesting, thinning and mortality from natural causes such as disease, pest outbreaks, fire, windthrow and other events (for example, landslides, avalanches).

Growing stock accumulation in European forests results from complex, regionally variable factors. Since 1990, felling has increased in most regions except South-West Europe, yet growing stock has continued to rise because volume increment has consistently outpaced harvesting. This reflects several influences: forest age structure, market conditions, declining economic reliance on forestry, greater recognition of forests' multifunctional roles and – in some regions – enhanced growth linked to higher CO_2 concentrations and nitrogen deposition.

However, the rate of accumulation is slowing. Between 2010 and 2025, the annual increase in Europe's growing stock averaged 0.8%, which is below the long-term average of 1.3% for the period from 1990 to 2025 *(Table 1.2-2)*. This slowdown can be attributed to several factors, including declining forest area expansion, changing forest age structure, higher utilisation rates of net annual increment, and increasing forest damage. This 'slowing accumulation' message is consistent with earlier SoEF editions, but the period from 2020 to 2025 shows particularly low annual gains in several regions, highlighting the growing influence of disturbances and higher utilisation rates on net stock change.

Table 1.2-2: *Trends in total growing stock, by region, 1990–2025*

Region	2025	2020	2010	2000	1990	2020–2025		2010–2020		2000–2010		1990–2000		1990–2025	
	million m³					million m³	%	million m³	%	million m³	%	million m³	%	million m³	%
North Europe	9125	9105	8415	7647	7148	19	0.04	691	0.82	767	1.00	499	0.70	1977	0.79
Central-West Europe	9441	9306	8799	7846	6785	135	0.29	507	0.58	953	1.21	1061	1.56	2656	1.12
Central-East Europe	11989	11747	10695	9315	8127	242	0.41	1052	0.98	1380	1.48	1188	1.46	3862	1.36
South-West Europe	2828	2810	2482	2125	1568	18	0.13	328	1.32	357	1.68	557	3.56	1260	2.30
South-East Europe	4942	4761	4113	3478	2829	181	0.76	648	1.58	634	1.82	649	2.29	2113	2.13
EU-27	***27894***	***27608***	***25514***	***22647***	***20093***	***286***	***0.21***	***2094***	***0.82***	***2867***	***1.27***	***2554***	***1.27***	***7801***	***1.11***
Europe	***38326***	***37730***	***34503***	***30412***	***26457***	***595***	***0.32***	***3227***	***0.94***	***4091***	***1.35***	***3955***	***1.49***	***11869***	***1.28***

Note: Data coverage as % of regional forest area: NE 100%. C-WE 100%. C-EE 100%. S-WE 100%. S-EE 99.9%. EU-100%. Europe 99.9%.

Indicator 1.3 *Age structure and/or diameter distribution*

Why it is important

The age structure and diameter distribution of a forest describe its composition (the proportion of young and old trees) and developmental stages (the proportion of small and large trees). These factors provide insights into the ecological stability and future productivity of forests.

A well-balanced forest structure at a landscape or national scale comprises a mix of young, mature and old trees, supporting continuous regeneration, biodiversity and habitat diversity. Skewed distributions may indicate past afforestation efforts, management impacts, natural disturbances or regeneration challenges. At the level of individual stands, diversity in age and size can strengthen resilience to pests, storms and climate change. This indicator can also be interpreted through a risk-and-recovery lens, as large disturbance events can temporarily reshape the distributions of age and diameter.

The diameter distribution of trees affects economic outcomes, as different industries rely on specific sizes and qualities of trees. Monitoring these attributes helps to guide related silvicultural practices, such as thinning, harvesting, natural regeneration, tree planting and seeding, in order to align them with long-term forest health goals. Different tree sizes and age classes are also crucial for maintaining habitats for species that depend on specific structural conditions, such as large, old trees. Changes in structure can indicate risks or opportunities for the sustainable management of forests.

How it is defined

Age structure and/or diameter distribution of forest and OWL, classified by availability for wood supply.

Key findings

- Around 64% of Europe's forests are even-aged, while 36% are uneven-aged. This indicates a continued shift towards a larger proportion of uneven-aged forests compared to previous reports.
- In Europe, forests available for wood supply are dominated by even-aged stands that have passed the regeneration phase but not yet reached maturity, which is consistent with the broad pattern reported in earlier editions.
- The growing stock in uneven-aged forests available for wood supply is concentrated in the 21–40 cm diameter class. Meanwhile, the proportion of very large trees remains comparatively small at the European level.

Status

Data reported for 2020 indicates that middle-aged and mature forests dominate in most regions of Europe. The largest shares of middle-aged forests are found in Central and Northern Europe, reflecting long-established management systems with regular harvest cycles and regeneration.

In Northern Europe, particularly in Sweden and Finland, forests are primarily composed of middle-aged and mature coniferous stands managed under rotation systems. In Central Europe, there is a gradual shift towards older stands because of the maturing of post-Second World War afforestation efforts.

In Southern and South-Eastern Europe, younger and uneven-aged structures are more common, especially in areas affected by fire, grazing and coppicing. However, in countries such as Spain and Portugal, ageing trends are also becoming visible in high forest systems.

Forest ageing is particularly pronounced in Western Europe, where harvesting intensity is relatively low and regeneration is often delayed.

In parallel, recent droughts, storms and outbreaks of bark beetles have locally accelerated structural change, particularly in Central Europe. Following salvage operations and subsequent regeneration, disturbance-affected areas have temporarily

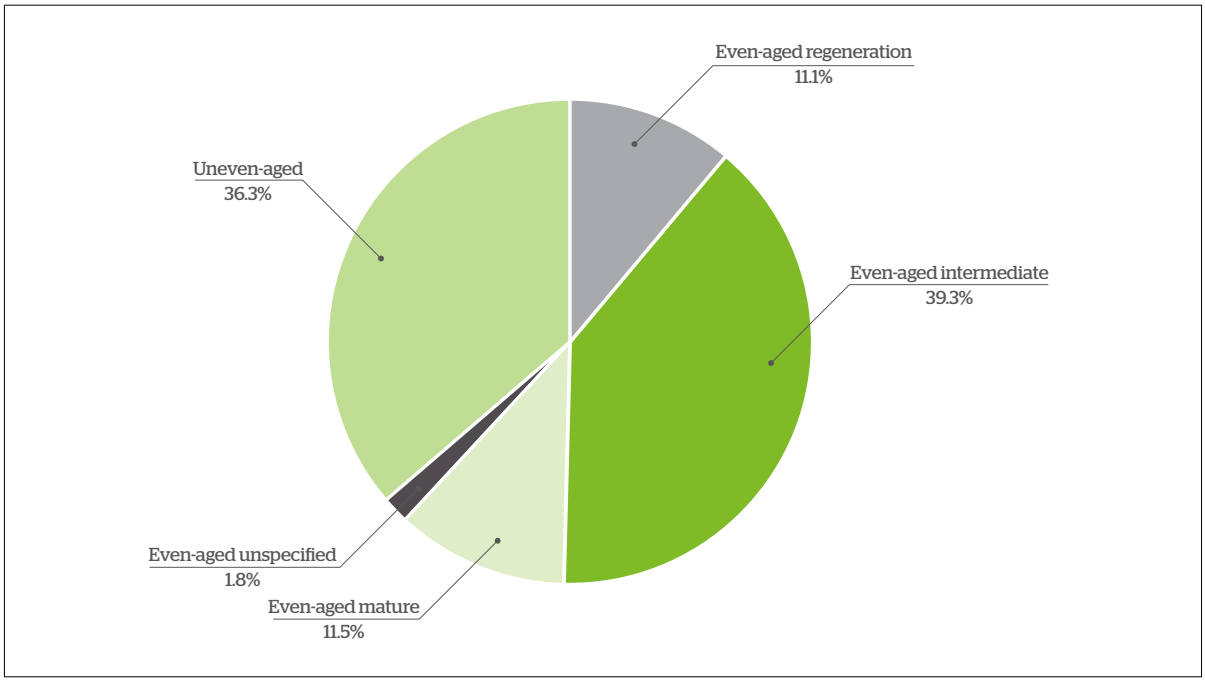


Figure 1.3-1: *Share of the area of even-aged forest development phases and of uneven-aged forest in FAWS, 2020*

Note: Data coverage of even-aged as % of total area of FAWS: 83.5%, Data coverage of un-even-aged as % of total area of FAWS: 72.6%

increased the relative share of younger development stages.

The age structure of the European FAWS area in 2020 is shown in Figure 1.3-1. Overall, even-aged forests dominate. For Europe, more than 64% 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 18.0% of the growing stock in even-aged FAWS. However, the growing stock in uneven-aged forest dominates in South-West and Central-West Europe.

For Europe as a whole, the diameter class 21–40 cm dominates in the uneven-aged forest; about 9.8% of the growing stock consists of trees larger than 60 cm diameter at breast height (DBH).

Trends

Although trend analysis remains limited by incomplete time series, coverage for the period 2000-2020 now extends to approximately 70% of FAWS, which is substantially higher than the coverage available for the earlier 2000–2015 trend subset.

For this subset of countries, the trend indicates a continuous decline in even-aged stands between the years 2000 and 2020 on average. Only minor changes were observed in the distribution of development phases within even-aged FAWS, with a slight decrease in the regeneration phase and an increase in the intermediate phase between 2010 and 2020 *(Figure 1.3-2)*. Stands in the intermediate development phase accounted for the largest share (61%) and increased between 2000 and 2010. This phase is usually linked to high growth rates, which aligns with the broader pattern of ongoing (though slowing) growing stock accumulation reported at the European level (see Indicator 1.2).

Overall, the reported age structure indicates a forest profile that leans towards maturity more than in earlier decades. However, recent disturbance dynamics highlight that structural signals can shift rapidly and should be interpreted alongside information on damage and regeneration.

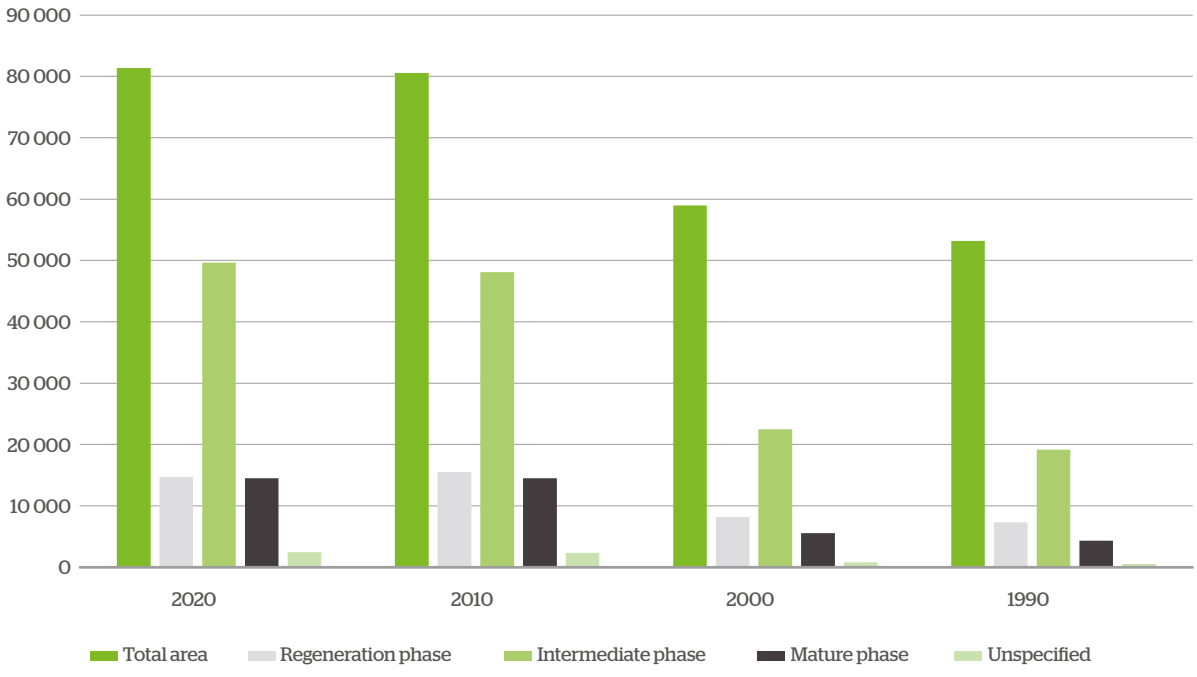


Figure 1.3-2: *Trend in area of development phases of even-aged forests available for wood supply, 1990–2020*

Note: Data coverage as % of total area of FAWS: 70%

Indicator 1.4 *Forest carbon*

Why it is important

Forest carbon stock refers to the total amount of carbon stored within a forest, including in its biomass, deadwood, litter and soil. Sustainably managed forests can act as carbon sinks, absorbing more carbon dioxide than they emit. This makes forests a crucial natural solution for mitigating climate change. However, over time, forests may reach an equilibrium between carbon absorption and release the carbon stored during growth is eventually returned to the atmosphere through burning or natural decay. Recent assessments emphasise that disturbance dynamics and stand ageing can reduce net removals even when total carbon stocks remain high.

Changes in forest carbon stocks reflect natural processes and human activities, such as forest management (including harvesting and reforestation) and changes in land use. An increase or stability in carbon stocks suggests that forest ecosystems are being maintained or enhanced, whereas significant losses may indicate intensive harvesting, forest damage, changes in age structure, degradation, or deforestation. Forest carbon stocks can be influenced by management practices and natural hazards affecting growth rates, species composition, and stand structure. When interpreting the data, it is also important to consider the growing role of compound disturbances (e.g., drought followed by bark beetle outbreaks) and their effects on mortality and recovery trajectories.

Monitoring carbon is essential for reporting under frameworks such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, as well as for meeting national, EU, and global climate targets. It is also important for carbon accounting in voluntary and compliance carbon markets. Integrating carbon considerations into forest management ensures that climate goals align with biodiversity and wood production objectives. Under the UNFCCC, the Kyoto Protocol and the Paris Agreement, parties are required to submit reports on greenhouse gas emissions and removals for various land use categories and carbon pools. Within this framework, forest land is a key land use category in many European countries. The credibility of discussions on forest carbon policy increasingly depends on transparent monitoring approaches and clear communication of which carbon pools are included (e.g., biomass, soils, deadwood and harvest wood products).

How it is defined

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

Key findings

- Carbon stock in European forest biomass is increasing, representing a significant sink for CO_2 emissions. However, the size of this sink is declining. There is partial evidence of a decline in the sink function, primarily due to natural disturbances, increased harvesting, and climate-related stress reducing forest growth. Compared with earlier SoEF reporting periods, the net annual increase in biomass carbon is smaller, indicating a weakening accumulation trend (though still positive).

- Between 2010 and 2025, the average annual sequestration of carbon in forest biomass was 106 Mt C, but this figure masks substantial year-on-year variability associated with disturbance events and salvage operations, which can raise removals and reduce net increment simultaneously.

- Living woody biomass represents around 30% of the total carbon stock in forests. Soils remain the largest reported pool in countries providing full coverage *(Figure 1.4-1)*, but pool shares are sensitive to national methods and reporting completeness across pools.

- Carbon stored in biomass per hectare is highest in Central-West and Central-East Europe. This reflects higher standing volumes and a larger proportion of mature forests in certain regions, which has implications for future sink strength as the forests age.

Status

Reporting carbon balances associated with harvested wood products (HWP) is mandatory under the UNFCCC. Under the Kyoto Protocol, carbon pools are categorised as biomass (above- and below-ground), dead organic matter (deadwood and litter) and soil (mineral and organic). However, this 2025 report only analyses the biomass pool, as this component can change significantly over short time periods in response to natural disturbances. Changes in the other carbon pools generally occur more slowly. While this approach facilitates the interpretation of short-term disturbance signals, it means that the indicator does not capture potentially offsetting changes in deadwood, soils or HWP that are relevant for comprehensive forest land carbon accounting.

Table 1.4-1 shows biomass carbon stocks in various European regions. When expressed per hectare of forest land, biomass carbon is highest in Central-West and Central-East Europe, while Southern and Northern Europe hold only half these amounts. This regional gradient is consistent with differences in growing stock density (Indicator 1.2) and forest type composition (Indicator 1.1).

The analysis to assess the relative proportions of the various forest carbon pools (i.e. above- and below-ground biomass, deadwood, litter, and soil organic carbon) is based on data from countries that reported on all five pools. Figure 1.4-1 shows that 55% of total forest carbon is stored in soils, while 30% is contained in living woody biomass. As full pool reporting only covers part of Europe's forest area, these figures should be considered indicative rather than fully representative.

Table 1.4-1: *Carbon stocks in biomass divided into below- and above-ground components, by region, 2025*

Region	Carbon in above-ground biomass		Carbon in below-ground biomass		Carbon in total biomass	
	Mt C	*tonnes/ha*	*million m³*	*tonnes/ha*	*million m³*	*tonnes/ha*
North Europe	2 674	37.4	699	9.8	3 373	47.2
Central-West Europe	2 899	73.0	683	17.2	3 582	90.2
Central-East Europe	4 027	87.6	792	17.2	4 819	104.8
South-West Europe	1 051	32.9	318	9.9	1 369	42.9
South-East Europe	1 805	41.7	449	10.4	2 254	52.0
EU-27	***8 667***	***53.5***	***2 106***	***13.0***	***10 772***	***66.6***
Europe	***12 456***	***53.6***	***2 941***	***12.7***	***15 397***	***66.3***

Note: Data coverage as % region forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 99.9%, S-EE 100%, EU-27, Europe 99.9%.

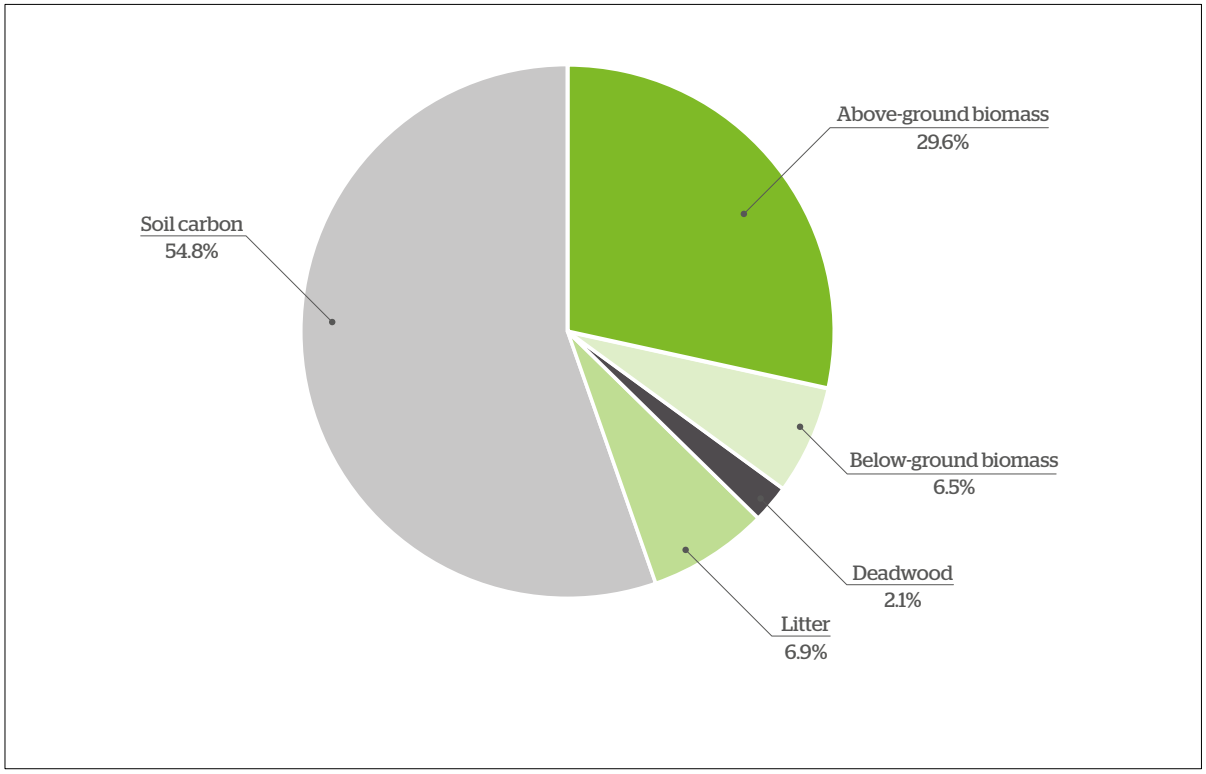


Figure 1.4-1: *Proportions of forest carbon pools in Europe, 2025*

Note: Based on data from countries that reported on all five carbon pools. Data coverage as % of total forest area in Europe is 56%.

Trends

Table 1.4-2 shows the trends in biomass carbon stocks in European forests from 1990 to 2025. Across all regions, biomass carbon stocks increased steadily during this timeframe. The overall rise between 2010 and 2020 was significant, with an increase of 106 Mt C per year recorded for all European countries during the period 2010–2025.

This increase was primarily driven by forest growth exceeding harvest levels and mortality rates. However, since 2015, growth has increasingly been constrained in several regions by drought and heat stress, higher mortality and the impact of disturbances such as storms, pests and fire, resulting in a smaller net increase in biomass carbon.

South-west Europe has experienced a decrease in carbon stocks, largely due to an increase in forest fires in recent years. This pattern is consistent with wider evidence that extreme fire weather and prolonged fire seasons can produce significant, albeit episodic, carbon losses in biomass, even where longer-term trends remain positive elsewhere.

Recent findings from the EEA's assessment indicate that the EU's forest sink has decreased over the last decade due to increased harvesting, disturbances, ageing forests and climate-related stress. These issues are not widespread but are concentrated in parts of the Nordic and Baltic countries, as well as Central Europe. The Nordic, Baltic and Central European regions have experienced the most significant reductions in forest carbon removals overall. These developments highlight the importance of adaptive management, monitoring and restoration measures to ensure Europe's forests continue to play their role in carbon sequestration under changing climatic and economic conditions. While these EEA findings focus on the EU, they also provide relevant context for the wider FOREST EUROPE area, where similar drivers (ageing, harvest dynamics and disturbance regimes) are increasingly being reported.

Table 1.4-2: *Annual change in total forest biomass carbon stocks, by region, 1990–2025*

Region	2025	2020	2010	2000	1990	Annual change 2010–2025		Annual change 2010–2020		Annual change 2000–2010		Annual change 1990–2000	
	Mt C					Mt C	%	Mt C	%	Mt C	%	Mt C	%
North Europe	3373	3370	3100	2843	2569	18	0.59	27	0.87	26	0.91	27	1.07
Central-West Europe	3582	3530	3261	2900	2409	21	0.66	27	0.82	36	1.25	49	2.04
Central-East Europe	4819	4563	4113	3169	2693	47	1.14	45	1.09	94	2.98	48	1.77
South-West Europe	1369	1442	1363	1265	1165	0	0.02	8	0.57	10	0.78	10	2.06
South-East Europe	2254	2177	1965	1627	1425	19	0.98	21	1.08	34	2.08	20	1.42
EU-27	***10 974***	***10 931***	***10 062***	***7 976***	***7 093***	***61***	***0.60***	***87***	***0.86***	***209***	***2.62***	***88***	***1.28***
Europe	***15 396***	***15 081***	***13 803***	***11 803***	***10 260***	***106***	***0.77***	***128***	***0.93***	***200***	***1.69***	***147***	***1.51***

Note: Data coverage as % regional forest area: NE 100%, C-WE 100%, C-EE 80.5%, S-WE 99.9%, S-EE 100%, EU-27 99.9%, Europe 96%.

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

Key findings

All countries that reported on this criterion have policy objectives relating to the maintenance and enhancement of forest resources and their role in carbon sequestration. These objectives are generally incorporated into wider national forest policies, programmes and strategies that address climate change, biodiversity and rural development. In many countries, these objectives increasingly combine mitigation, adaptation, and resilience in response to mounting pressures from drought, pests, storms, and fire. This emphasis is consistent with earlier SoEF reporting, while recent country inputs place greater weight on disturbance risk and recovery as determinants of net carbon outcomes.

Most countries have established institutional frameworks and policy tools that promote sustainable forest management, afforestation, forest restoration, and improved data collection. These measures contribute to the stability of forest resources and climate change mitigation. Country reporting also highlights the importance of implementation capacity and monitoring systems for demonstrating measurable outcomes over time. In line with earlier SoEFs, countries frequently report on forest area and growing stock alongside carbon-related aims, and increasingly point to monitoring capacity as a precondition for credible accounting.

Policy objectives

Of the 31 countries that reported, 28 identified explicit policy objectives under Criterion 1. These include maintaining or increasing forest area, improving forest conditions, enhancing growth and productivity, as well as strengthening forests' contribution to climate change mitigation.

Other common objectives include conserving biodiversity, preventing deforestation, and promoting afforestation and reforestation. Several countries have integrated carbon-related targets into their forest and climate policies, including commitments under the EU Climate Law, the Regulation on land use, land use change, and forestry (LULUCF) and the Paris Agreement. These objectives are often set alongside requirements for greenhouse gas reporting and land use accounting, thereby strengthening the link between forest policy instruments and the delivery of climate policy. Many countries also frame these objectives in terms of maintaining forest resources as a foundation for sustained mitigation, reflecting the long-standing SoEF emphasis on resource stability.

National forest programmes and strategies in Austria, Germany, Finland and France directly link forest resource management to carbon sequestration and sustainable wood use. Spain, Italy and Portugal have specific objectives to prevent forest fires and restore degraded land. At the same time, Central and Eastern European countries focus on increasing forest cover and improving forest structure through afforestation and regeneration projects. Overall, countries are reporting a shift from stand-alone forestry objectives towards more integrated objectives spanning climate, biodiversity, and rural development. This broadening of objectives aligns with earlier SoEFs, but recent reporting more explicitly links forest objectives to land-use accounting and delivery frameworks.

Institutional measures and policy tools

Twenty-six countries reported having implemented legal, financial, and administrative instruments under this criterion. These measures are typically rooted in national forest legislation that defines sustainable forest management, forest ownership rights, and afforestation obligations. Additionally, several countries have instruments specifically designed to address disturbance prevention, response and recovery in light of increased risk of damage. This reflects a gradual evolution already noted in SoEF 2015 and SoEF 2020, with more explicit attention to disturbance-response measures in recent reporting.

Financial instruments include subsidies and grants for afforestation, reforestation and restoration activities, as well as compensation schemes for forest owners affected by natural disturbances. Funding is often provided through national budgets, EU Rural Development Programmes, LIFE projects or climate-related mechanisms, such as the EU Emissions Trading System (ETS). Advisory services, support for forest owner cooperation, and investments in monitoring and inventory systems often supplement these financial measures. Where relevant, countries also describe instruments that support regeneration after disturbance, diversification, and adaptive silviculture as part of maintaining the resource base.

Several countries have developed specific programmes to enhance carbon sequestration and storage. For instance, France promotes carbon projects under the Label Bas-Carbone scheme, while Finland and Sweden support research into climate-smart forestry and the long-term storage of carbon in harvested wood products. Germany, Austria and Poland provide financial support for sustainable forest management and reforestation following storm or pest damage. Together, these tools aim to maintain forest resources, support recovery after disturbances, and strengthen long-term mitigation benefits. This also mirrors earlier SoEF observations that policy mixes often combine "area and resource maintenance" measures with targeted incentives and support schemes.

Institutional coordination across sectors, particularly forestry, climate and agriculture, is becoming an increasingly important focus. Many countries have reported closer integration of forest management with national climate adaptation and biodiversity strategies. They also emphasise the importance of strengthening measurement, reporting and verification (MRV) capacities, including improving national forest inventories and increasing the use of remote sensing, to support transparent carbon accounting.

Achievements

Twenty-five countries reported measurable achievements in this area. These include expanding forest areas, improving forest health, and continued growth in timber stocks and carbon sequestration. Several countries also reported improvements in monitoring systems and data harmonisation, which enables a more robust assessment of carbon-related outcomes. As in earlier SoEFs, achievements commonly relate to maintaining or increasing forest resources; recent reporting more frequently highlights monitoring and data integration as enabling achievements.

Afforestation and reforestation programmes have been particularly successful in Central and South-Eastern Europe, where forest cover has increased significantly over the past few decades. Türkiye has implemented one of the largest afforestation initiatives in Europe, expanding forest cover by over four million hectares since 1990.

In Western Europe, efforts have focused on enhancing the ecological quality of existing forests, integrating forest carbon objectives into wider environmental and energy policies and encouraging the use of wood as a renewable resource. In some cases, these efforts have also strengthened restoration approaches and increased the resilience of existing forests.

Several countries, including Finland, Sweden, Germany and Austria, have reported successes in sustainable forest management certification, forest monitoring and data harmonisation, thereby supporting transparent carbon accounting. These advances help to link policy instruments to measurable trends and support improved reporting consistency across agencies and frameworks.

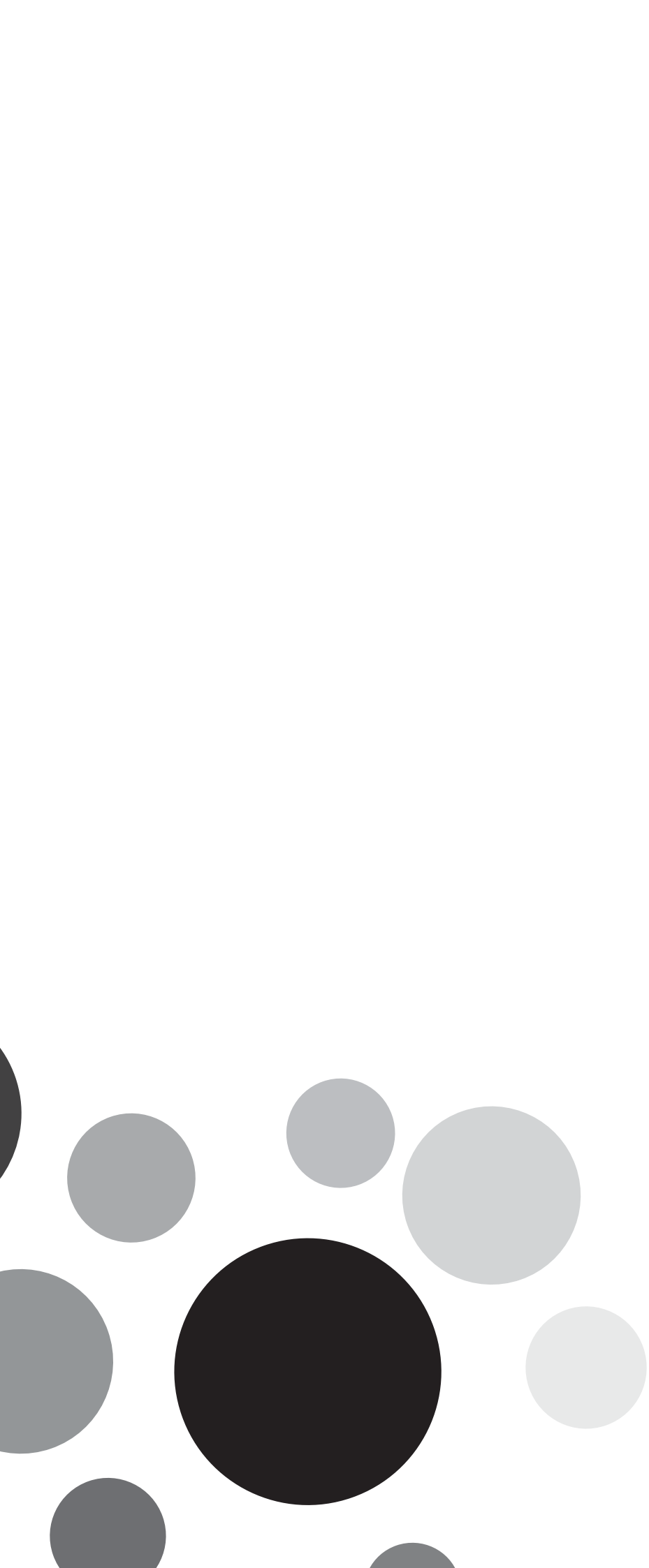
Overall, the reported progress indicates that forest resources across Europe are stable or increasing and that their role as a carbon sink is being strengthened through national and international policy instruments. At the same time, however, several countries have noted that disturbance impacts can reduce net removals even when carbon stocks remain stable or increase, highlighting the importance of resilience and recovery measures. This distinction between stocks and net removals is increasingly emphasised in recent reporting, and is important for interpreting outcomes over time.

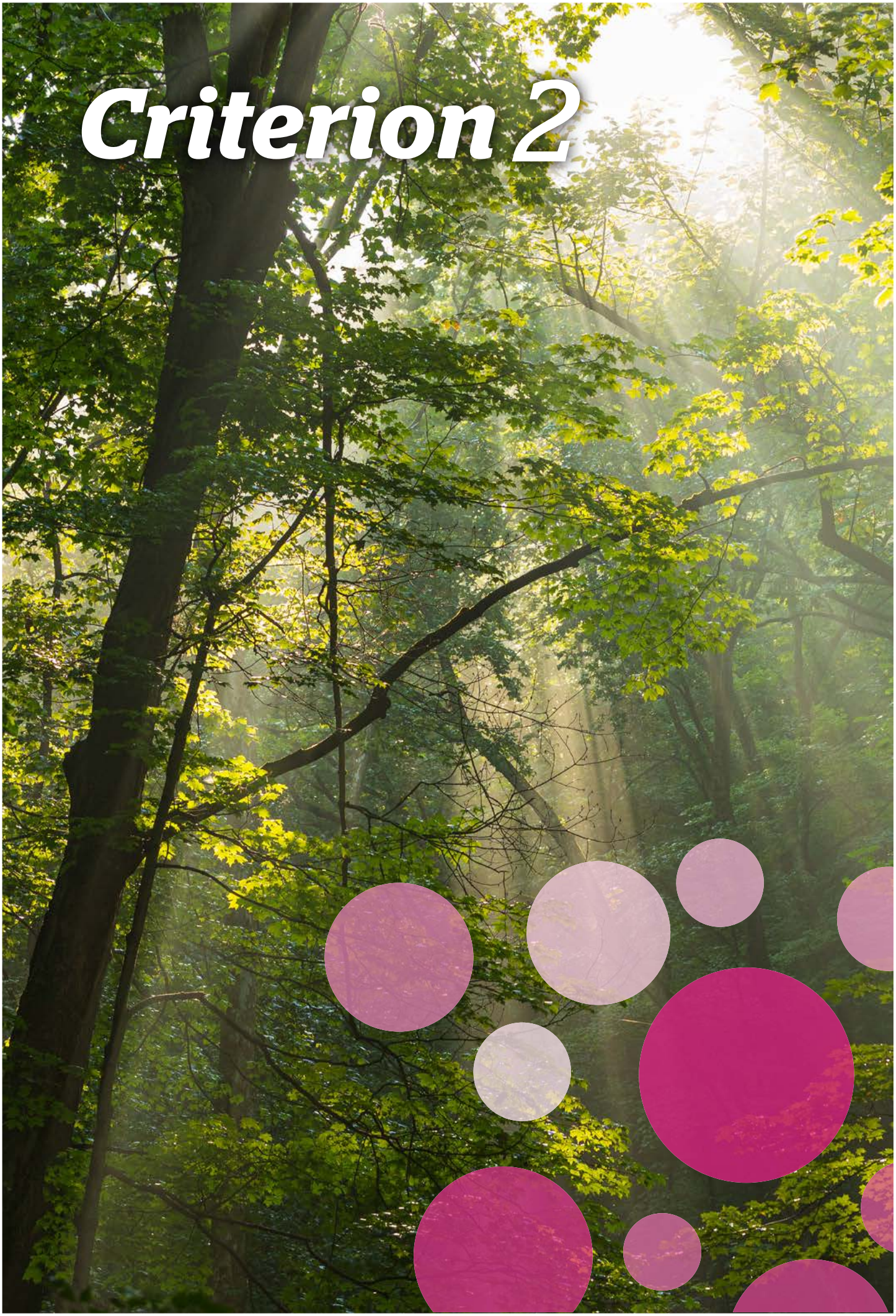
Challenges

Twenty-three countries identified challenges in implementing policies under this criterion. The most frequently mentioned challenges were the increasing impacts of climate change, particularly droughts, pests and fires, as well as financial constraints, insufficient institutional capacity, and a lack of coordination between sectors. In some countries, repeated disturbances can increase costs and uncertainty, reducing the effectiveness of longer-term mitigation measures.

Several countries emphasised the need to reconcile competing land uses and policy objectives, for instance, between biomass utilisation and long-term carbon storage. Others highlighted the difficulty of financing large-scale afforestation and restoration projects and emphasised the need for improved monitoring systems to evaluate the carbon balance of forests and harvested wood products. These tensions reinforce the importance of policy coherence and clear implementation conditions.

Data harmonisation remains a key issue, particularly when integrating national forest inventories with remote sensing and international reporting requirements. Countries emphasise that better coordination among forest, climate, and energy policies is essential to ensure that forest resources continue to contribute effectively to Europe's climate-neutrality goals. Strengthening MRV capacity and improving the transparency of methods were also repeatedly identified as priorities for the credible evaluation of policy delivery. In addition, several countries point to definitional and methodological differences across reporting channels (forestry, inventories, and land-use accounting) as a practical challenge for comparability, an issue also highlighted in earlier SoEF's and emphasised in the FAO Global Forest Resources Assessment process through commonly agreed terms and definitions and reporting guidelines.




Criterion 2

Criterion 2:

Maintenance of Forest Ecosystem Health and Vitality

Maintaining the health and vitality of forest ecosystem is essential for sustaining the full range of forest functions and services. Healthy forests are more resilient to disturbances such as storms, pests, diseases and wildfires, particularly in the context of changing climatic conditions.

Climate change is a key factor influencing the health, vitality and resilience of Europe's forests. The increasing frequency and intensity of biotic and abiotic disturbances - including compound or cascading events (e.g., drought followed by pest outbreaks), are posing greater risks of damage and disrupting forest vitality and resilience.

Monitoring forest damage and vitality indicators enables the early detection of risks and supports adaptive responses. Management practices that maintain soil quality, water availability and species diversity help to preserve ecosystem stability. Ensuring the continuity of ecological processes ensures that forests can continue to provide long-term carbon storage, biodiversity habitats and other essential services. Where disturbance pressures increase, management and monitoring increasingly focus on reducing vulnerability, supporting recovery and maintaining key ecosystem functions.

The health and vitality of forests are assessed through indicators the following indicators: (1) air pollutant deposition and concentration, (2) soil condition, (3) defoliation (crown condition), and (4) forest , and (5) forest degradation damage.

Indicator 2.1 *Deposition and concentration of air pollutants*

Why it is important

The deposition and concentration of air pollutants in forests affects their health and productivity, as well as biodiversity. High levels of these pollutants can lead to acidification, nutrient imbalances, and damage to leaves and tree roots, thereby weakening the resilience of forests. Coniferous trees typically absorb more pollutants due to their higher leaf density. The impact of pollutants also depends on site sensitivity, particularly soil buffering capacity, hydrology and stand structure.

Monitoring atmospheric deposition helps to identify pressures on forest ecosystems that may not be immediately visible, yet which have long-term impacts. Trends in pollutant levels reflect the effectiveness of air quality and environmental policies at national and international levels. Declining deposition rates usually mean that regulatory controls have improved and industrial emissions have reduced, creating more favourable conditions for forest growth. However, even low levels of chronic exposure can stress sensitive forest types, particularly in areas with poor soil buffering capacity. This is particularly relevant for nitrogen, where continued inputs can lead to eutrophication and changes in species composition, even as acidifying sulphur inputs decline.

Sustainable forest management must consider these external environmental pressures to ensure forests remain healthy and productive. Including air pollution monitoring in forest assessments provides an integrated approach to managing forest ecosystems in the context of wider environmental change.

Since the mid-1990s, the International Cooperative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests), operating under the UNECE Convention on Long-Range Transboundary Air Pollution (the Air Convention), has been measuring the atmospheric deposition of key compounds, including sulphate (SO_4^{2-}), nitrate (NO_3^-), ammonium (NH_4^-) and base cations (BC), in open fields and under forest canopies. Additionally, ozone (O_3) concentrations during the growing season have been monitored since 2000 at Level II monitoring plots across Europe. While these plots are not statistically representative of all European forests, they cover the main forest types and provide long-term, consistent information on deposition and ozone exposure.

How it is defined

Deposition and concentration of air pollutants on forest and OWL.

Key findings

- Annual nitrogen deposition was generally higher in Central Europe than in Northern Europe, while sulphur deposition was generally relatively low, except for several sites in Central-Eastern and South-Eastern parts of Europe. Overall, reduced nitrogen (linked to ammonia emissions) remains a key issue in parts of Central and Southern Europe.

- Mean annual sulphur and nitrogen deposition decreased by approximately 20–40% and about 5–20% respectively from 2013 to 2023. However, ammonium deposition showed slight or significant increases at multiple sites in southern Central Europe. This indicates that progress in reducing acidifying sulphur inputs has been more consistent than progress in reducing ammonia-related agricultural inputs.

- The thresholds for potential adverse effects on forests, known as critical loads, are still exceeded at many ICP Forests plots. For nitrogen deposition, this mainly occurred in the central parts of Europe. This suggests a continued risk of eutrophication impacts in sensitive forest ecosystems, even where overall deposition levels are declining.

Status and trends

The emissions of sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3) from the burning of fuel, industrial processes, traffic and agriculture have increased over the last century, and these emissions are partly transported over long distances. The related loads of sulphur (S) and reactive nitrogen (N) deposited in the atmosphere can affect forest ecosystems through accelerated soil acidification and eutrophication, and these are monitored on ICP Forests Level II plots[1].

The UNECE Convention on Long-range Transboundary Air Pollution has defined critical loads and critical levels, which are the levels below which 'harmful effects on specified elements of the ecosystems do not occur according to current knowledge'. While these thresholds provide a framework for interpreting deposition data, exceeding them does not automatically imply observed damage at a given plot, as responses depend on site conditions and interacting stressors.

[1] *ICP Forests. 2020. Manual on methods and criteria for harmonized sampling, assessment, monitoring and analysis of the effects of air pollution on forests. Thünen Institute of Forest Ecosystems, Eberswalde, Germany.*

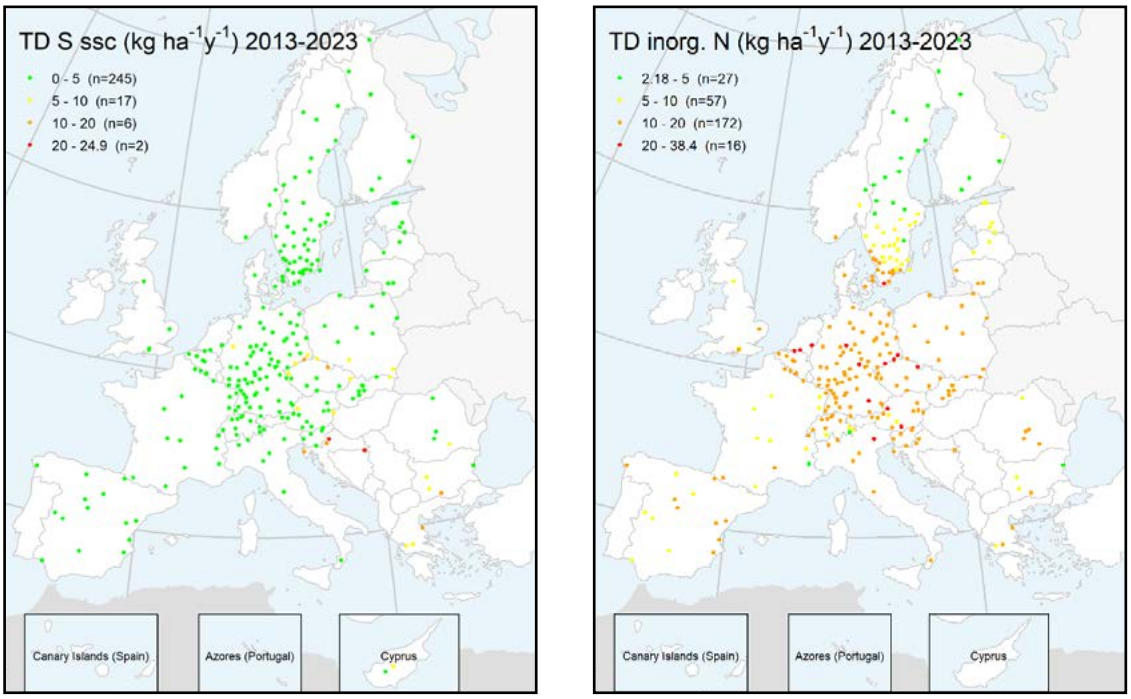


Figure 2.1-1: *Mean annual total deposition (TD) of sulphur (S ssc; sea salt corrected) (left) and of inorganic nitrogen (inorg. N; sum of ammonium and nitrate) (right) on ICP Forests Level II plots with continuous measurements in the period from 2013 to 2023. Total atmospheric deposition is estimated from open field bulk deposition and throughfall sampling with canopy budget models. (n=number of plots)*

Atmospheric deposition values exhibit a high spatial and temporal variability. Overall, mean sulphur deposition corrected for sea salt was low at most plots from 2013 to 2023 and has decreased further since then, except at some plots in Eastern Europe and several plots in South-Eastern Europe. Total deposition of inorganic nitrogen remains high in many parts of Central and Southern Europe Typically, sulphate deposition decreased by about 20% to 40%, and nitrogen deposition by about 5% to 20%, over these 10 years. Sites showing significantly decreasing trends prevailed for sulphate and nitrate

A relatively high number of plots showed slightly or significantly increasing ammonia throughfall deposition between 2013 and 2023, particularly in Southern-Central and Eastern parts of Europe. This pattern is consistent with the stronger relative role of agriculture in ammonia emissions and the slower pace of reduction compared to industrial sulphur controls.

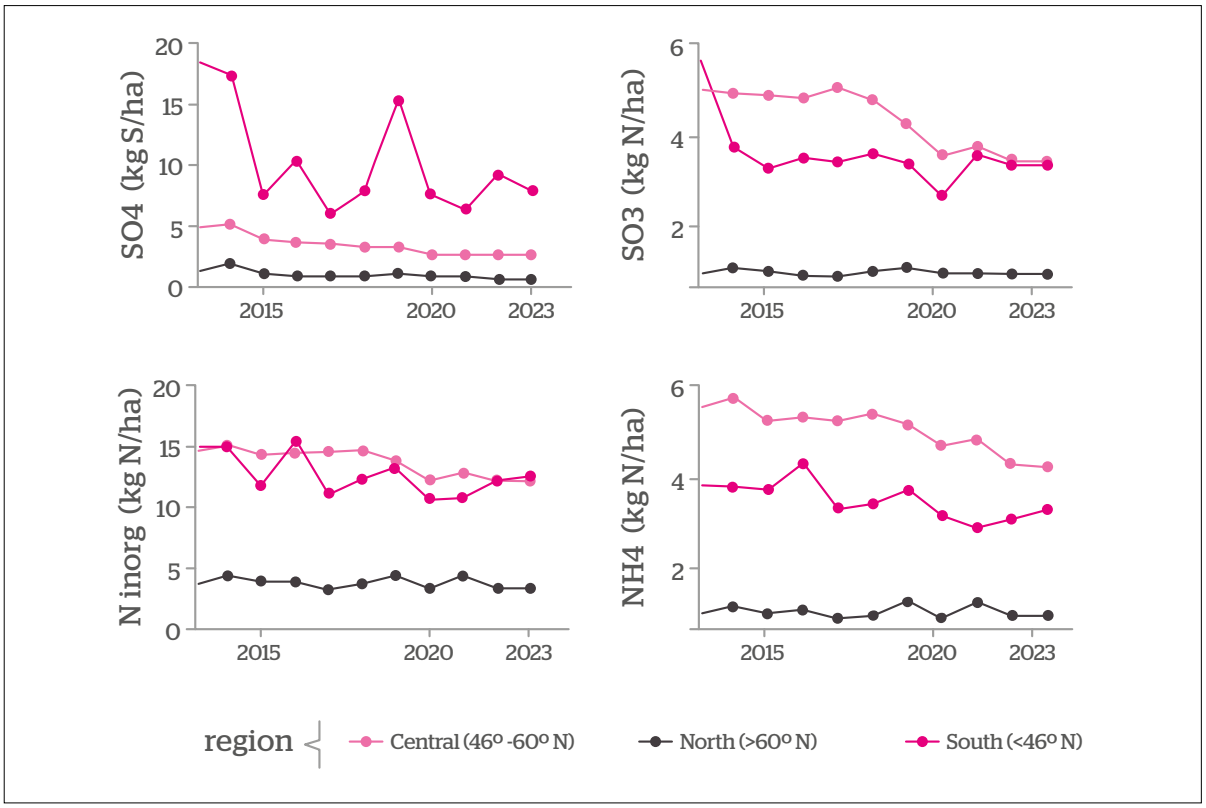


Figure 2.1-2: *Annual mean values of atmospheric deposition of the Level II plots in northern, central and southern Europe in the ten years from 2013 to 2023. Total deposition of sulphur (SO_4; sea salt corrected) and of inorganic nitrogen (N inorg; sum of ammonium and nitrate) (left) and throughfall deposition of nitrate nitrogen (NO_3) and ammonium nitrate (NH_4) (right)*

When it comes to ozone concentration (data covering years between 2013 and 2023) during the growing season (April-September), the overall mean value was 65.9 µg/m³, ranging from 14.3 to 157.5 µg/m³, remaining highly variable. The highest values are to be found in Switzerland and Romania. There has been a shift in mean ozone concentrations between Central and Southern Europe since 2017 as a result of decreasing values in the south (by approximately 15%) and increasing values in the Central European countries (by approximately 5%), with the decrease in tropospheric ozone being more pronounced in Spain. These shifts highlight that ozone exposure remains an active stressor and can evolve differently across regions, even when other pollutants decline.

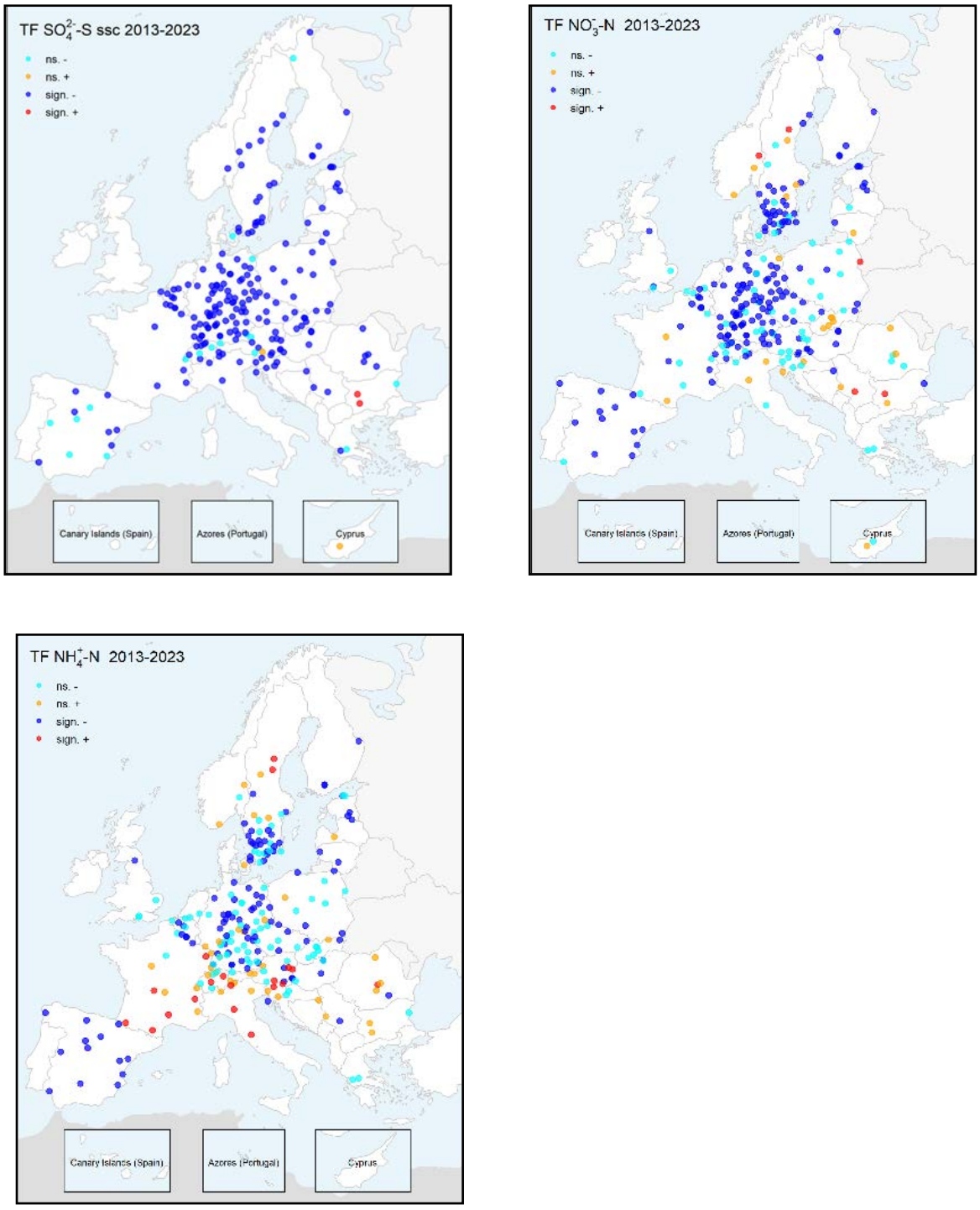


Figure 2.1-3-: *Trends in throughfall (TF) deposition of sulphate (SO_4), nitrate (NO_3) and ammonium (NH_4) deposition on ICP Forests Level II plots with continuous measurements in the period 2013–2023*

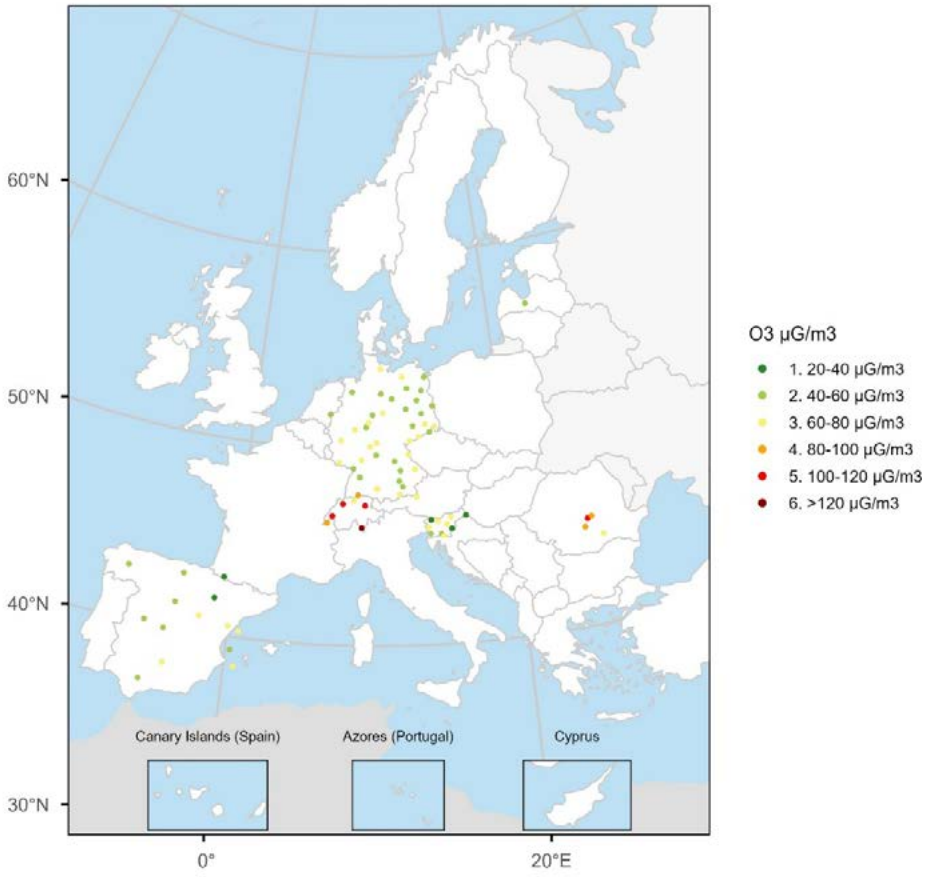


Figure 2.1-4: *Mean annual ozone (O_3) concentration (in µg/m³) on ICP Forests Level II plots with growing season measurements in the period from 2013 to 2023.*

Figure 2.1-5: *Annual mean values of ozone (O_3) concentrations (in µg/m³) of the Level II plots in central and southern Europe in the ten years from 2013 to 2023*

Overall, air pollution reduction measures implemented across Europe since the 1990s have successfully decreased the load of acidifying sulphate and partly of nitrogen compounds to Europe's forests. The still high deposition of reduced nitrogen in some areas typically originates from ammonia, which is emitted, e.g., during intensive agricultural use. However, for nitrogen (N) deposition, the empirical critical loads are still exceeded in large parts of Central and Southern Europe. In the context of increasing temperatures, tropospheric ozone still affects forests, especially in Central Europe, where its levels are increasing.

Indicator 2.2 *Soil condition*

Why it is important

The condition of the soil is a key factor in forest health, influencing how trees grow, which species thrive, how water is retained by the soil and the nutrient cycle. Healthy soils support resilient forest ecosystems by providing a stable foundation for regeneration and growth, as well as for storing carbon. Changes in soil properties can indicate pressures from pollution, climate change, or forestry operations, including harvesting. Soil condition is also increasingly being discussed in relation to drought sensitivity, the impact of disturbances and recovery capacity.

Degraded soil can reduce forest productivity, increase erosion and lead to a loss of biodiversity. Monitoring soil condition helps to identify risks early on and informs adaptive management strategies, such as adjusting harvesting methods, reducing the impact of machinery or restoring soil. The aim of sustainable forest management is to maintain or improve soil functions so that forests can provide ecosystem services in the long term. Healthy soil is also important for storing carbon and regulating the climate. By protecting soil health, forest managers can support the long-term ecological and economic viability of forests. Therefore, soil condition is a key indicator of sustainable forest management, linking above-ground management to the integrity of the below-ground ecosystem.

How it is defined

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

Key findings

- Forest soil conditions remain stable: forest-soil pH, organic carbon and nutrient ratios show limited changes across Europe, indicating overall stability of soil conditions.
- Forest soil holds high organic carbon stocks: woodland soil averages about 88 g C kg^{-1}, confirming forests as major carbon reservoirs, although values vary regionally.

Status

Forest soil is a vital part of Europe's forest ecosystems, influencing factors such as productivity, biodiversity and carbon dynamics. It regulates water cycles, mitigates the impact of pollutants and acts as a major carbon reservoir. Continuous soil monitoring under the LUCAS and ICP Forests programmes provides the basis for tracking the condition and health of forest soils across Europe. However, due to differences in sampling depth, site selection and coverage, the datasets complement each other rather than providing a single, fully harmonised, pan-European time series.

This indicator combines harmonised soil data from the European Commission's LUCAS soil survey (2009–2018 cycles), the ICP Forests Level I and II monitoring networks (2015–2025) and new data products from the EU Horizon 2020 HoliSoils project (2020–2025). LUCAS provides harmonised topsoil (0–20 cm) data for countries covered by the survey, including physical and chemical parameters. ICP Forests adds deeper profile and deposition data for intensive forest monitoring plots. The HoliSoils project has enabled the analysis to be extended by producing 100 m-resolution maps of forest soil properties and microbial diversity, as well as harmonised monitoring protocols aligned with the forthcoming EU Soil Monitoring Law. While these initiatives strengthen the evidence base, the interpretation of the SoEF should clearly distinguish between (i) measured plot/survey data and (ii) modelled or mapped products derived from multiple inputs.

According to the 2018 LUCAS topsoil survey, forest soils in Europe remained generally acidic to slightly acidic (pH ≈ 5.1-5.8) with high concentrations of organic carbon (mean 4.8%) and low electrical conductivity. Bulk density averaged 1.27 g cm^{-3}, indicating a stable soil structure. Organic carbon and total nitrogen concentrations have remained statistically stable since 2015, suggesting equilibrium between inputs and decomposition. However, stability in averages does not preclude significant changes in sensitive soils (e.g., shallow Mediterranean soils, organic soils or erosion-prone mountain areas), particularly following fire or extreme rainfall events.

Changes and trends

Comparisons of LUCAS data from 2009, 2015 and 2018 reveal a modest recovery from historical acidification, as well as stability in organic carbon and nitrogen levels[2]. Between 2015 and 2018, the mean pH value increased by 0.02 units, while the levels of organic carbon and nitrogen remained almost unchanged. C/N ratios declined slightly, reflecting modest nitrogen enrichment likely linked to residual atmospheric deposition. This is consistent with the decline in sulphur deposition and the persistence of nitrogen inputs discussed under Indicator 2.1.

Table 2.2-1: *Trends in forest soil properties (2009–2018).*

Indicator	2009	2015	2018	Change 2015–2018	Interpretation
pH (H_2O)	5.69	5.73	5.75	+0.02	Gradual recovery from acidification
Organic C (%)	4.9	4.8	4.82	stable	Stable SOC pool
Total N (%)	0.31	0.32	0.32	stable	Persistent nitrogen inputs
C/N ratio	15.7	15.2	15.1	−0.1	Mild N enrichment
$CaCO_3$ (%)	4.5	4.5	4.6	stable	Stable buffering capacity
Bulk density	1.26	1.27	1.27	stable	Stable soil structure

Forest soil across Europe has remained stable in its chemical and physical properties during the past decade, with signs of gradual recovery from historical acidification. Across Europe, the condition of forest soil reflects strong regional and ecological gradients.

Regional patterns show the following trends.

- Northern and Atlantic Europe forest soil is generally rich in organic matter and exhibits low bulk density. Cool, moist climates favour carbon accumulation and slow decomposition, but acidification remains a concern in some podzolic soils.
- Central Europe slight increases in soil pH indicate gradual chemical recovery from historic acidification. Declining C/N ratios suggest moderate nitrogen enrichment linked to residual atmospheric deposition and intensive forest growth.

[2] https://esdac.jrc.ec.europa.eu/content/lucas-2018-topsoil-data

- Mediterranean regions forest soil is typically shallower, calcareous and low in organic carbon. Drought, erosion and fire events pose continuing risks to soil stability and nutrient retention. Areas with intensive management show localised compaction and reduced soil organic carbon (SOC) stocks.

- Boreal and mountain zones thick organic horizons and low temperatures result in large carbon stocks but also make this soil sensitive to warming, drainage and permafrost degradation. Peatland forests remain key carbon stores but are vulnerable to hydrological disturbance.

Overall, European forest soils exhibit significant spatial heterogeneity, which is driven by climate, geology, vegetation and management. These differences highlight the importance of region-specific soil monitoring and management within a pan-European framework. The upcoming LUCAS 2022 and ICP Forests surveys will improve trend detection. To enable more policy-relevant interpretation, future reports would benefit from distinguishing between (i) mineral and organic soils, (ii) disturbed and undisturbed plots, and (iii) topsoil and deeper soil layers.

Indicator 2.3 *Defoliation*

Why it is important

Defoliation, or leaf loss, is a key indicator of the health of a forest. It is often caused by insect outbreaks, diseases, drought, air pollution or other environmental stressors. While some leaf loss is a normal part of natural forest dynamics, widespread or repeated defoliation can indicate that trees are struggling to grow and are more likely to die.

Tree health in Europe is systematically assessed through annual surveys of individual tree crown conditions, which record attributes such as defoliation and signs of biotic and abiotic damage. The crown condition survey is the core activity of the Europe-wide ICP Forests monitoring system (Level I). This is based on harmonised methodologies under the UNECE Convention on Long-range Transboundary Air Pollution (Air Pollution Convention). As with SoEF 2015 and SoEF 2020, it is one of the few long-running, pan-European forest health datasets that includes consistent annual field observations.

Monitoring defoliation helps to identify problems early on, assess overall forest conditions and inform timely management responses, such as pest control, choosing suitable tree species or using adaptation strategies. In sustainable forest management, regular defoliation monitoring provides early warnings of damage. It also supports long-term resilience planning to ensure that forests remain productive and ecologically functional. Such regular assessments are often part of national forest health monitoring programmes and inform both local practices and broader policy decisions.

As defoliation is a visible sign of stress in the ecosystem, it provides a practical means of linking above-ground symptoms to the underlying causes, such as climate change or air pollution. Therefore, addressing the causes and impacts of defoliation is essential to maintaining forest vitality, protecting biodiversity, and ensuring the delivery of ecosystem services in a changing environment.

How it is defined

Defoliation of one or more main tree species on forest and OWL in each of the defoliation classes.

Key findings

- In the period from 2010 to 2024, the health of forest trees, as measured by defoliation, remained unchanged in 54.1% of the monitored plots, deteriorated in 35.6% and improved in 10.3%. Compared with the 2010–2018 sub-period used in earlier reports, a substantially higher proportion of plots showed worsening defoliation, indicating that deterioration has become more widespread in recent years.

- In 2024, 31.1% of the over 100 000 forest trees assessed were moderately to severely defoliated. This means that roughly one in three assessed trees exceeded the warning threshold (>25% defoliation), highlighting that stress signals in the crown remain common.

• Insect attacks, weather extremes and fungal diseases were the most common and widespread factors causing tree defoliation. Notably, drought-related stress and heat extremes are increasingly interacting with biotic agents (e.g., defoliators and secondary pathogens), contributing to compound impacts on crown condition.

Status

Regular monitoring of defoliation provides a valuable early warning system for assessing the response of forest ecosystems to environmental changes. Defoliation is affected by various factors, such as climatic conditions, extreme weather events, insect outbreaks, fungal infestations and the deposition and uptake of pollutants.

In 2024, 27 countries submitted defoliation data from 5 712 plots. A total of 101 564 trees comprising more than 130 species were assessed, with the 15 most frequent species accounting for 76% of the sample. While this dataset provides broad coverage of major European forest types, it is not designed to be statistically representative of all forests at a national level.

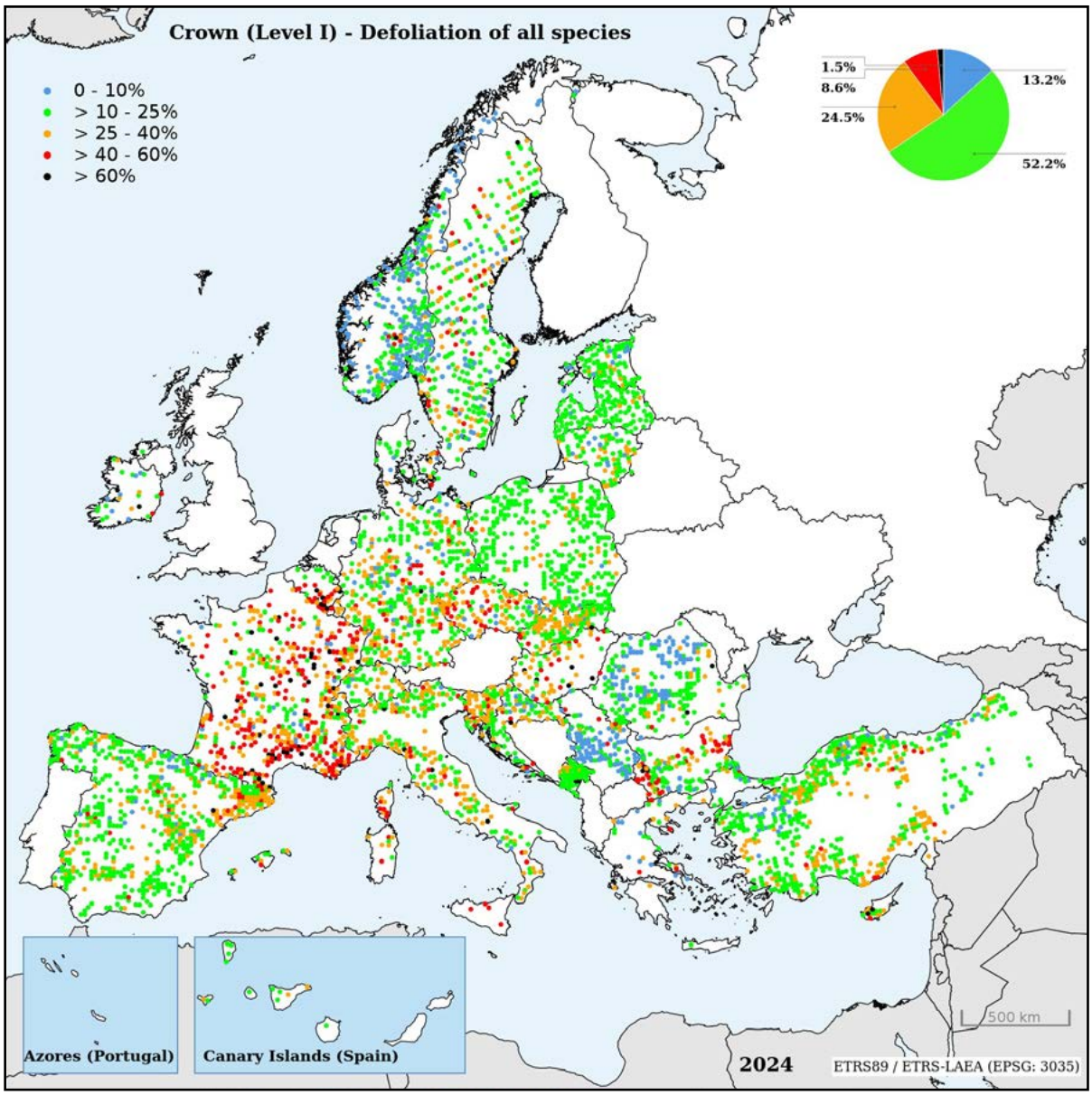


Figure 2.3-1: *Mean defoliation of trees at monitoring plots (all tree species), 2024*

In 2024, 31.1% of all assessed trees exhibited defoliation above the warning threshold of 25%, with mean defoliation above this threshold recorded on 34.6% of plots *(see Figure 2.3-1)*. Defoliation varies by region and species. High mean defoliation was mostly observed on plots in France, parts of Central Europe, and Bulgaria. Plots with low mean defoliation were mainly found in Northern Europe, as well as in Spain and Türkiye in the south. These spatial patterns are consistent with previous reports in highlighting both a north–south gradient and significant variability at country and site levels.

The main factors for crown defoliation in 2024 were insect attacks, abiotic causes (particularly drought) and fungi. During the period 2012–2023, the most significant categories of damaging agents were insects (averaging 26%), abiotic factors (16%) and fungi (11%). Defoliators, drought, and decay/root rot were the most prominent single factors within each agent group. This aligns with the SoEF 2025 emphasis on disturbance dynamics under Criterion 2, where drought and pests are reported as interacting pressures.

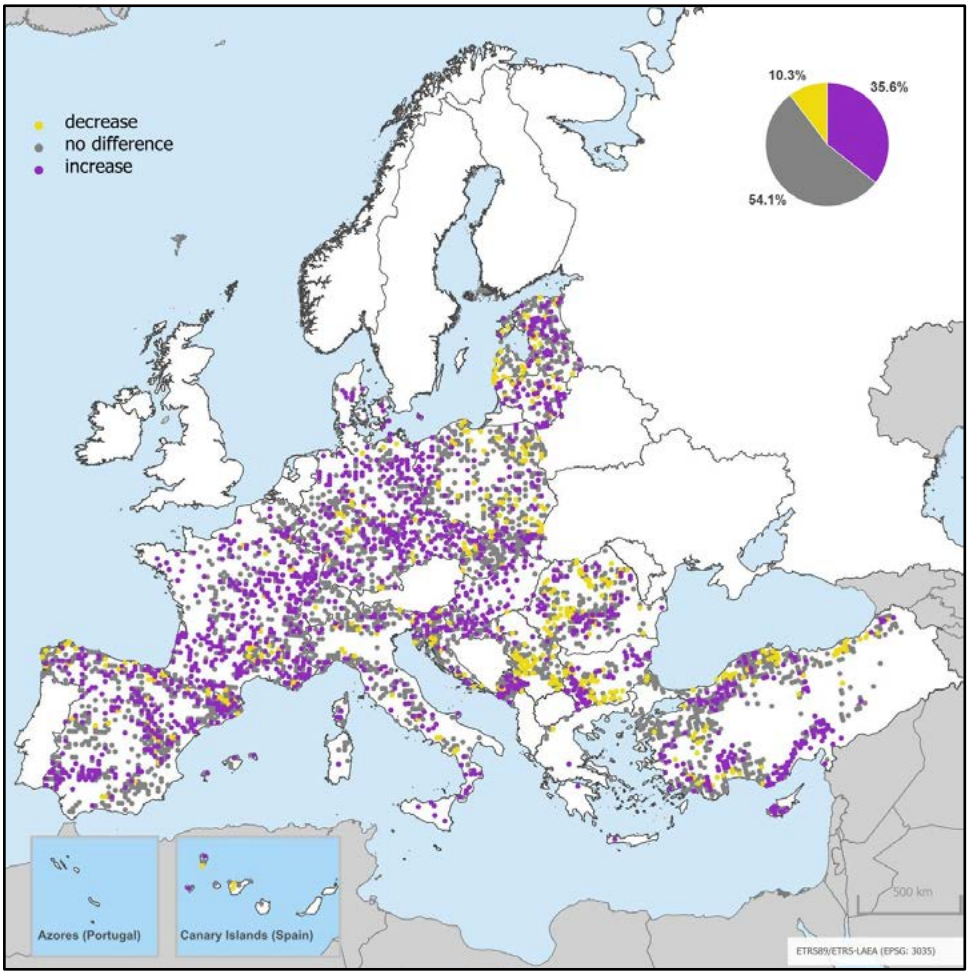


Figure 2.3-2: *Trend in mean plot defoliation of all species over the years 2010–2024*

Trends

Between 2010 and 2024, defoliation increased on 35.6% of the monitored plots and decreased on 10.3% *(see Figure 2.3-2)*. No change in defoliation was observed on 54.1% of the monitored plots. Compared to the 2010–2018 period, the percentage of plots with increasing defoliation has almost doubled, suggesting that deterioration signals have become more frequent across the monitoring network in recent years. This is consistent with the sequence of hot/dry summers and disturbance events reported elsewhere in this SoEF cycle.

Of the main tree species, temperate oaks (*Quercus robur* and *Q. petraea*) and *Quercus ilex* have exhibited the highest mean defoliation over the past three decades. While no clear defoliation trend has been observed in *Pinus sylvestris*, *Picea abies* or *Fagus sylvatica*, the health of *Quercus ilex* and *Pinus pinaster* has deteriorated since the 1990s and that of temperate oaks since 2017. These species patterns reinforce earlier SoEF findings that broadleaved oaks often exhibit consistently high crown condition stress, whereas some conifers demonstrate stronger event-driven variability linked to drought and pest dynamics.

Climatic conditions, particularly drought stress, are a key factor influencing forest health across Europe. Periods of water shortage have repeatedly resulted in higher defoliation in several tree species. These impacts can be even more pronounced at a regional level; for example, during the severe drought of 2018, early leaf senescence affected beech forests in Central and Northern Europe. The recent overall increase in mean annual defoliation indicates that trees are facing rising environmental stress. With climatic extremes projected to intensify in the coming decades, these pressures are likely to increase. Furthermore, climate change interacts with other stressors, such as soil acidification, nutrient imbalances in foliage, and the increasing presence of non-native pests and pathogens. These factors pose additional risks to the vitality and resilience of forests.

Indicator 2.4 *Forest damage*

Why it is important

Forest damage refers to the adverse impact on trees and forest ecosystems caused by biotic agents (such as pests and diseases) and abiotic factors (such as storms, drought and wildfires). Monitoring forest damage is essential for evaluating forest resilience and assessing the effectiveness of management practices. If damage becomes more frequent or severe, this may indicate that forests are under stress due to climate change, air pollution, poor forest structure or unsuitable management practices. In addition, damage is increasingly shaped by compound or cascading events (e.g., drought predisposing stands to insect outbreaks, or storms creating breeding material for bark beetles), which can lead to an increasing need for salvage logging in subsequent years, or large-scale disturbances, which may only be covered in later reporting years.

While some level of damage is natural and can even be beneficial for ecosystem dynamics, excessive or widespread damage can reduce forest productivity, lower biodiversity and limit the ability to store carbon. The aim of sustainable forest management is to minimise preventable damage through risk-informed planning, identifying problems early and adapting management responses. Assessments of forest damage also inform salvage operations, such as the clearing of damaged trees, and help to select suitable tree species and regeneration strategies. Analysing long-term trends in forest damage enable policy makers and managers to prepare for future challenges and improve forest health. Understanding and managing forest damage is essential for maintaining the long-term ecological, economic and protective functions of forests.

Earlier SoEF editions have also highlighted a core interpretive challenge, namely, that reported changes may reflect both real disturbance dynamics and differences in national monitoring systems, definitions and coverage. This remains important in SoEF 2025 because the disturbance signal is increasingly strong, while reporting systems and detection capacity are evolving at different speeds across countries (e.g., through greater use of Earth observation).

How it is defined

Forest and OWL with damage, classified by primary damaging agent (abiotic, biotic and human induced)[3].

Key findings

- Windstorms and snow, insects and diseases, wildlife (particularly large ungulates, such as deer) and grazing by domestic animals caused the most forest damage in Europe. Drought is an important enabling stressor for several of these pathways.

- Forest fire damage mostly affects the Mediterranean region while storm, wind and snow have more impact on the North, South-East and Central-East European regions. Ungulate browsing affects forests across the whole of Europe. This geographical pattern is consistent with earlier SoEF editions. However, recent years also stress that severe fire seasons can occur beyond the traditional hotspots, including in parts of Central and South-Eastern Europe, and in several non-EU FOREST EUROPE members.

- New forms of monitoring, reporting and verification (MRV) of forest damage are currently lacking to perform a clearer and more detailed analysis. Earlier SoEF editions also concluded that trend interpretation is constrained by uneven country coverage and inconsistent time series. A SoEF-2025-relevant development is the increased use of rapid satellite-based mapping and pan-regional services (e.g., EFFIS/GWIS for fires)

[3] *Reporting may be affected by differences in whether damage is recorded as an "affected area" in a given year or as a condition over multiple years.*

• Compared with previous editions of the SoEF, there is a stronger emphasis on the dynamics of compound or cascading disturbances (e.g., droughts followed by outbreaks of bark beetles) and on the need to link disturbance reporting more directly to resilience and recovery planning. Recent literature also indicates that the 2018–2022 heat and drought sequence generated persistent disturbance impacts over multiple years in several regions.

Status

Damaged forest area

Multiple damaging agents can simultaneously affect forests for example, insect outbreaks frequently occur after storms, droughts or wildfire events. Therefore, and in order to prevent double counting, reporting countries supplied both the total forest area affected by damage and the areas attributed to individual agents.

A total of 38 countries (covering 98% of Europe's forest area) supplied information on the total damaged forest area *(Table 2.4-1)*. Based on this data, about 2.1% of total forest area is affected by some type of damage.

Three countries, namely Portugal (33.8%), Croatia (19.4%) and the Republic of Moldova (19%), reported the highest proportions of damaged forests. This was followed by Ireland (8.5%), Switzerland (6.6%), Denmark (6%), Spain and Czechia (5%). In the remaining 30 countries, the share of damaged forests ranged from 3.5% (Austria) to below 0.1% (Latvia, North Macedonia).

A key difference compared with SoEF 2020 is the far higher overall data coverage in the current dataset,

Table 2.4-1: *Forest area with damage, by region, (2020)*

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	954.0	1.3
Central-West Europe	590.9	1.5
Central-East Europe	407.4	1.1
South-West Europe	2 225.7	7.0
South-East Europe	514.2	1.3
EU-27	***3 784.9***	***2.4***
Europe	***4 692.2***	***2.1***

Note: Data coverage as % of regional forest area: NE 100%, C-WE 90%, C-EE 91%, S-WE 99.9%, S-EE 89%, EU-27 97.1%, Europe 98%.

which is close to the full European forest area. This supports more robust regional comparisons, even though coverage still varies..

Insects and diseases

Heavy attacks by insects and pathogens - including bacteria, viruses and fungi can severely weaken forest ecosystems and cause major economic losses. Insects and micro-organisms are highly sensitive to climate change, with visible damage symptoms persisting for several years. Wind damage and drought often trigger mass bark beetle outbreaks, as seen in 2020, 2021 and 2022. In parts of Central Europe, studies indicate that the impacts of drought-driven bark beetle infestations persisted for multiple years and were closely linked to high levels of salvage felling. This illustrates how disturbance processes can influence both damage area indicators and harvest statistics.

A total of 27 countries (representing 90% of Europe's forest area) provided information on forest area damaged by insects and diseases *(Table 2.4-2)*. The highest proportions of forest area damaged by insects and diseases were recorded in Portugal (27.7%), Croatia (11.9%), Spain (4.0%) and Austria (3.0%). Across reporting countries, 1.5% of

Table 2.4-2: *Area of forests damaged by insects and diseases, by region, 2020.*

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	253.4	0.4
Central-West Europe	317.6	0.8
Central-East Europe	231.7	1.6
South-West Europe	1 771.7	5.6
South-East Europe	295.2	0.9
EU-27	***2 644.4***	***1.9***
Europe	***2 869.6***	***1.5***

Note: Data coverage as % of regional forest area: NE 100%, C-WE 99.9%, C-EE 80.5%, S-WE 99.9%, S-EE 77.5%, EU-27 89%, Europe 90%

forest area was reported as affected in 2020 *(Table 2.4-2)*. Regionally, the share ranges from 5.6% in South-West Europe to 0.4% in Northern Europe. Interpreting trends should be approached with caution. While earlier SoEF editions noted that trend interpretation is sensitive to coverage and definitions, the current period highlights renewed and locally severe outbreaks. These are partly linked to drought stress and storm legacies, and partly a reflection of improved detection and reporting. Research also indicates that disturbance damage from wind and insects has increased over recent decades and can affect carbon storage, reinforcing the need to connect damage reporting with resilience and carbon outcomes.

Wildlife and grazing

Forests provide habitat for a wide range of wildlife species. However, when populations of certain herbivores increase substantially, browsing can impede forest regeneration, decreasing tree-species diversity and requiring expensive protective measures. Grazing by domestic animals is not regarded a widespread problem.

A total of 19 countries (representing about 39% of Europe's forest area) supplied information on damage from wildlife and grazing,. The highest proportions of forest area affected in those countries were reported in Northern Europe (0.2%), and the lowest in South-East Europe (0.01%).

Compared to the SoEF 2020 data, these figures suggest that monitoring and reporting on the impact of wildlife remains underdeveloped and requires further attention. This limitation has persisted across multiple SoEF cycles and remains a significant obstacle to comparability across Europe. Given the policy relevance of successful regeneration under climate stress and disturbance, improving consistent reporting on browsing pressure would strengthen the interpretability of forest recovery pathways in the 2025 SoEF.

Forest fires

While forest fires are most frequent and severe in the Mediterranean region, they are also increasing across Europe. Uncontrolled large-scale wildfires can have devastating impacts on ecosystems, cause soil erosion, desertification and loss of property and life, and result in substantial economic costs. Recent evidence also points to longer fire seasons and more frequent extremes under hotter and drier conditions, increasing the importance of prevention and risk management.

A total of 36 countries (representing about 94% of Europe's forest area) provided information on forest fires. Fires affected about 0.1% of forest area, corresponding to 242 320 ha in Europe and 121 090 ha in the EU-27 *(Table 2.4-3)*. The largest burnt areas were in South-West Europe (80 900 ha) and Central-East Europe (91 000 ha), together accounting for more than 70% of the total fire-affected area.

Table 2.4-3: *Area of forests damaged by forest fires, by region, 2020.*

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	2.1	0.0
Central-West Europe	12.3	0.0
Central-East Europe	91.0	0.2
South-West Europe	80.9	0.3
South-East Europe	56.1	0.1
EU-27	***121.1***	***0.1***
Europe	***242.3***	***0.1***

Note: Data coverage as % of regional forest area: NE 83%, C-WE 2%, C-EE 32%, S-WE 29%, S-EE 13%, EU-27 46%, Europe 39%

While Southern Europe continues to be a major hot spot for forest fires, their occurrence has also become more frequent in regions once considered low risk. Exceptionally hot and dry summers in recent years have intensified fires and prolonged of the fire seasons across the continent.

The European Forest Fire Information System (EFFIS), established by the European Commission in cooperation with national fire administrations, provides up-to-date data and analysis to support forest-fire protection in the EU and neighbouring countries. According to EFFIS, the 2024 fire season was highly variable across Europe, with significant impacts in several regions of the Mediterranean and Southeastern Europe. The EU's Joint Research Centre's annual forest fire report (based on EFFIS) recorded a total burnt area of 383 317 hectares in 2024 (8 343 fires), which is slightly above the long-term average.

It should be noted that there is a systematic difference in assessment of area compared to the standard FOREST EUROPE reporting, as EFFIS is based on real-time satellite data. EFFIS reporting also covers several non-EU countries in the wider European region, including a number of FOREST EUROPE members and observers. In 2024, the most affected non-EU countries participating in the EU Civil Protection Mechanism were Albania, Bosnia and Herzegovina, North Macedonia, Türkiye and Ukraine, demonstrating that severe fire seasons are not confined to the EU and that their impact can extend across the wider FOREST EUROPE reporting area.

Preliminary EFFIS indicators suggest that 2025 was an exceptionally severe year for fires in parts of Europe. By late August, more than 1 million hectares had burned in the EU alone, exceeding the previous record since EFFIS records began in 2006. While the most extensive burned areas were recorded in south-western Europe (notably in Spain and Portugal), large-scale fires were also reported in other parts of Europe, including in Central and South-Eastern Europe and the Mediterranean basin.

While these statistics provide useful context on the scale of recent fire seasons across Europe, they are not directly comparable to FOREST EUROPE reporting *(Table 2.4-4)* due to differences in definitions, spatial coverage, and assessment methods (e.g., satellite rapid mapping versus national reporting).

Storms, wind and snow

Windstorms and heavy snowfalls can severely damage forests, leading to major economic losses and long-term impacts on forest structure, landscape quality and biodiversity. Such events often trigger subsequent bark-beetle infestations.

A total of 26 countries (representing about 85% of Europe's forest area) reported related data. In Europe, about 950 000 ha (0.5% of forest area in reporting countries) were affected by storms,

Table 2.4-4: *Area of forests damaged by storm, wind and snow, by region, 2020.*

Region	Forest area with damage	Percent of total forest area
	1 000 ha	%
North Europe	364.7	0.5
Central-West Europe	197.8	0.6
Central-East Europe	64.2	0.2
South-West Europe	207.8	0.7
South-East Europe	115.3	0.3
EU-27	***734.6***	***0.5***
Europe	***949.8***	***0.5***

Note: Data coverage as % of regional forest area: NE 100%, C-WE 87%, C-EE 58%, S-WE 99.9%, S-EE 77%, EU-27 92%, Europe 85%

wind and snow *(Table 2.4-4)*. The regions most affected were Central-West and South-West Europe. Nationally, the largest proportions of damaged forest area were in Switzerland (4.4%), Croatia (3.3%), Denmark (2.8%) and Hungary (1.2%). In most countries, less than 1% of forest area was affected.

Given the peaks in storm damage in Central Europe in 2018 and 2019, the current reporting system is not satisfactory. New monitoring, reporting and verification systems are needed to better understand primary and secondary causes of damage (for example, bark beetle infestations after large storm events) and to facilitate clearer analysis. This includes the ability to distinguish physical damage (wind/snow) from delayed mortality (insects/diseases) and to track recovery after disturbances.

Human-induced damage

Human-induced damage can arise from activities such as forest management operations, recreational use, pollution and other human activities. For example, logging and the construction of forest roads can temporarily weaken stand stability or degrade soil quality, while intensive tourism can lead to erosion, littering and vandalism. However, quantitative reporting on human-induced damage remains limited and inconsistent across countries. Furthermore, differences in national definitions, monitoring practices and thresholds for what constitutes damage mean that low reported values may reflect under-reporting rather than low real-world impact.

Trends

Because of limited reporting for 1990, trend analyses start from 2000. No consistent overall trend could be identified in the extent of forest areas affected by different damaging agents between 2000 and 2020, mainly due to varying country coverage *(Figure 2.4-1)*. This is consistent with earlier SoEF editions, which flagged that shifting participation and unregular reporting can create apparent trends that are artefacts of coverage.

Trends were evaluated only for those damaging agents with continuous data covering at least 20% of Europe's forest area: insects and diseases, wind and snow and forest fires. Results represent only part of the actual situation and may be overly influenced by data from individual countries. They should therefore not be extrapolated to all European forests. This constraint has been consistent across previous SoEF 2015 and SoEF 2020 editions.

Areas affected by insects have expanded significantly: in 2020 the reported damaged area was nearly three times higher than in 2000, with increases recorded for Portugal, Germany, Croatia, Spain, Czechia and Ukraine, while decreases

were noted in Bulgaria, Hungary, Lithuania and Türkiye. Data for 2000–2020 shows that the forest area affected by fires decreased slightly between 2005 and 2010, followed by a minor increase up to 2020.

Areas affected by diseases show similar dynamics, rising from 323 000 ha in 2000 to 1.1 million ha in 2020, with Portugal, Spain, Germany and Austria most affected. This may be partly explained by more comprehensive reporting. The area damaged by wind and snow increased slightly by 2010, based on data from Norway, Germany, Spain, Finland and Sweden.

These observations illustrate how the frequency and intensity of damaging events vary across regions and over time, emphasising the importance of continued harmonised monitoring of forest disturbances in Europe. Overall, there is clear evidence that reporting on forest damage requires substantial revision. A pilot project by UNECE gives an overview of ways forward[4].

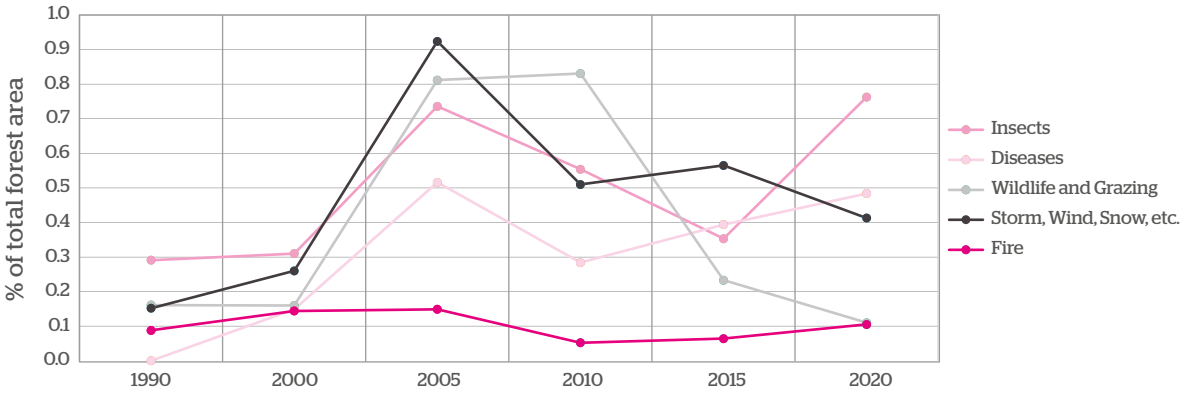


Figure 2.4-1: *Trends in damaged forest area by agents, 1990–2020*

[4] https://unece.org/info/Forests/pub/391138

Indicator 2.5 *Forest land degradation*

Why it is important

Forest land degradation refers to the long-term decline in the health, productivity, and ecological functions of forest ecosystems. This can be caused by harmful activities such as unsustainable logging, overgrazing, wildfires, pollution, soil erosion and inappropriate land use. Degraded forests are often characterised by reduced canopy cover, loss of biodiversity, declining soil fertility, and diminished capacity to regulate water. In practice, degradation can also occur without obvious canopy loss, for instance due to repeated disturbances, soil compaction or persistent regeneration failure.

Monitoring forest degradation is crucial for identifying early signs of ecosystem decline and for informing restoration efforts. Forest land degradation undermines efforts to mitigate climate change, disrupts people's livelihoods and reduces the provision of ecosystem services. Sustainable forest management seeks to prevent degradation by promoting practices that maintain or enhance forest vitality, such as controlled harvesting, planting new trees and protecting the soil. As degradation is usually a gradual process, it is closely linked to the concept of resilience and the cumulative effects of the pressures highlighted under Criterion 2 (Indicators 2.1–2.4).

How it is defined

Trends in forest land degradation.

Key findings

- Forest land degradation can be assessed in two ways: Either the number and intensity of relevant land degradation processes are evaluated, or the extent of the land area degraded as a result of these processes is evaluated. Forestry can help to restore previously degraded forests and other land, thereby reducing the area affected by land degradation. In practice, countries use a combination of proxy signals (e.g., erosion risk, repeated fires and persistent low regeneration) and qualitative judgement, which makes comparability difficult.

- The current pan-European reporting does not yet provide consistent enough definitions, time series or spatial coverage to support robust quantitative assessments or comparable trend reporting for this indicator.

This indicator was developed and implemented as part of a pilot study conducted for the publication of SoEF 2020. Forest land degradation is defined as a reduction in, or loss of, the biological or economic productivity and structural complexity of forests, resulting from land use or one or more processes, including those arising directly or indirectly from human activity. Forest land degradation describes a process of change that negatively affects forest functions. This interpretive framework aligns with previous SoEF reporting, which emphasised that degradation is multidimensional and cannot be captured by a single metric without agreed operational definitions.

These processes may include:

- Soil erosion caused by wind and/or water

- Deterioration of the physical, chemical and biological properties of soils

- Long-term loss of natural vegetation or permanent modification toward more regressive stages.

The change is driven by disturbances that differ in terms of their type, scale, impact, severity, cause and frequency. These disturbances can be: (1) natural, such as wildfires, strong winds, droughts and massive erosion, (2) human-induced, such as overexploitation, forest pasture exceeding its carrying capacity, mining and inappropriate land use, or (3) a combination of both. Indirect causes, such as chemical or nuclear contamination, long-range transboundary air pollution, exposure to ammunition, and changes in site conditions, can also contribute to degradation.

Forest land degradation can have serious environmental, social and economic consequences, reducing the production of goods such as wood and biomass, and reducing the provision of services such as soil protection, water regulation and biological diversity. Perceptions of forest land degradation vary depending on the underlying drivers of degradation and the most concerning goods and services.

This new forest land degradation indicator was added to the updated pan-European set of indicators just before the publication of the 2020 report, when limited information was available at the national level. This situation has not yet changed, but there is an ongoing effort within the FAO to collect countries' definitions of forest land degradation. In addition, assessment methods for monitoring forest degradation have been collected. In the context of Europe, seven countries covering 14 657 hectares reported national definitions of forest degradation for the 2025 FRA report. While these FRA results provide useful contextual evidence that definitions and monitoring approaches are still emerging, they are not yet sufficient to derive a pan-European trend estimate.

Further work is needed to assess this indicator. Priority areas include: (i) agreeing on the operational minimum criteria for what constitutes "degradation" of forest land, as distinct from "disturbance" and "recovery", (ii) establishing a minimum reporting set, e.g., regeneration failure, persistent canopy loss, erosion/soil loss, repeated high-severity fire and long-term productivity loss, (iii) improving the linkage between national monitoring systems, remote sensing products and field-based assessments, to enable comparable reporting over time.

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

Key findings

Most European countries report having policy frameworks in place to maintain and improve forest health and vitality. These frameworks are usually incorporated into national forestry legislation, programmes and broader environmental strategies. The policies focus on preventing and mitigating damage to forests caused by biotic and abiotic agents, promoting adaptive management, and supporting monitoring systems. Many countries also emphasise the importance of stronger links to climate adaptation and to disturbance response capacity (e.g., in the event of drought, storms, pests, or fire). This mirrors the direction already noted in earlier SoEFs, with increasing emphasis on compound and cascading risks.

While institutional and legislative frameworks are generally well established, many countries report increasing challenges related to climate change, forest disturbances, and insufficient financial resources for effective implementation. Several countries also emphasise the need to strengthen monitoring and early warning systems, as well as coordination across responsible institutions. As in earlier SoEF reporting, comparability depends on harmonised methods and sustained monitoring over time.

Policy objectives

Of the 31 countries that reported, 27 defined specific policy objectives under this criterion. Common goals include preventing and controlling forest damage, conserving forest health, and enhancing forest resilience against pests, diseases, and climatic stress. Objectives are increasingly framed in terms of risk reduction, preparedness, recovery, and prevention. Several countries also frame objectives explicitly in relation to resilience building under climate change, reflecting the growing frequency of disturbance events reported since SoEF 2015 and SoEF 2020.

Policy objectives often emphasise the importance of maintaining ecosystem functions, biodiversity and soil and water protection. Many countries also integrate forest health policies with frameworks for climate adaptation, biodiversity conservation, and disaster risk reduction.

Germany, Austria and Finland, for example, have incorporated forest health policy objectives into national climate adaptation plans. At the same

time, Italy, France and Portugal have included them in national wildfire prevention and forest protection programmes. In Central and Eastern European countries such as Poland, Slovakia and the Czech Republic, policy priorities focus on pest monitoring and forest regeneration following large-scale disturbances. This continued regional differentiation—fire risk in parts of the Mediterranean and disturbance-driven mortality in parts of Central Europe—has been a recurring theme in earlier SoEFs.

Institutional measures and policy tools

Twenty-seven countries reported institutional measures and policy tools under this criterion, including legal, financial, and administrative instruments. These measures are usually implemented via national forest protection frameworks, national monitoring systems and targeted prevention and restoration programmes. In several countries, these tools are complemented by measures to strengthen preparedness and response capacity, including coordination arrangements and operational protocols for large-scale events.

Commonly reported instruments include:

- National forest health monitoring and early warning systems (often linked to ICP Forests).
- Pest and disease surveillance and response measures.
- Fire prevention, preparedness and post-fire restoration programmes (especially in Mediterranean countries).
- Support schemes for restoration and reforestation following disturbance events.
- Guidance and training to promote adaptive silviculture and species diversification

Several countries also report investments in data systems and harmonisation to strengthen consistent reporting and comparability across monitoring networks. Where relevant, these investments also support alignment between forest monitoring and wider environmental reporting needs, including cross-agency data sharing and method documentation.

Achievements

Twenty countries reported notable achievements in forest protection and health management. These included enhanced forest monitoring, improved institutional coordination, and the implementation of preventive measures against major sources of damage.

Many countries emphasise the benefits of long-term monitoring under the ICP Forests programme, which has improved understanding of forest conditions and environmental pressures. Germany, France, and Switzerland reported substantial progress in reducing air pollution and restoring soil. Meanwhile, Finland, Estonia and Sweden have made significant progress in integrated pest and disease control. These types of achievements are consistent with earlier SoEFs, which also highlighted monitoring networks and emission reductions as enabling conditions for forest vitality.

Forest fire prevention systems have been reinforced throughout the Mediterranean region, where improved early warning systems and risk mapping have reduced the average annual burnt area. Portugal, Spain, Italy and Greece have all made progress in terms of prevention capacity, training and post-fire restoration. In practice, strengthened preparedness can include measures that combine risk mapping, early warning, training, and coordinated prevention and restoration planning.

In Central Europe, the Czech Republic, Germany and Austria have initiated large-scale reforestation and forest transformation programmes to restore areas affected by bark beetle outbreaks. Meanwhile, Poland and Slovakia have strengthened national monitoring networks to improve the early detection and assessment of forest health.

Overall, these achievements point to more robust institutional frameworks, increased public awareness, and enhanced technical capacity to manage forest health challenges. Several countries also highlight improved data quality

and expanded monitoring coverage as significant accomplishments, as they facilitate more reliable trend analysis over time. This is also relevant for maintaining consistency with earlier SoEF reporting cycles, where sustained monitoring is essential for interpreting trends rather than single-year conditions.

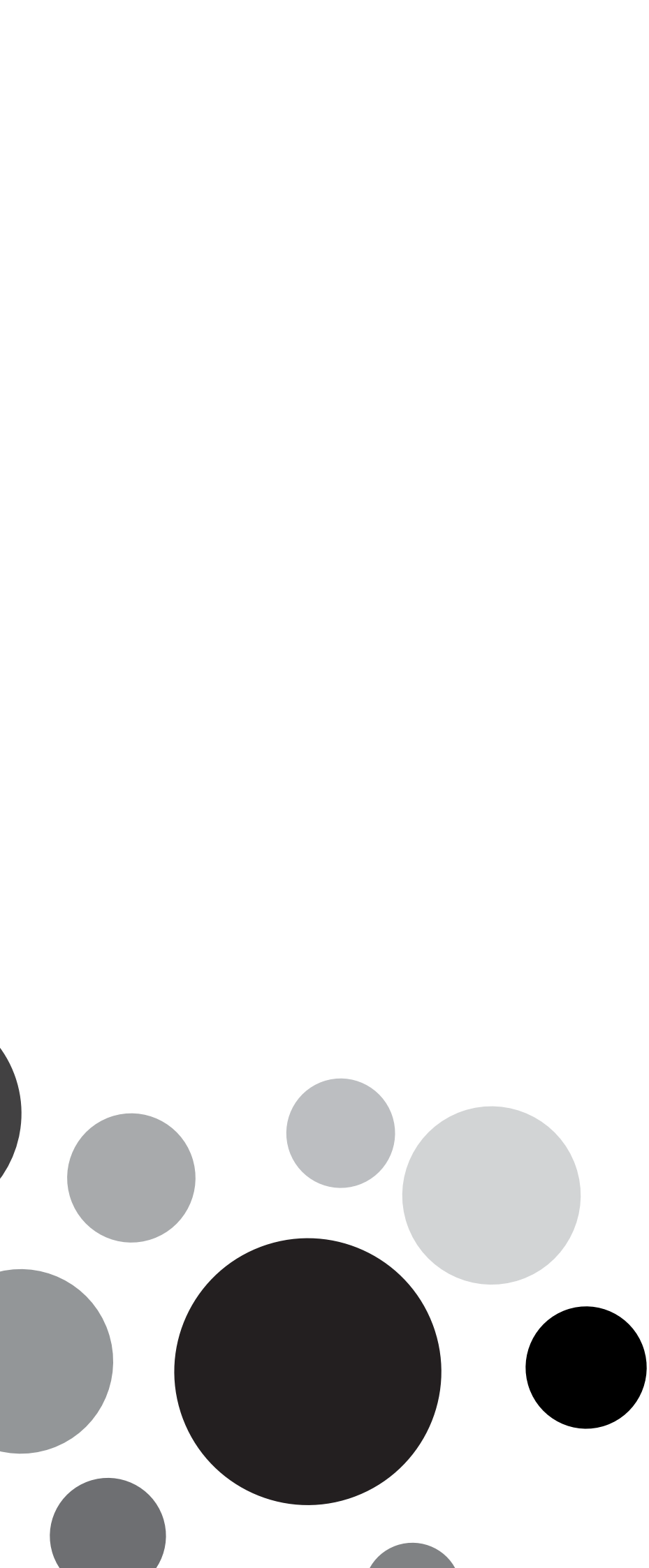
Challenges

Most countries identified major challenges in maintaining and improving forest health. The most frequently reported issue was the increasing frequency and intensity of climate-driven disturbances, such as droughts, heatwaves, storms, wildfires and pest outbreaks. Countries emphasised that these disturbances can interact and have a cascading effect (e.g. drought stress can increase susceptibility to pests), creating new risk profiles. This interaction of stressors has been increasingly emphasised since SoEF 2020, and recent reporting suggests it is becoming more widespread.

Financial and technical limitations remain significant barriers to implementing preventive and restorative measures. In many regions, fragmented forest ownership and limited management capacity hinder coordinated responses to large-scale damage.

In Central Europe, extensive bark beetle outbreaks and difficulties in forest regeneration following disturbances are reported as key concerns. Southern Europe continues to face persistent threats from forest fires, drought and desertification, while windstorms and increased browsing pressure are emerging challenges in Northern Europe.

Several countries also note that, despite progress, monitoring and early warning systems require further expansion and harmonisation. Enhanced cooperation between forestry, agriculture and environmental institutions, alongside improved access to EU funding, is considered vital for maintaining the vitality of forest ecosystems in the coming decades. In addition, differences in monitoring design and national reporting practices can affect comparability across countries.



Criterion 3

Criterion 3:

Maintenance *and* ***Encouragement*** *of* ***Productive Functions*** *of* ***Forests*** *(Wood and Non-Wood)*

Forests play a central role in the bioeconomy by providing a sustained supply of wood and non-wood products through sustainable management. Supporting and maintaining these productive functions contributes to economic development while safeguarding forest integrity. Practices such as sustainable harvesting, effective regeneration and investment in forest infrastructure are key to ensuring long-term forest productivity. Non-wood forest products also support local livelihoods and cultural values. Achieving a balance between production and conservation is essential for sustaining ecosystem services. Reliable data on forest outputs together with the recognition of multiple functions of forests underpin the efficient and responsible use of forest resources.

The maintenance and encouragement of productions forest functions is assessed with regards to 1) increment and fellings, (2) roundwood, (3) non-wood goods, and (4) services.

Indicator 3.1 *Increment and fellings*

Why it is important

The ratio of increment to fellings reflects the balance between the two, helping to evaluate the sustainability of forest use and ensuring that future generations can benefit from forest resources. When the ratio is above one, more forest is growing than is being removed, providing a sustainable or expanding resource base. In the current reporting cycle, this indicator is increasingly being used to understand the impact of disturbances and management responses on the growth-removal balance over time.

If more trees are cut down then can grow back, this could be intentional, for example, to reduce forest density in areas with a high standing volume. Alternatively, it could be due to severe damage from storms, pests, diseases, or wildfires. However, it may also indicate overharvesting and long-term forest degradation, for instance, through increased salvage logging. As noted in 2015 and 2020 in the published SoEF reports, market volatility and accumulated growing-stock surpluses can lead to periods of higher felling without undermining medium-term sustainability. However, the scope for such buffer use is more limited where the increment weakens or disturbances recur.

In Europe, many forests are reaching maturity, and their growth is slowing. Their age structure, therefore, indicates that overall accumulation is approaching saturation. This could mean that stable utilisation rates conceal underlying changes, such as slower growth, higher natural losses and increased salvage logging. High ratios may also indicate underuse, which can affect forest health due to ageing or overcrowding. In sustainably managed forests, the aim is to maintain or improve forest conditions while allowing for economic use by keeping a balanced ratio.

This metric (increment and fellings) helps countries with their national forest accounting, meeting their climate goals and planning their wood supply. It informs decisions regarding harvesting levels, forest regeneration and silvicultural practices. As such, it is a central element of sustainable forest management, linking ecological integrity with resource use. However, because the ratio can be temporarily affected by disturbance-related felling and reduced increment, it should be interpreted alongside information on natural losses, disturbances, and changes in growing stock. This is particularly the case when salvage fellings increase, and net increment simultaneously declines.

How it is defined

Balance between net annual increment (NAI) and annual fellings of wood on forest available for wood supply (FAWS).

Key findings

- Wood resources in European forests continue to be used sustainably annual fellings amount to around 81% of the NAI. Despite increased harvesting, timber stocks continue to grow, confirming that Europe's forests maintain a positive wood balance and provide a renewable supply of raw materials. While the overall balance remains positive, the margin has narrowed compared to previous reporting periods. Short-term usage peaks in certain countries are increasingly associated with disturbance-related fellings. This continues the upward trajectory observed in earlier editions: the published SoEF 2015 reported a Europe-wide felling rate below 100% (approximately two-thirds of the NAI for the reporting set), while published SoEF 2020 reported a higher utilisation level for 2015 (approximately three-quarters of the NAI for the reporting set). Therefore, the 2020 reference year indicates a further tightening of the balance.

- Between 1990 and 2020, wood increment and harvest volumes rose substantially by around 22% and 52%, respectively. NAI utilisation increased from around 60% to 81% across Europe, with the highest rates in Northern and Central-West Europe. This reflects an intensification of forest use across most regions while remaining sustainable. Therefore, the long-term trend points to higher utilisation of increment, while recent years emphasise the

importance of distinguishing between planned and salvage fellings, and of considering the effects of disturbances on increment. This also builds on earlier SoEF findings that fellings have increased continuously since the 1990s. At the same time, the pace of change varied across sub-periods (with slower increases in some regions during 2005–2010, and stronger increases thereafter).

- Additionally, total wood removals reported in FRA 2025 based on FAOSTAT suggest that the 2020 peak was not sustained in subsequent years (2021–2023), providing additional context beyond 2020. This supports the interpretation of 2020 as a short-term high point rather than a new steady state.

Status

Although the ratio of increment to fellings is a classic indicator of sustainability, it is also complex. In the long term, fellings should not exceed increment; however, in the short to medium term, other interpretations may apply. For example, salvage logging to offset natural losses is currently included in annual fellings, while simultaneously reducing the net annual increment. Consequently, salvage logging leads to high utilisation rates in the short term. When the volume of salvage logging represents a significant proportion of the net increment, this bias can be substantial. This is particularly relevant where drought, storms, and bark-beetle outbreaks have increased natural losses and triggered high levels of salvage felling.

A total of 25 countries reported data on both NAI and fellings for 2020, covering approximately 83% of the forest area in the EU-27 and 78% in Europe. The percentage of FAWS covered by countries reporting on indicator 3.1 varied by region, ranging from 46% in Central and Eastern Europe to almost 99% in Central and Western Europe. Regional differences in coverage should therefore be considered when interpreting regional utilisation rates.

Salvage logging of natural losses is included in annual fellings while at the same time it reduces the

Table 3.1-1: *Net annual increment and fellings, by region, 2020*

Region	NAI		Fellings		Utilisation rate
	1 000 m³	*m³/ha*	*1 000 m3*	*m³/ha*	*%*
North Europe	230 097	4.5	219 990	4.3	95.6
Central-West Europe	244 974	6.9	206 802	5.8	84.4
Central-East Europe	49 918	7.7	40 931	6.3	82.0
South-West Europe	78 862	3.1	30 275	1.2	38.4
South-East Europe	78 175	4.5	52 364	3.0	67.0
EU-27	***582 190***	***5.2***	***531 732***	***4.7***	***91.3***
Europe	***682 026***	***5.0***	***550 363***	***4.0***	***80.7***

Note: Data coverage as % of regional area of FAWS: NE 94%, C-WE 99%, C-EE 46%, S-WE 92%, S-EE 75%, EU-27 83%, Europe 78%. Germany and Czech Republic used data for all forests.

reported net annual increment. Thus, when salvage logging occur, comparisons between net annual increment and total fellings can be biased and the utilisation rate overestimated. Countries also use different bases for calculating fellings in relation to increment, some use all forest land, while others use only forest available for wood supply.

In 2020, the NAI in European FAWS totaled 682 million m³, ranging from 49.9 million m³ in Central-East Europe to over 245 million m³ in Central-West Europe *(Table 3.1-1)*. At the country level, the highest NAI was observed in Germany (101.5 million m³), Sweden (89.4 million m³), and Finland (92.6 million m³). The highest NAI per hectare was reported in Central-East Europe (7.7 m³/ha), while the lowest was noted in South-West Europe (3.1 m³/ha).

Fellings reported for 2020 totaled 550.4 million m³ across Europe. The largest volume was recorded in Northern Europe (220 million m³), followed by Central-West Europe (206.8 million m³). In several countries, fellings during this period were influenced by salvage operations following windstorms, droughts, and pest outbreaks.

Figure 3.1-1 shows a comparison of NAI and fellings. Based on the reported data, 81% of NAI in Europe is utilised by fellings. The highest utilisation rates were recorded in Estonia (131%), Belgium (108%), Sweden (105.9%), Germany (100.3%), the Czech Republic (97.5%), Switzerland (95.2%), Austria (91.7%) and Finland (90.6%). In all other countries, utilisation rates were below 90%. The lowest utilisation rates were reported in Iceland (5.6%), Italy (33.4%), Serbia (39.4%) and Spain (42.4%). Utilisation rates above 100% should be interpreted with caution, as they may reflect short-term disturbance-related salvage felling combined with reduced increment.

Over the past decade, several countries in Northern and Central Europe have experienced severe storms and droughts, which bark beetle infestations have often followed. These disturbances have resulted in significant natural losses and subsequent salvage logging, as well as reductions in net aboveground biomass. In addition, increment has been underutilised for decades in some countries due to harvesting restrictions, resulting in overmature stands with large growing stocks ageing. Under these conditions, utilisation rates exceeding 100% may still represent sustainable management. Some countries have achieved high utilisation rates while maintaining exceptionally high growing stocks. However, where repeated disturbances drive high utilisation, the ratio should be interpreted alongside information on regeneration success and changes in growing stock to avoid misinterpreting single-year values. The published SoEF 2015 report already highlighted that additional timber mobilisation could be possible in many reporting countries while remaining within sustainable limits. The current reports suggest that this potential varies more strongly across regions and is increasingly shaped by the impact of disturbances and growth constraints.

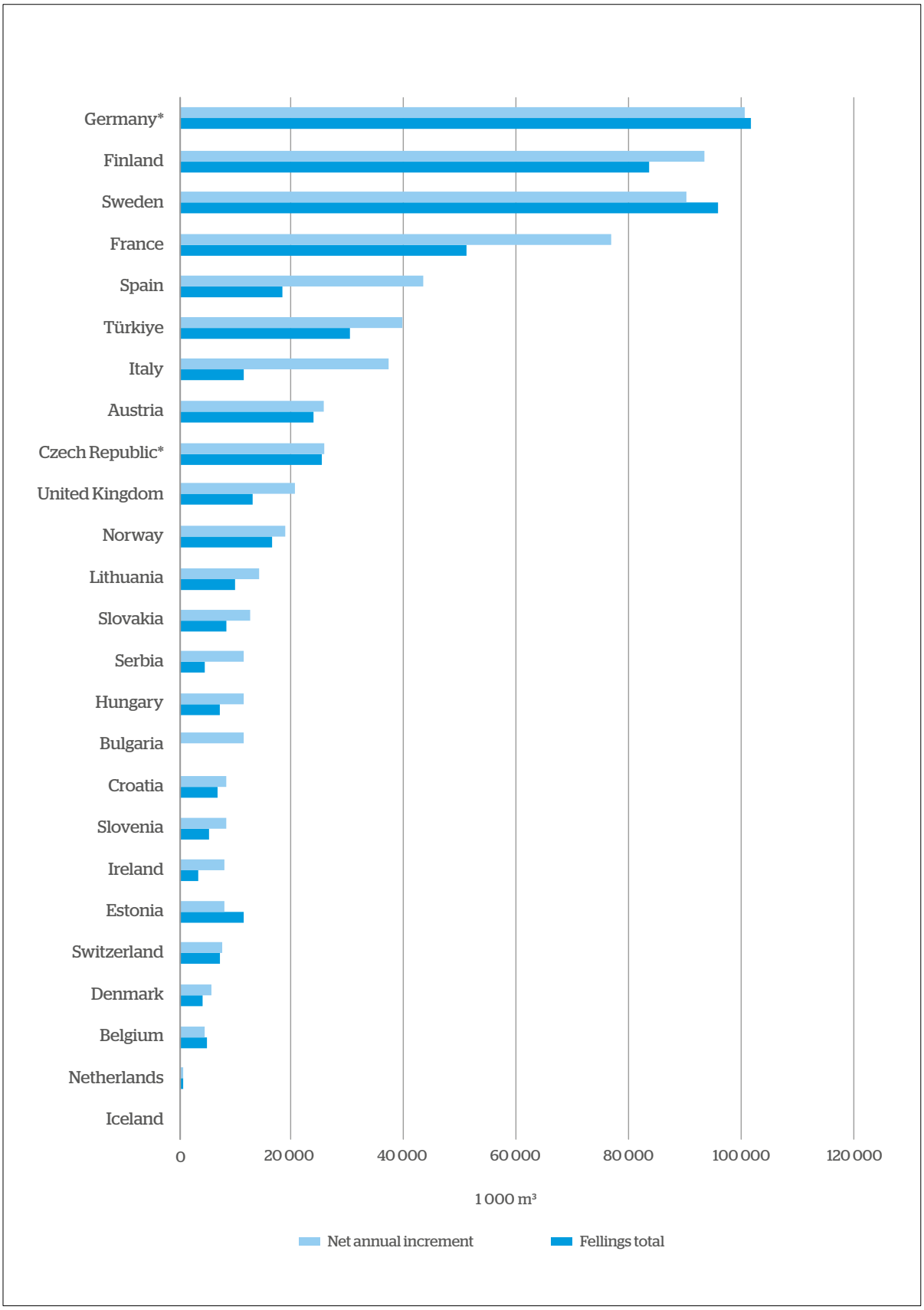


Figure 3.1-1: *Annual fellings and net annual increment, by countries, 2020 (* information provided for all forests)*

Germany and Czech Republic used data for all forests regarding net annual increment.

Trends

This NAI trend analysis is based on data from countries that reported a complete time series for the period 1990–2020. Of these countries, seventeen provided information on NAI and sixteen on fellings.

In these countries, NAI increased by almost two million m³ per year in all regions between 1990 and 2020. However, NAI declined slightly across Europe as a whole between 2010 and 2020, at an average annual rate of 0.3%. The strongest increase occurred in South-East Europe, where NAI grew by an annual average of 1.4% between 1990 and 2020. There was considerable variability among countries: in absolute terms, Serbia reported the largest increase in total NAI, nearly doubling it over the period. Despite the overall positive trend, some countries – notably Estonia, Belgium, Norway and the Netherlands – showed a slight decline in NAI over the entire reporting period. This highlights that changes in utilisation rates can result from either increased felling or reduced growth.

Utilisation of NAI in European forests has increased consistently since 1990, although regional trends differ. At the pan-European level, the average utilisation rate increased from approximately 60% in 1990 to around 81% in 2020, reflecting higher harvest levels associated with growing demand for wood and improved access to forest resources. This long-term increase in utilisation is a key message for the current reporting cycle.

The most significant increases were observed in Northern and Central-West Europe, where felling rates reached approximately 96% and 84% of NAI in 2020, compared to around 66% and 60% in 1990. In contrast, Central Eastern Europe showed a relatively stable trend, with a slight decrease over the same period. South Western Europe experienced a gradual decline in utilisation, likely due to lower harvesting profitability and a higher incidence of fires. In Southeast Europe, utilisation increased from around 49% in 1990 to over 60% in 2020, reflecting gradual improvements in management and market integration.

For the EU-27, utilisation rates increased from 54% in 1990 to almost 92% in 2020, confirming an overall trend towards more intensive yet sustainable wood use across most European regions. This suggests that the EU-27 is closer to the 'balance line' than in previous reporting periods and is therefore more susceptible to disturbances and short-term spikes.

However, the latest EUROSTAT figures[5] for 2022 it indicate that, despite some differences in definitions and methodology, the 2020 high point has passed. Overall, the harvest/increment ratio is decreasing again, with Central Europe still suffering the consequences of droughts, major storms, and bark beetle outbreaks, and utilisation of increment is mostly below 100%. Therefore, EU forests continue to accumulate standing volume overall and remain clearly within sustainable limits, though they show higher rates than in earlier reporting periods.

In parallel, total wood removals reported in FRA 2025 based on FAOSTAT data suggest a decline in Europe-wide removals after the 2020 peak, reinforcing the idea that the 2020 high point should not be interpreted as a new steady state.

[5] https://ec.europa.eu/eurostat/statistics-explained/images/b/bb/Forests_forestry_and_logging_statistics_2025_Jan.xlsx

Indicator 3.2 *Roundwood*

Why it is important

Roundwood is raw timber harvested from forests, with or without bark, and it is a key product of forest-based industries. It is used in construction, for making furniture and paper, and for producing pulp and energy, thereby linking forest resources to economic activity.

The amount of roundwood produced and any changes over time reflect market demand and the intensity of forest use. Roundwood statistics are important for evaluating the efficiency and sustainability of wood supply chains at national and international levels.

When harvested responsibly, roundwood can contribute to climate goals by replacing carbon-intensive materials and storing carbon in durable wood products, such as buildings. Sustainably managing the extraction of roundwood is essential to maintaining forests' ecological functions, including protection, while supporting rural economies and green industries. In recent years, however, roundwood production has become more closely linked to disturbance dynamics (e.g., salvage operations following storms or bark beetle outbreaks), thereby increasing short-term volatility in supply.

How it is defined

Quantity and market value of roundwood.

For this indicator, roundwood refers to wood removed from forests in its natural state (e.g., unprocessed), including planned harvesting and incidental felling, but not logging residues left in the forest.

Key findings

- In 2020, Europe's roundwood production reached almost 626 million m³. The forests of North and Central Europe remain the main producers, with Sweden, Finland, Germany, France and Poland accounting for 50% of total roundwood removals in Europe by volume, at 313 million m³.

Status and trends

Compared with the previous SoEF reporting cycle (reference year 2015), the 2020 peak coincided with elevated disturbance-related felling in parts of Europe. This reinforces the need to interpret short-term changes in production in the context of storms, droughts and pest outbreaks. International data series reported in FRA 2025 indicate that total wood removals in Europe peaked around 2020 and declined by about 6% between 2021 and 2023. This is consistent with weaker demand for industrial roundwood in some wood-processing segments after the 2020 high point.

The data refer to the total amount of wood removed (both marketed and non-marketed). Forty-one countries reported data on roundwood removals. The total volume of roundwood excludes that harvested for self-consumption (subsistence) and for other uses that do not involve market transaction. Data were reported for individual years and are presented here as five-year averages for the reference years, e.g., for 2020 the average for 2017–2022 is used.

A total of 625.8 million m³ of roundwood was produced in 2020. Northern Europe produced 189.2 million m³, Central-Western Europe produced 175.6 million m³, and Central-Eastern Europe produced 150.9 million m³ *(see Table 3.2-1)*. The countries with the highest roundwood production were Germany (78.6 million m³), Sweden (75.2 million m³), Finland (64.9 million m³), France (50.6 million m³) and Poland (43.7 million m³).

Removals per hectare of forest available for wood supply (FAWS) ranged from 4.9 m³/ha in Central-Western Europe to 1.7 m³/ha in South-Western Europe. Overall, the highest levels of roundwood production were seen in Sweden, Finland, Germany, Poland, France and Austria, which together accounted for around two-thirds of Europe's total output.

FRA 2025 (FAOSTAT-based) indicates that Europe's total wood removals (a broader metric than SoEF roundwood removals) declined by around 6%

between 2021 and 2023 following the peak in 2020, suggesting a moderation in removals since then.

Box 3.2-1: How SoEF roundwood relates to FRA/ FAOSTAT removals.

> The SoEF reports on roundwood removals within the FOREST EUROPE indicator framework (including both marketed and non-marketed removals from forests), excluding subsistence/self-consumption and other non-market flows. FRA 2025 reports on total wood removals using FAOSTAT (industrial roundwood and wood fuel) and may include removals from trees outside forests. While these data support an internationally comparable interpretation of recent (post-2020) dynamics, they are not directly comparable to SoEF totals.

When interpreting the data, two long-standing limitations (also highlighted in previous SoEF publications) must be considered: (i) consistent estimates of the market share of total removals are unavailable for all countries, and (ii) wood fuel removals are likely to be under-recorded where monitoring is incomplete. These issues can bias comparisons between countries and overtime, especially where non-market uses are significant.

Roundwood production in Europe has increased steadily over the past three decades, rising from approximately 425 million m³ in 1990 to over 625 million m³ in 2020. This growth occurred across all

Table 3.2-1: *Volume of roundwood, by region, 1990–2020*

Region	Roundwood volume							
	1 000 m³				*m³/ha FAWS*			
	2020	2010	2000	1990	2020	2010	2000	1990
North Europe	189 180	157 904	153 727	112 515	3.5	2.8	2.7	2.0
Central-West	175 553	165 829	151 998	179 351	4.9	4.7	4.4	5.6
Central-East	150 916	109 271	82 120	67 463	4.5	3.3	2.5	2.1
South West	47 039	38 677	36 852	34 312	1.7	1.4	1.4	1.5
South East	63 106	47 334	36 313	31 803	2.7	2.2	2.1	1.9
EU-27	***504 815***	***433 475***	***397 911***	***369 456***	***3.7***	***3.4***	***3.8***	***3.6***
Europe	***625 795***	***519 014***	***461 010***	***425 444***	***3.6***	***3.0***	***2.7***	***2.5***

Note: Averages of five years; Data coverage as % of total regional FAWS area: Roundwood volume: 100% for all regions.

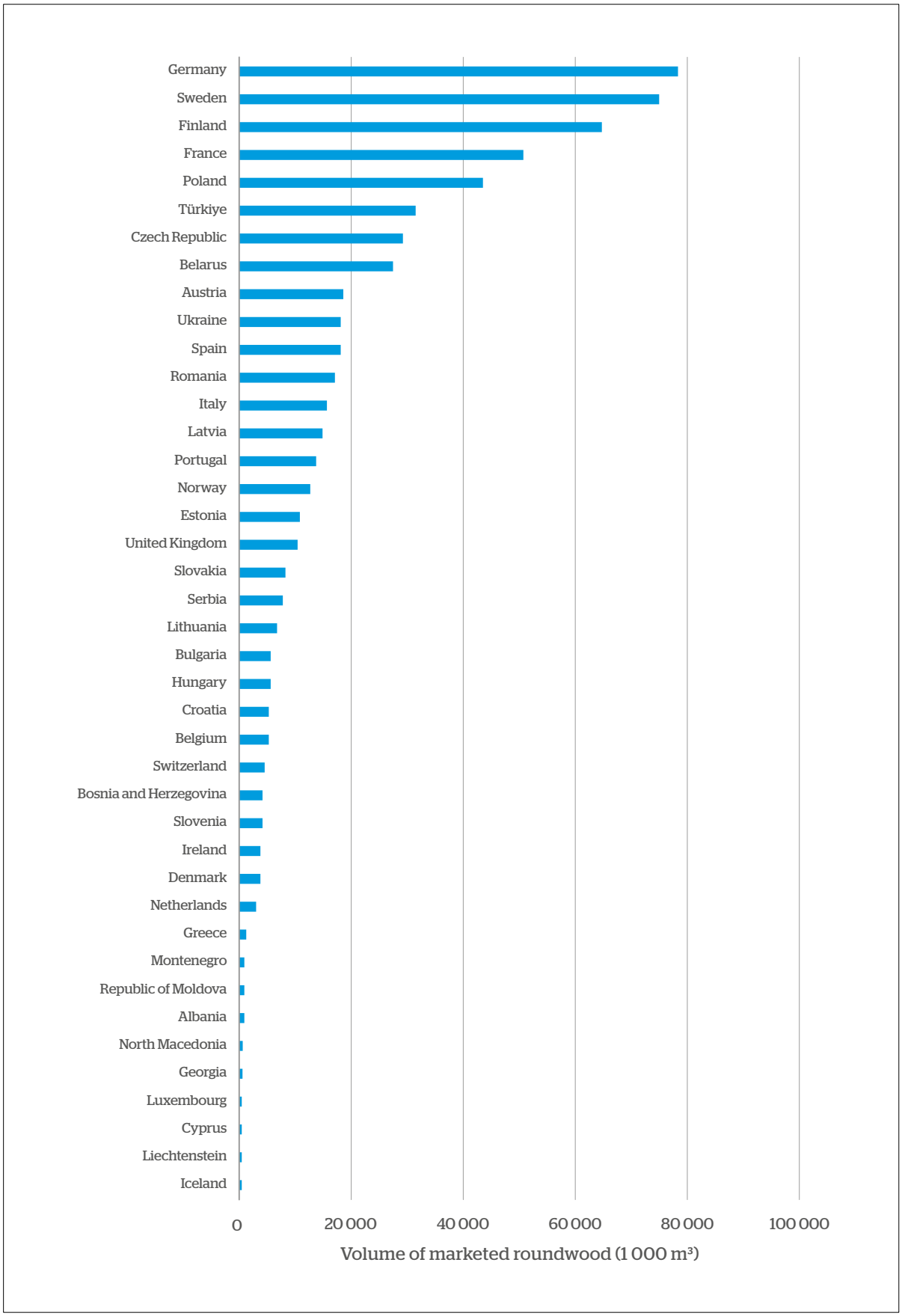


Figure 3.2-1: *Volume of marketed roundwood, by countries, 2020 (averages 2017–2022)*

regions from 2010 to 2020, with the most significant increases in Central and Eastern Europe and Northern Europe. This reflects the growing demand for biomass and the market pull, which has been met by higher forest productivity and improved management practices. Production intensity also increased, rising from 2.5 m³/ha to 3.6 m³/ha. The highest values were recorded in Central-West Europe (but still rather steady compared to 1990), while the lowest values were recorded in South-West Europe.

Country-specific trends vary considerably. Finland, Sweden and Germany remain Europe's leading producers, although growth has slowed due to maturing forests, the loss of spruce forests in Central Europe and resource constraints. Meanwhile, Poland, the Czech Republic, Romania and the Baltic States have shown marked increases in output, linked to forest restitution and the modernisation of harvesting operations. Production in parts of Southern Europe has fluctuated due to economic cycles, wildfires, and logistical constraints.

At the continental level, the overall increase in roundwood production is paralleled by population growth, improved forest management, and the broader expansion of Europe's forest area. However, evidence synthesised in FRA 2025 from internationally comparable FAOSTAT data suggests that the period after 2020 may be characterised by greater variability and a partial moderation of removals at the European scale.

Although overall production remains within sustainable limits, short-term peaks in felling volumes during the late 2010s and early 2020s were partly driven by large-scale salvage operations following windstorms, droughts, and bark beetle outbreaks. While these disturbance-related removals temporarily increased the supply of roundwood, they also highlight the growing impact of climate-related stressors on forest productivity and harvest dynamics in Europe. Therefore, peaks in removals should be considered alongside disturbance indicators (e.g., Indicator 2.4) and market conditions rather than being interpreted as a sign of steady long-term intensification.

Indicator 3.3 *Non-wood goods*

Why it is important

Non-wood goods (NWGs) from forests include mushrooms, berries, medicinal plants, resins, honey and cork. NWGs play a key role in supporting rural livelihoods, ensuring food security and preserving cultural heritage. These products support local economies and provide alternative income streams, which are particularly important in regions where timber harvesting is limited or unsustainable. In several FOREST EUROPE countries, NWGs are also linked to small enterprises, local processing and seasonal employment. They can also complement income from timber, where its extraction is limited.

The availability and quality of NWGs reflect the ecological health and biodiversity of forest ecosystems. Sustainable forest management involves carefully harvesting NWGs to ensure they remain available in the long term and are not overused. However, NWG supply can be sensitive to changes in climate and disturbance regimes (e.g., drought, fire and pest outbreaks), which can affect yields and access.

Monitoring the production of these goods provides a better understanding of how forests are used beyond timber and informs conservation planning. These goods are also closely linked to traditional knowledge systems and community-based forest management. In many places, they contribute to nature-based tourism, making forests more valuable and multifunctional. Promoting these products diversifies forest economies while maintaining ecological balance and strengthening citizens' connection to forests. Compared with earlier SoEF editions, there is a growing interest in capturing NWGs more effectively as part of the forest bioeconomy and reflecting their multifunctional role. Still, data gaps and inconsistent classifications limit this.

How it is defined

Quantity and market value of non-wood goods from forest and OWL.

Key findings

- Non-wood forest products and OWL are important sources of food and materials, including cork, Christmas trees, chestnuts, fruit, mushrooms, wild game, and honey. These goods also provide an additional income stream from forests. However, reported values reflect only marketed products and exclude substantial self-consumption and informal trade that occur in many countries.

- In Europe, for example, the market value of non-wood goods is more than twice as high for plant products as it is for animal products. This pattern is largely driven by the high reported value of ornamental plants (including Christmas trees) within the plant product category.

NWG products and services are not currently accounted for, and within a broader bioeconomy, these could substantially increase the overall value of the forest sector. Incorporating these values and volumes into national strategic planning would be crucial in supporting the further expansion of the forest-based bioeconomy. At the same time, the significant contribution of non-market provisioning means economic valuation must be interpreted carefully and supplemented with information on subsistence use and cultural services where available.

However, comparisons are difficult as the data is not harmonised, despite being available. National statistical offices do not use a commonly accepted classification or priority list of NWGs, and, given the large number of products, data collection remains expensive. This presents a significant challenge for compiling a comprehensive and comparable overview of all types of NWGs across Europe. This limitation has been consistently highlighted in SoEF 2015 and SoEF 2020, and it remains a central constraint in SoEF 2025. Apparent changes over time may reflect improved reporting as much as real changes in production or markets.

Status

Plant products

Thirty-four countries reported quantities and/or values of marketed plant NWGs.

Table 3.3-1 shows the quantities and values of the various types of marketed plant products by region. The highest values were reported for ornamental plants and food, accounting for 54.1% and 34.5%, respectively. Other plant products accounted for the remaining 9.5%. Together, these three categories account for 98% of the total value of NWGs, as the reported values for all other NWG categories are much smaller. This concentration of value in a small number of product groups suggests that many NWGs remain poorly captured statistically.

Twenty-five countries reported ornamental plant data, with a total value exceeding EUR 2 334 million. The highest values were recorded in Denmark (EUR 8 767 million), Germany (EUR 570 million), Sweden (EUR 323 million) and the United Kingdom (EUR 321 million) among the reporting countries. As in the previous SoEF 2020 publication, Christmas trees remain the main product in this category. However, given the very high value reported for Denmark, cross-country comparisons should be interpreted cautiously and checked against the scope of national accounting (e.g., what is included under 'ornamental plants' and whether the reporting captures production, trade, or broader market flows).

Twenty-one countries reported food quantity data. Overall, food accounted for 444 500 tonnes in weight and EUR 1 489.8 million in value in these countries. The main producers were Sweden (EUR 391 million), Spain (EUR 127.2 million), the Czech Republic (EUR 254.3 million), Portugal (EUR 162.9 million) and Slovenia (EUR 140.5 million). As in earlier SoEF editions, the reported food NWGs typically include products such as berries, mushrooms, fruit and chestnuts; however, coverage and market channels differ greatly between countries.

The total value reported for plant-product NWGs amounts to approximately EUR 4.332 billion. The highest values were reported for Northern Europe (EUR 1.8 billion) and Central-West Europe (EUR 1.2 billion). The lowest values were reported for South-East Europe (EUR 162 million) and Central-East Europe (EUR 408 million) *(Table 3.3-3)*. Lower reported values may reflect limited reporting capacity and lower market formalisation rather than low biophysical availability or local importance.

Table 3.3-1: *Value of different types of marketed plant products, by region, 1 000, 2020*

Region	Food	Fodder	Raw material for medicine and aromatic products	Raw material for utensils, handicrafts & construction	Ornamental plants	Exudes	Other products
North Europe	477 916		1 991		1 320 225		
Central-West Europe	97 849		5 582	2 068	1 015 795		77 041
Central-East Europe	379 701		17 792		6 933		6 009
South-West Europe	378 310	42 158	11 175			10 355	323 009
South-East Europe	156 011		2 782		183		3 439
EU-27	***1 459 148***	***42 158***	***34 018***	***2 068***	***2 249 186***		***387 302***
Europe	***1 489 787***	***42 158***	***39 322***	***2 068***	***2 343 136***	***10 355***	***409 498***

Note: Data coverage as % of total forest area: Food 74%, Fodder 4%, Raw material for medicine and aromatic products 25%, Raw material for colourants and dyes 0%, Raw material for utensils, handicrafts and construction 8%, Ornamental plants 59%, Exudates 8%, Other products 48%.

Animal products

Twenty-eight countries reported quantities and/or values for marketed animal NWGs.

Table 3.3-2 shows the quantities and values of the various types of marketed animal products, broken down by region. The highest reported values were for wild meat, accounting for 81% of the total. As for plant products, the values of animal products are likely to underrepresent non-market use and informal trade in several countries.

Wild meat includes all hunted birds and mammals, such as partridge, pheasant, hare, deer, wild boar, chamois, and moose. The data contains the main game species whose habitats are forest-related. Game raised on farms is excluded from the data collection.

Twenty-three countries reported data on the value of wild meat. The top producers were Sweden (EUR 857 million), France (EUR 356 million) and Germany (EUR 202 million). Combined, the reporting countries' wild meat accounted for EUR 1 778.8 million, representing 81% of NWGs related to animal products *(Table 3.3-2)*. The dominance of wild meat values should be considered alongside Indicator 3.4, since hunting-related revenues, such as licence fees, may be reported elsewhere, which affects the overall picture of forest-related income streams.

Twelve countries reported the value of honey and beeswax production. The total value of marketed honey and beeswax, including output from farmlands, was EUR 339 million. The highest values were recorded in Spain (EUR 126 million), Germany (EUR 53 million) and Switzerland (EUR 48 million).

Table 3.3-2: *Value of different types of marketed animal products, by region, 2020*

Region	Living animals	Hides, skins and trophies	Wild honey and beeswax	Wild meat
North Europe	114	4 119	4 384	1 021 457
Central-West Europe	200	7 248	145 692	611 180
Central-East Europe	97	4 575	5 915	38 508
South-West Europe			168 225	97 801
South-East Europe		62 466	14 831	9 886
EU-27	***211***	***17 391***	***266 341***	***1 696 477***
Europe	***411***	***78 408***	***339 047***	***1 778 832***

Note: Data coverage as % of total forest areas: Living animals 2%, Hides, skins and trophies 7%, Wild honey and beeswax 36%, Wild meat 99%

As reported, honey values may include non-forest sources, comparability as a strictly "forest" NWG is limited unless national reporting clearly separates production originating from forests. Other categories of marketed animal products, including live animals, hides, skins, and trophies, accounted for less than 4% of the total NWG value from animal products.

The highest values of marketed NWGs from animal sources were reported in Central-West Europe (EUR 764 million) and Northern Europe (EUR 1 030 million). The lowest values were reported for South-East Europe (EUR 87 million) and Central-East Europe (EUR 49 million) *(Table 3.3-3)*. However, data coverage in these regions is very limited, so the figures must be interpreted with caution. This reporting pattern has persisted across SoEF cycles and remains a major constraint for pan-European assessments.

Trends

The upward trend in NWG production and value observed in previous SoEF reports is also confirmed in the current reporting period. This may be partly explained by improved reporting, though the data remain incomplete. The reported value of marketed NWGs in Europe *(Table 3.3-3)* is almost double for plant products (EUR 4 332 million) than for animal products (EUR 2 197 million), despite payments for hunting licences being reported in a different indicator (indicator 3.4). Consistent with the SoEF reports of 2015 and 2020, a key interpretive point is that increases over time may reflect improvements in national coverage and changes in classification as much as changes in real production or prices.

The NWGs sector is difficult to define clearly, and European statistics on production, trade and consumption remain underdeveloped. This is due to the wide variety of products, their diverse end uses (including significant self-consumption), and inconsistent market organisation. In addition, NWG value chains are often local and seasonal, and products may be reported across different statistical domains (forestry, agriculture, food, tourism), reducing coherence.

Apart from mass products such as cork, Christmas trees, chestnuts and a few other NWGs, there is a lack of data on stocks, harvesting, prices, operators and detailed trade flows for many non-wood forest products. This is not related to the economic, social, and environmental importance of NWGs, but rather to problems of statistical classification,

Table 3.3-3: *Value of marketed non-wood products, by region, 2020*

Region	Plant	Animal
	1 000 Euro	
North Europe	1 800 227	1 030 074
Central-West Europe	1 195 984	764 321
Central-East Europe	408 409	49 095
South-West Europe	765 007	266 026
South-East Europe	162 375	87 183
EU-27	***4 173 880***	***1 984 250***
Europe	***4 332 002***	***2 196 698***

data collection, and coordination by national statistical agencies. Earlier SoEF editions noted similar constraints; SoEF 2025 reinforces the need for a pragmatic "priority NWG list" and minimum reporting standards to improve comparability (e.g., defining core product groups, separating forest vs non-forest origin where relevant, and documenting whether values reflect production, trade or broader market turnover).

Overall, reporting has improved, with more countries providing data than in previous SoEF reports. However, the figures still cannot be considered representative of Europe as a whole, specific product categories, or user groups, and should therefore be interpreted as minimum estimates of the financial benefits generated by NWGs. In future, combining national statistics with targeted surveys and harmonised classification guidance would help to distinguish real market trends from reporting artefacts, providing a more accurate reflection of the multifunctional contributions of NWGs.

Indicator 3.4 *Services*

Why it is important

Marketed forest ecosystem services represent the portion of forest benefits that have a quantifiable economic value and are traded or sold on the open market. These include timber and non-wood forest products, as well as services such as carbon credits, recreation fees, and payments for ecosystem services related to water protection or biodiversity conservation. While forests provide many additional non-market benefits, the development of these services highlights their increasing importance in the green economy and rural livelihoods. In practice, however, many forest services are only partially captured by market transactions. They may be recorded outside forestry statistics (e.g., through conservation, tourism, or climate policy accounting), thereby affecting comparability.

Sustainable forest management recognises these services as essential for linking ecological functions with economic opportunities. Maintaining and enhancing these services requires integrated planning that balances production, conservation and social values. Although their full financial potential remains underutilised, these services contribute to climate mitigation, biodiversity goals and the transition towards a circular bioeconomy. Strengthening valuation, monitoring, and reporting systems helps capture their contribution to national economies and sustainable development objectives more effectively. Compared with earlier SoEF editions, greater attention is paid to payments and incentives for biodiversity, water and climate outcomes. However, this is not yet consistently reflected in pan-European reporting for this indicator.

How it is defined

Value of marketed services in the forest and OWL.

Key findings

- Social and biospheric services account for the vast majority of marketed forest ecosystems, representing 95% of the reported value. This reflects the dominance of compensation- and contract-based payments (biospheric) and hunting- and recreation-related revenues (social) in the limited dataset.

- Based on data from 14 countries, the total reported value of marketed forest services was approximately EUR 1.26 billion. However, substantial differences exist in the way services are monitored and reported across countries. Consequently, these figures should be considered minimum estimates rather than a comprehensive valuation of forest services in Europe.

Status and trends

The indicator for marketed services comprises five categories:

Marketed ecological services include those associated with Indicator 5.1, which covers the environmental functions of protective forests in relation to soil and water protection, and the safeguarding of infrastructure and other assets. In several countries, these functions are provided through public regulation rather than market payments, which partly explains the limited reporting in this category.

Marketed biospheric services relate to indicators 4.6 (*in situ* or *ex situ* conservation of genetic resources) and 4.9 (protected forests). These include voluntary contractual nature protection measures, with compensation or other payments from private or public entities, which may include payments within NATURA 2000 sites. Contract-based nature protection schemes are increasingly being discussed and implemented to promote ecological and biospheric forest services. Similar schemes also exist outside the EU (e.g., national biodiversity contracts, habitat agreements, and restoration payments), but these are not consistently captured in reports submitted under this indicator.

Marketed social services include hunting and fishing licences, hut and house rentals, forest-based recreation, sports and outdoor activities, and educational services involving user fees. The value of recreational services not exchanged through market transactions is not reported, even though they represent a substantial contribution. There has been significant growth in initiatives related to forest therapy and forest bathing. However, as these initiatives are often organised outside forestry administrations, they are rarely recorded as forest-sector income, limiting the conclusions that can be drawn from the reported dataset.

Several cultural services, also referred to as "amenity services", encompass functions related to spiritual, cultural and historical values. Examples include sacred spaces, sites of worship, landscape features such as mountains and waterfalls, cultural "memories" embedded in the landscape, aesthetic enjoyment and inspiration, and forests used for nature museums, concerts, theatre performances, and the preservation of historical artefacts. The use of forests for burials is also recognised in many European countries. While many of these services are important, they are typically non-market or managed through municipal or cultural budgets rather than being recorded as forest-owner income.

Other services marketed include payments to woodland owners for licences regulating activities such as gravel extraction, telecommunications masts, wind farms, and electricity distribution infrastructure. Depending on national legislation, these services may contribute directly to forest owners' income, thereby supporting the economic viability of sustainable forest management. In several countries, however, these revenues are recorded under general land-lease or infrastructure categories, which can reduce their visibility in forest statistics.

Only 14 countries, representing 48% of the European forest area, reported data on the value of marketed services in the five categories. Therefore, overall information remains scarce. This pattern is consistent with earlier SoEF editions, where reporting on marketed services was also limited and uneven across categories.

The volume of income derived from these services is often not recorded or registered, and typically covers only part of the forest sector, despite these services being clearly identified. In most cases, countries reported values for only some categories, primarily social services, or reported values without specifying the amounts of services and their corresponding units. Figure 3.4-1 illustrates the proportion of each marketed forest service for all reporting countries combined. Social and biospheric services dominate the reported data, accounting for around 86% of marketed services across all categories.

The highest reported values relate to biospheric services, amounting to approximately EUR 844.9 million. These are primarily linked to payments for nature and forest habitat protection under conservation agreements. Sweden contributes the vast majority of this value, accounting for around 99% of the reported European total, largely due to national compensation schemes that include

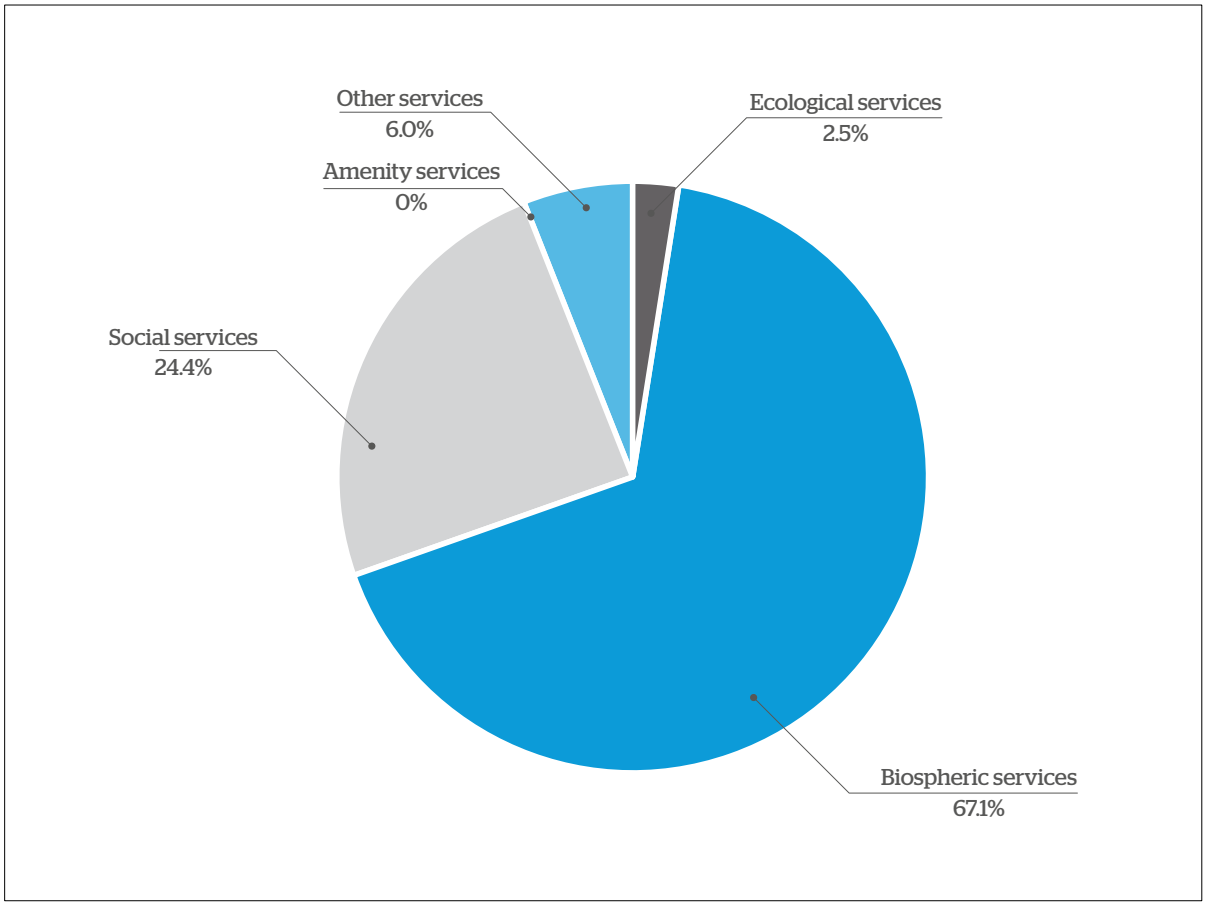


Figure 3.4-1: *Proportion of values of marketed services in 2020, for a total reported value of EUR 1.3 billion*

Table 3.4-1: *Value of reported marketed forest services, by region, 2020*

Region	Total reported services	
	1 000 Euro	***EUR/ha***
North Europe	870 705	16
Central-West Europe	275 262	12
Central-East Europe	14 988	8
South-West Europe	12 309	4
South-East Europe	86 368	3
EU-27	***1 224 921***	***14***
Europe	***1 259 632***	***11***

Notes: Data coverage as % of regional forest area: NE 78%, C-WE 57%, C-EE 4%, S-WE 11%, S-EE 64%, EU-27 54%, Europe 48%.

payments linked to protected habitats (e.g., Natura 2000-related arrangements, where applicable). This concentration highlights that regional totals are highly sensitive to single-country reporting and should not be interpreted as representative of the wider FOREST EUROPE area.

Social services are the second-largest category, with a reported value of around EUR 307 million. Together, Austria, Croatia and France account for around 75.6% of this total. Much of this value derives from hunting licences and related revenues, including hunting rights and the sale of products such as hides and meat. Although hunting-related services remain one of the most important traditional sources of income, many countries did not report related data. Demand and pricing vary widely across Europe and depend on factors such as the location and attractiveness of hunting areas and local food consumption traditions. Where data is missing, no robust pan-European inferences can be made about trends in hunting-related revenues.

Sweden was the only country to report amenity services, such as the preservation of historical and biological cultural heritage, valued at EUR 527 000. Given the breadth of cultural services described above, this likely reflects reporting practices rather than low relevance.

Given the limited number of reporting countries, the total value reported across all five categories amounts to approximately EUR 1.26 billion. The absence of data from many countries highlights gaps in national monitoring and reporting systems for these services. Consequently, SoEF 2025 can illustrate which service types are reported and where they are concentrated. Still, it cannot provide a comprehensive estimate of the economic value of forest ecosystem services across the FOREST EUROPE region.

Table 3.4-1 presents the average marketed value of the recorded services per hectare for 2020.

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

Key findings

Almost all European countries report policy objectives that address maintaining and enhancing the productive function of forests. These objectives typically centre on ensuring a sustainable supply of wood and non-wood products, improving forest infrastructure, and strengthening the forest sector's contribution to the bioeconomy. Several countries also emphasise the importance of balancing mobilisation objectives with resilience and biodiversity requirements in the context of changing climatic conditions.

Most countries have incorporated these goals into their national forest legislation, strategies, and programmes. Twenty-seven countries reported institutional measures and policy tools, including legal, financial, and organisational instruments that support sustainable forest management. Support for private forest owners and cooperation structures is often emphasised as a condition for implementation.

Reported achievements over the last five years include increased forest productivity, the expansion of areas covered by forest management plans, as well as improved coordination between forestry and related policy areas. However, many countries also highlighted persistent challenges, including limited funding, fragmented forest ownership, and the impact of climate change. This overall framing is consistent with earlier SoEF reporting, where management planning, mobilisation conditions, and market context were repeatedly identified as key enablers and constraints.

Policy objectives

Of the 31 countries that reported, 27 indicated explicit policy objectives relating to the productive functions of forests. These objectives cover a range of priorities, including maintaining or increasing forest productivity, ensuring a sustainable and stable supply of wood and non-wood products, promoting the forest sector's contribution to the green and circular economies, as well as enhancing the competitiveness and added value of forest-based industries.

Some countries have also set specific quantitative targets, such as increasing annual harvests within sustainable limits, improving stand quality, or expanding afforestation and regeneration areas. In others, objectives are defined more generally within national forest strategies, forest acts or rural development programmes.

These policy objectives are often aligned with broader European frameworks, such as the EU Forest Strategy, the EU Bioeconomy Strategy, and the Common Agricultural Policy (CAP).

Institutional measures and policy tools

Twenty-four countries reported using legal, financial and organisational measures to support productive forest functions. Most of these measures are defined in national forest legislation, which serves as the basis for forest management planning and sets utilisation limits and regulations for sustainable yields.

Financial incentives are a key element of policy implementation. These include subsidies, low-interest loans, tax exemptions and payments for ecosystem services. Funding is provided through national budgets, Rural Development Programmes and structural funds.

Several countries have introduced instruments to support private forest owners and cooperatives, promote forest certification, and develop marketing structures for wood and non-wood products. Examples include targeted investment programmes for forest road construction and mechanisation in Austria and Germany, support for forest owner associations in Finland and Sweden, replace with as well as incentives for diversification in Spain and Portugal.

There have also been reports of education, research and training measures, particularly in Central and Northern Europe, where innovation and bioeconomy initiatives are linked to forestry. Additionally, cross-sectoral coordination, particularly with the agricultural, energy, and industrial sectors, has been identified as crucial for enhancing forests' productive capacity.

Achievements

Nineteen countries reported tangible achievements in the productive functions of forests. These achievements include:

- increased areas under forest management plans
- expansion of the area of certified forests
- growth in the production of renewable forest-based materials and energy production
- improved cooperation among forest owners and associations
- enhanced forest data and monitoring systems
- new investments in forest infrastructure and processing industries

Germany, Austria, Poland, the Czech Republic and Slovenia have reported progress in sustainable forest management and wood mobilisation. In Central and South-East Europe, increased investment in forestry operations and mechanisation has led to greater efficiency and productivity.

Several countries also emphasised progress in integrating forest management objectives into national bioeconomy strategies and innovation programmes.

Challenges

Twenty-one countries identified persistent challenges in maintaining or improving forest productivity. The most frequently mentioned challenges were:

- increasing impacts of climate change, such as droughts, pest outbreaks and storm damage.
- financial and administrative limitations, particularly for small-scale forest owners.
- labour shortages and the need for training in sustainable management techniques.
- fragmented ownership structures, hindering efficient management and coordination.
- restricted market access and limited value addition for small- and medium-sized enterprises in the forest sector.

Several countries noted challenges in reconciling the economic, environmental and social functions of forests, as well as difficulties in improving data collection and monitoring capacity. The reports emphasise the importance of continued policy integration across the forestry, climate, energy and rural development sectors to maintain the long-term productive potential of Europe's forests.

Management plans

A total of 30 countries reported nearly 140 million hectares of forest under management plans or equivalent documents. The percentage of forest area under management varied considerably, ranging from 55% in Switzerland to 100% in several countries, including Finland, Slovenia and the Netherlands.

Management plans are obligatory in 22 countries and must be reported to an official body in 27 countries. Twenty-six countries indicated that the measures in the management plans were compulsory, with most cases focusing primarily on harvest volume and regeneration.

Regional summaries based on the reported data are as follows:

- in Northern Europe, 85% of forests are under management plans, mostly not obligatory.
- in Central-West Europe, 60% of forests are covered by management plans, which are obligatory in four countries.
- in Central-East Europe, 96% of forests are under management plans that are obligatory in all reporting countries.
- in South-West Europe, data were available for two countries, where the average forest area under obligatory management plans was 26%.
- in South-East Europe, 73% of forests are covered by management plans, all of which are obligatory.

Certification

Forest certification is a market-based tool designed to promote sustainable forest management and, in the process, raise consumers' awareness of sustainable wood products. The area of certified forests has steadily increased over the last 25 years *(Figure C.3-1)*. In 2024, the total area of certified forests was 117.5 million hectares.

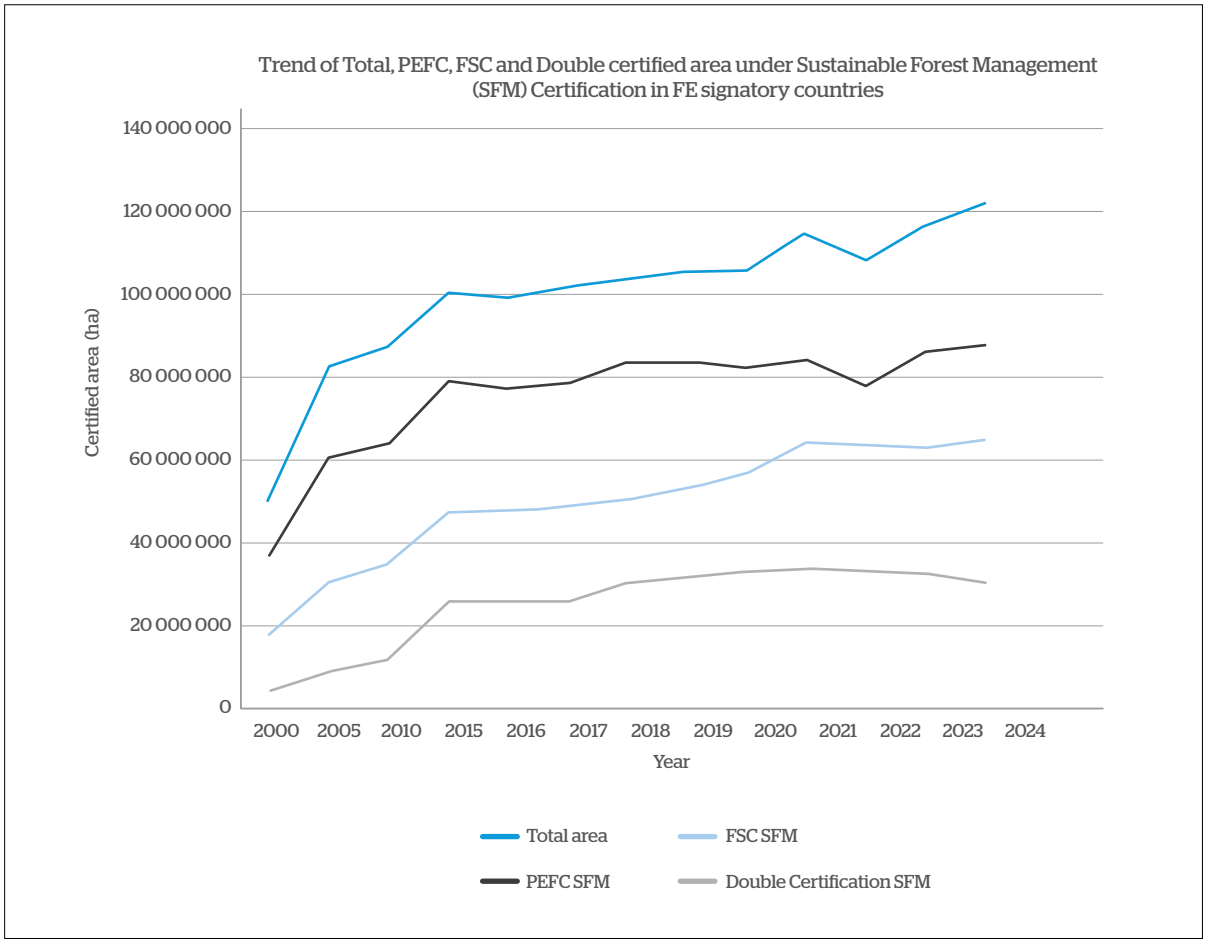
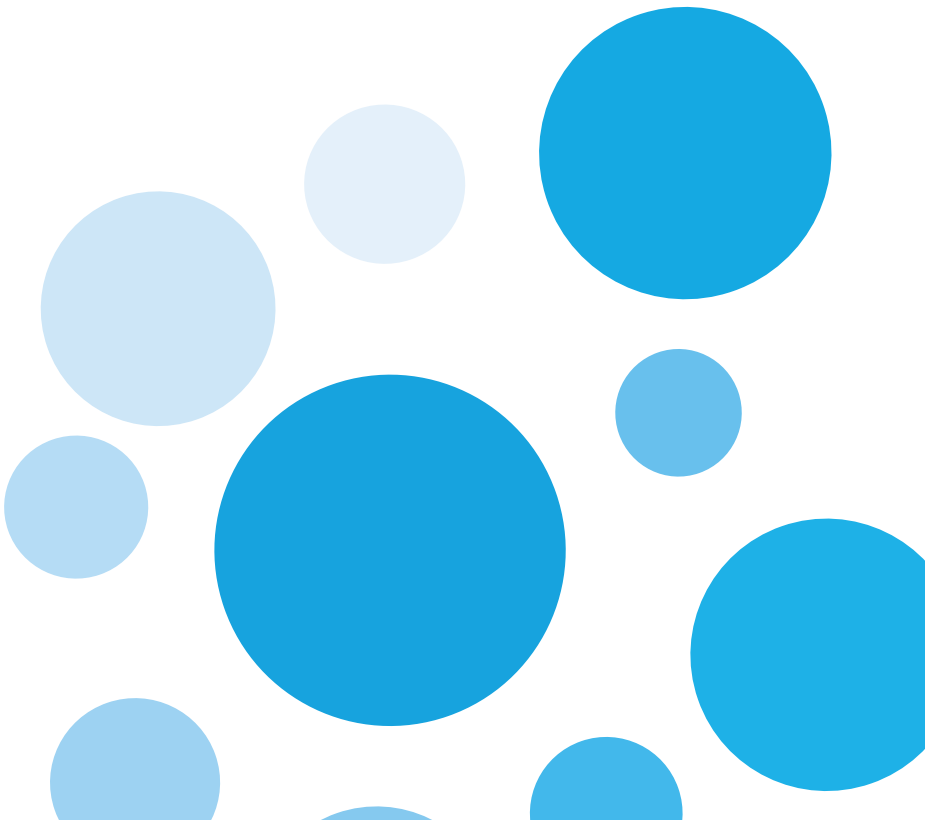
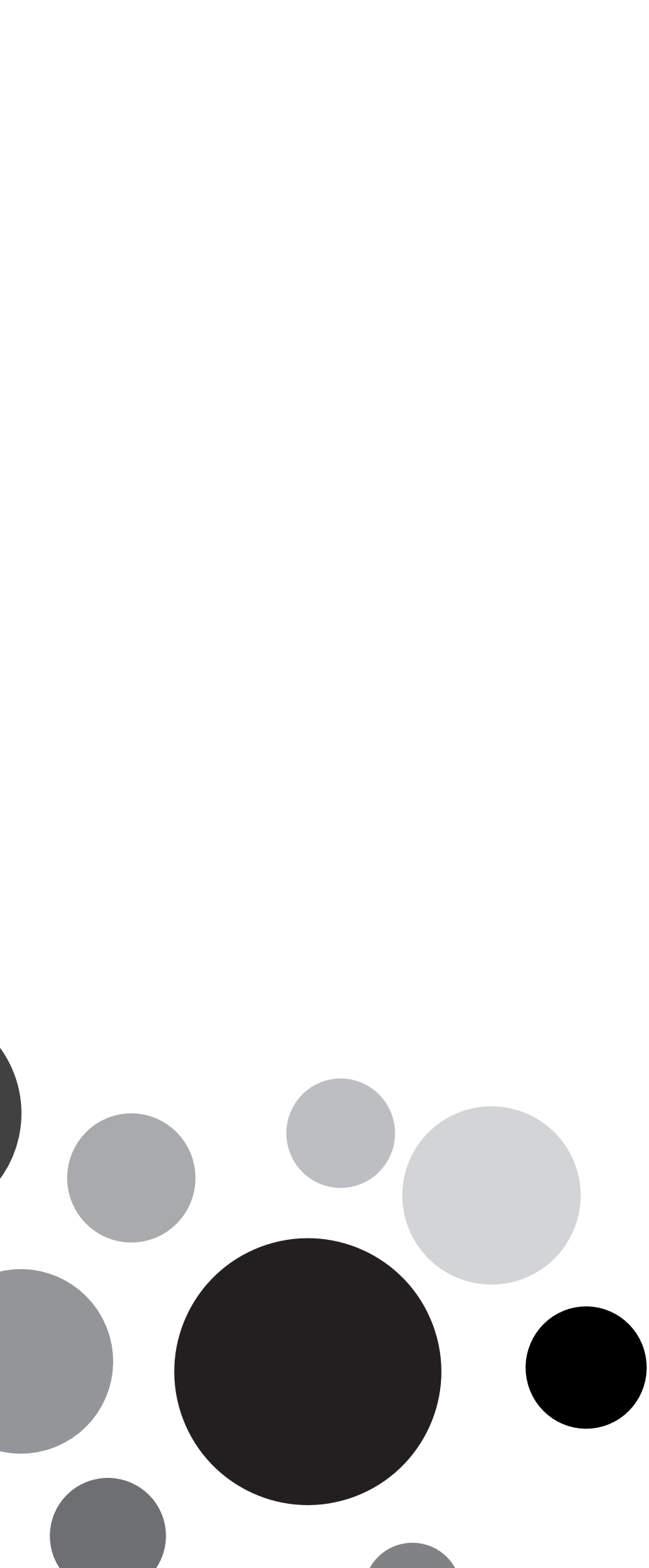
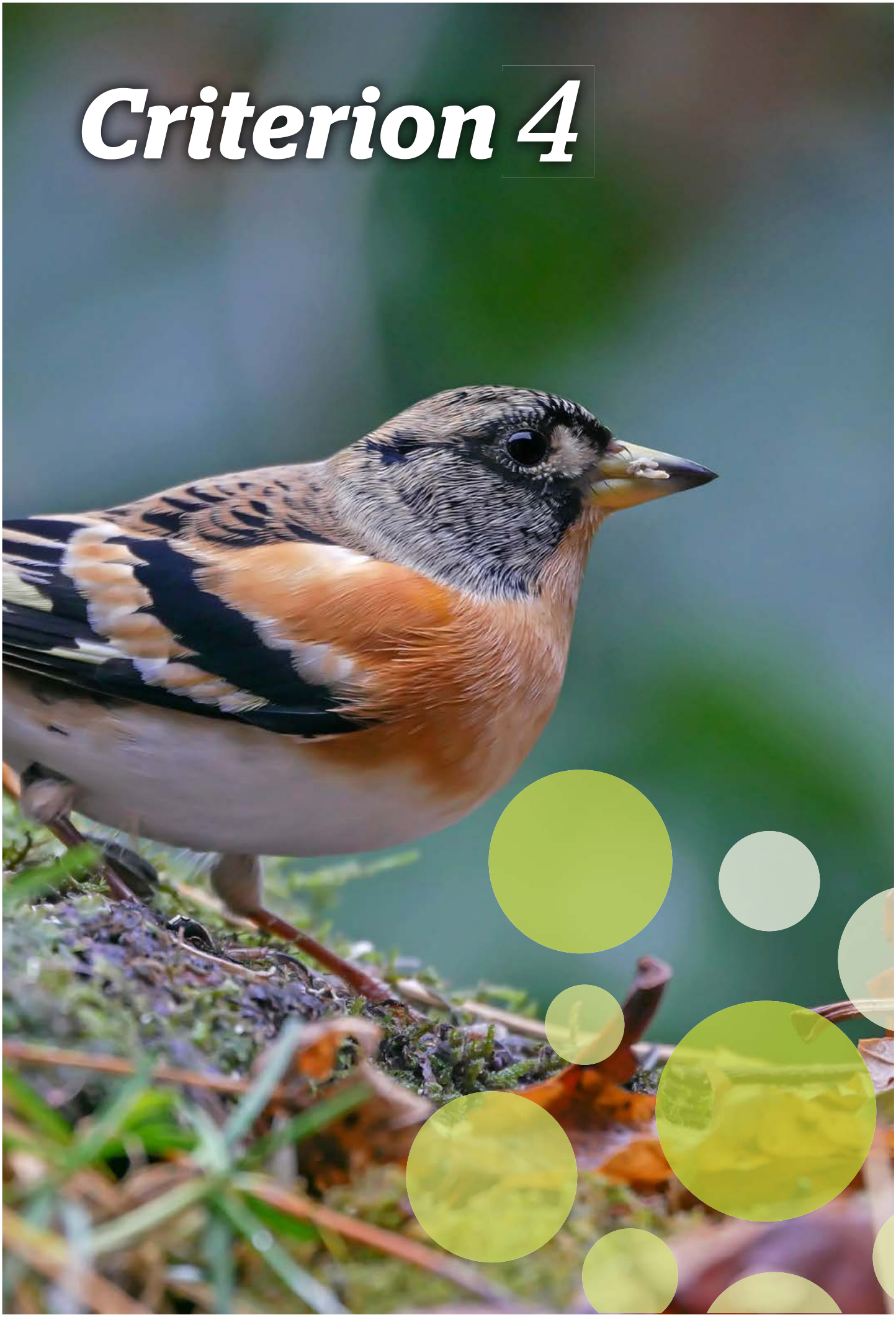


Figure C.3-1: *Trend of certified forest area in Europe (data provided by PEFC International and FSC)*





Criterion 4



Criterion 4:

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

Biological diversity underpins forest resilience, productivity and adaptability. Maintaining, conserving and appropriately enhancing biodiversity in forest ecosystems supports a wide range of ecological functions, from nutrient cycling to pest regulation. It also ensures the survival of forest-dependent species and the provision of ecosystem services. Structural diversity, species composition and genetic variation are key components of forest biodiversity.

Sustainable forest management includes protecting natural habitats, ensuring connectivity and integrating biodiversity objectives into forest planning. Conservation efforts across all forest types - natural, semi-natural and planted - help secure forest functions in the face of environmental change.

Indicator 4.1 *Diversity of tree species*

Why it is important

Diversity of tree species is an important sign of forest resilience, ecological integrity and long-term sustainability. Forests with a higher variety of tree species support more diverse habitats, enhance ecosystem functions and provide a wider range of goods and services.

Greater species diversity increases a forest's ability to withstand pests, diseases and climate change by reducing the risk of large-scale damage. Different tree species also contribute in complementary ways to soil health, water regulation and carbon storage. Sustainable forest management promotes tree species diversity by favouring mixed stands, protecting native species and avoiding over-reliance on monocultures.

Monitoring tree species composition helps identify trends in forest degradation, the spread of invasive species, or climate-driven changes. In addition, species diversity also enhances the cultural, aesthetic and recreational values of forests. In economic terms, it broadens the potential for diversified forest-based products and markets. Maintaining tree species diversity is essential for both conservation objectives and the long-term stability of forest ecosystems.

How it is defined

Area of forest and OWL, classified by number of tree species occurring.

Key findings

- European forests became steadily more diverse in tree species composition between 2005 and 2020. Almost 70% of forest area now comprises two or more tree species. About 30% of the forest stands contain a single tree species, and these are mainly coniferous.

- Species diversity and ecosystem dynamics vary considerably across Europe. Tree-species composition depends on natural factors – such as climate, soil and hydrology, or stand development stage – and on past and present human in¸uence through forestry, agroforestry or grazing. Forests composed of several tree species are generally richer in biodiversity, more resilient and functionally more diverse than mono-species stands, but this is also depending on the forest type.

- Recent changes in forest management – favouring mixed stands, promoting natural regeneration and allowing spontaneous forest expansion on abandoned farmland – have contributed to a slow but steady shift away from single-species forests. However, knowledge gaps remain about how best to design future forest structures that are simultaneously resilient, productive and ecologically functional under changing climate conditions. The climax stages of some natural forest ecosystems are naturally dominated by one or two species, such as boreal pine forests on dry sites, subalpine spruce stands and beech forests.

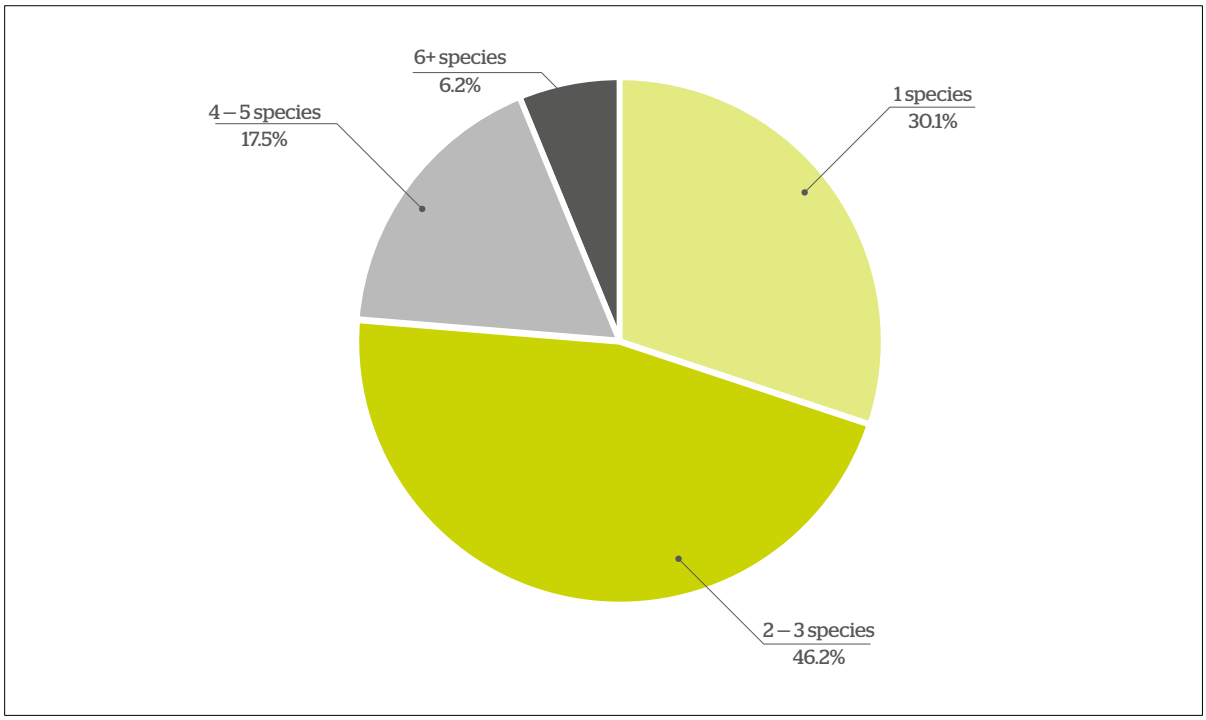


Figure 4.1-1: *Forest area in Europe classified by number of tree species occurring, 2020*

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

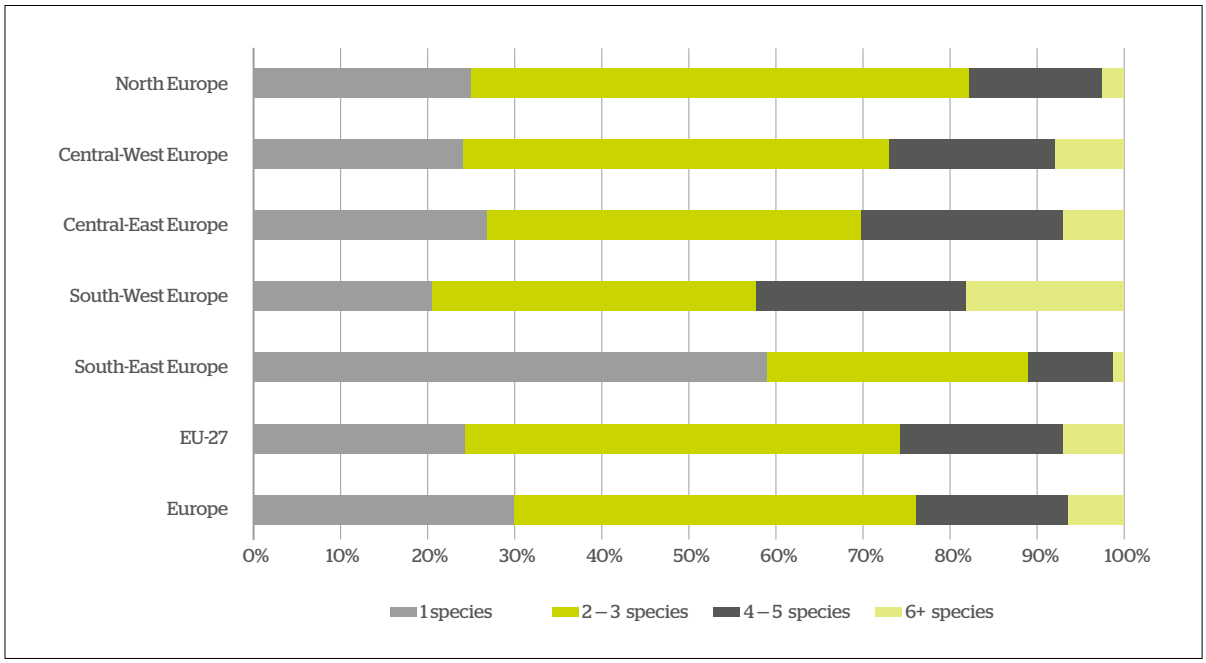


Figure 4.1-2: *Forest area classified by number of tree species occurring, by region, 2020*

Note: Data coverage as % of regional forest area: NE 95%, C-WE 61%, C-EE 52%, S-WE 99.9%, S-EE 77%, EU-27 93%, Europe 78%.

Status

Twenty-seven countries reported data for 2020, representing 78% of Europe's total forest area. The results show that roughly one-third of forests are dominated by a single species (Figure 4.1-1) – mostly pine or spruce, both natural and planted – as well as eucalypt and poplar plantations. About 70% of Europe's forests contain two or more tree species: 46% of stands host two to three species, 17% four to five species and 6% six species or more.

Single-species forests are most common in South-East Europe, where they account for 59.1% of the forest area *(Figure 4.1-2)*. Northern and Central-West Europe have the highest share of two-species stands, while South-West Europe records the greatest proportion of forests composed of six or more tree species (18%).

Trends

European forests are in a transition phase - from historically simplified forests towards more diverse, resilient tree species compositions. This is particularly driven by climate-driven pressures and changes. Hence, tree species diversity is slowly increasing in many countries, driven by natural regeneration, afforestation, forest restoration, and a shift toward mixed stands in forest policy.

The share of forests dominated by a single tree species has decreased slowly but steadily in favour of more species-diverse stands *(Figure 4.1-3)*. Between 2010 and 2020, all regions saw an increase in forests with two to five species. Northern Europe, in particular, gained a richer tree species composition over this period. The category of six or more species represents a minor share overall and showed little change over time, except in southern regions of Europe.

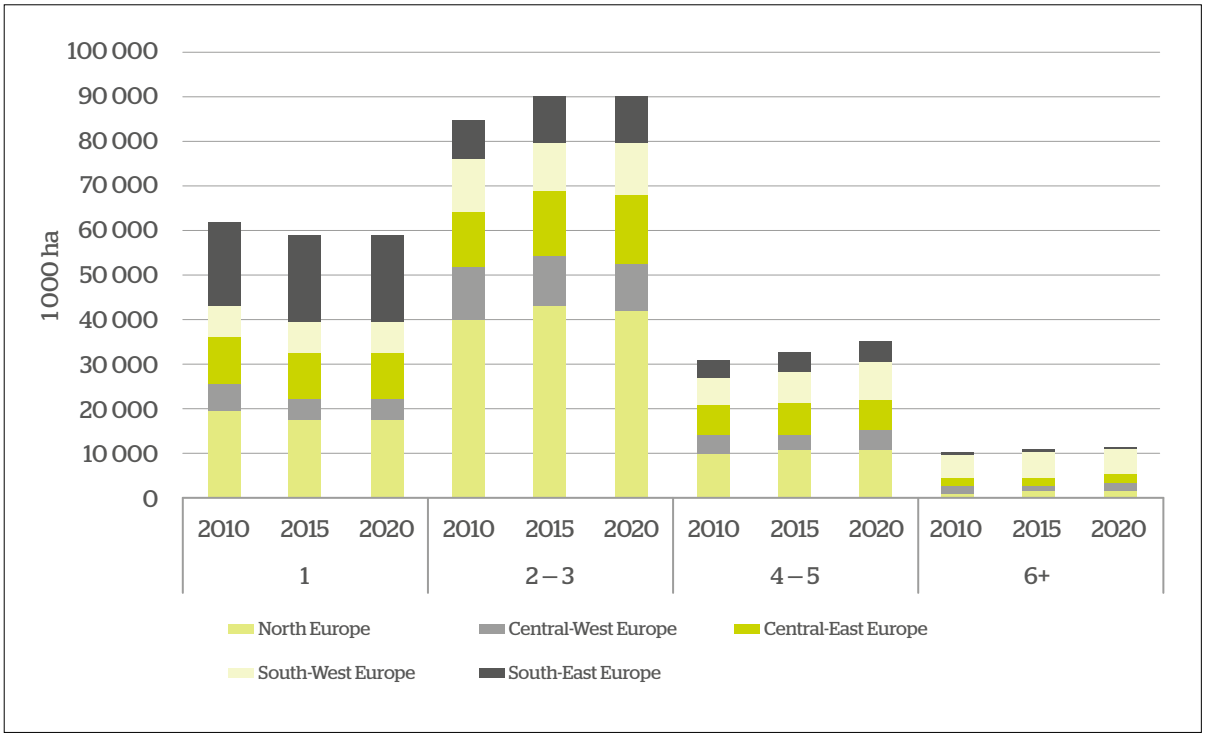


Figure 4.1-3: *Trends in area of forest classified by number of tree species occurring, by region, 2010–2020*

Note: Data coverage as % of regional forest area: NE 100%, C-WE 61%, C-EE 70%, S-WE 99.9%, S-EE 77%, EU-27 93%, Europe 78%. For those where data was absent the last available information was used

Indicator 4.2 *Regeneration*

Why it is important

Regeneration is the natural or assisted renewal of forest stands through seed germination, sprouting, or planting, and is fundamental to the continuity of forest ecosystems. Successful regeneration ensures that forests maintain their ecological functions, productivity and biodiversity after harvesting, natural disturbances or aging.

Natural regeneration supports ecosystem integrity by favouring native species and preserving genetic diversity, while artificial regeneration allows for targeted restoration and adaptation to climate change.

Monitoring regeneration reveals whether forests are being maintained or degraded over time. Poor regeneration may signal overuse, site degradation, unsuitable management or excessive ungulate populations. Sustainable forest management ensures that regeneration matches or exceeds removals, securing long-term forest cover and resource availability. Regeneration is therefore essential for forest vitality, continuity and the economic, ecological and social value of forests for future generations.

How it is defined

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

Key findings

- Around 74% of Europe's forest area has developed through natural regeneration and spontaneous expansion, while coppice forests account for about 2%. Afforestation and regeneration through planting and/or seeding represent the remaining 26%.
- The share of forests originating from natural regeneration and expansion is gradually increasing in most European regions, with northern Europe as the main exception.

Status

Natural regeneration preserves the genetic diversity, structure and dynamics of forest ecosystems. However, transforming monocultures or stands of introduced species into more site-adapted forests often requires planting to introduce missing species. Using new provenances of native trees can also enhance resilience to climate change or maintain productivity. Artificial regeneration may become essential after large-scale disturbances—such as storms, bark beetle outbreaks, or wildfires—to restore forest cover swiftly.

Thirty-nine countries, representing more than 99% of Europe's forest area, reported data on stand origin. Even-aged and uneven-aged forests are analysed together.

Table 4.2-1: *Forest area by stand origin types, by region, 2025*

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	52 885	74.0	18 535	26.0	0	0.0
Central-West Europe	25 690	64.7	14 004	35.3	211	0.5
Central-East Europe	26 463	57.5	19 522	42.5	742	1.6
South-West Europe	26 005	81.4	5 930	18.6		0.0
South-East Europe	35 922	94.8	1 956	5.2	4 097	10.8
EU-27	***113 395***	***70.1***	***48 445***	***29.9***	***3 211***	***1.8***
Europe	***166 964***	***73.6***	***59 947***	***26.4***	***5 050***	***2.2***

Notes: Coppice is a subset of the category "Natural regeneration and natural expansion". Data coverage as % of total forest area: NE 100%, C-WE 100%, C-EE100%, S-WE 100%, S-EE 97.1%, EU-27 100%, Europe 99.9%

In total, 170 million ha – or 74% – of Europe's forests originated through natural regeneration and expansion *(Table 4.2-1)*; 60 million ha (26%) were established by afforestation or planting/seeding; and five million ha (2%) are coppice stands. Natural regeneration exceeds 60% of total forest area in all regions except Central-East Europe, where the share is 57.5%, and where afforestation and planting account for 42.5% - the highest proportion among all regions. Coppicing is most prevalent in South-East Europe (9.8%).

Of the 39 reporting countries, 23 reported that more than two-thirds of their forest area had been established by natural regeneration or expansion in 2020 *(Figure 4.2-1)*. These include Bulgaria, Croatia, Cyprus, Estonia, France, Georgia, Italy, Latvia, Liechtenstein, Montenegro, Norway, Romania, Slovenia, Spain, Switzerland and Türkiye (≥80%). In contrast, Belgium, Czechia, Denmark, Iceland, Ireland, Poland, Portugal, the Netherlands and the United Kingdom each reported more than 60% of their forests as originating from afforestation or planting/seeding.

In some countries – such as Hungary, Croatia, Greece and Bosnia and Herzegovina – coppice forests account for more than 10% of forest area. A few countries reported coppicing as natural regeneration, meaning that the actual total may be slightly higher.

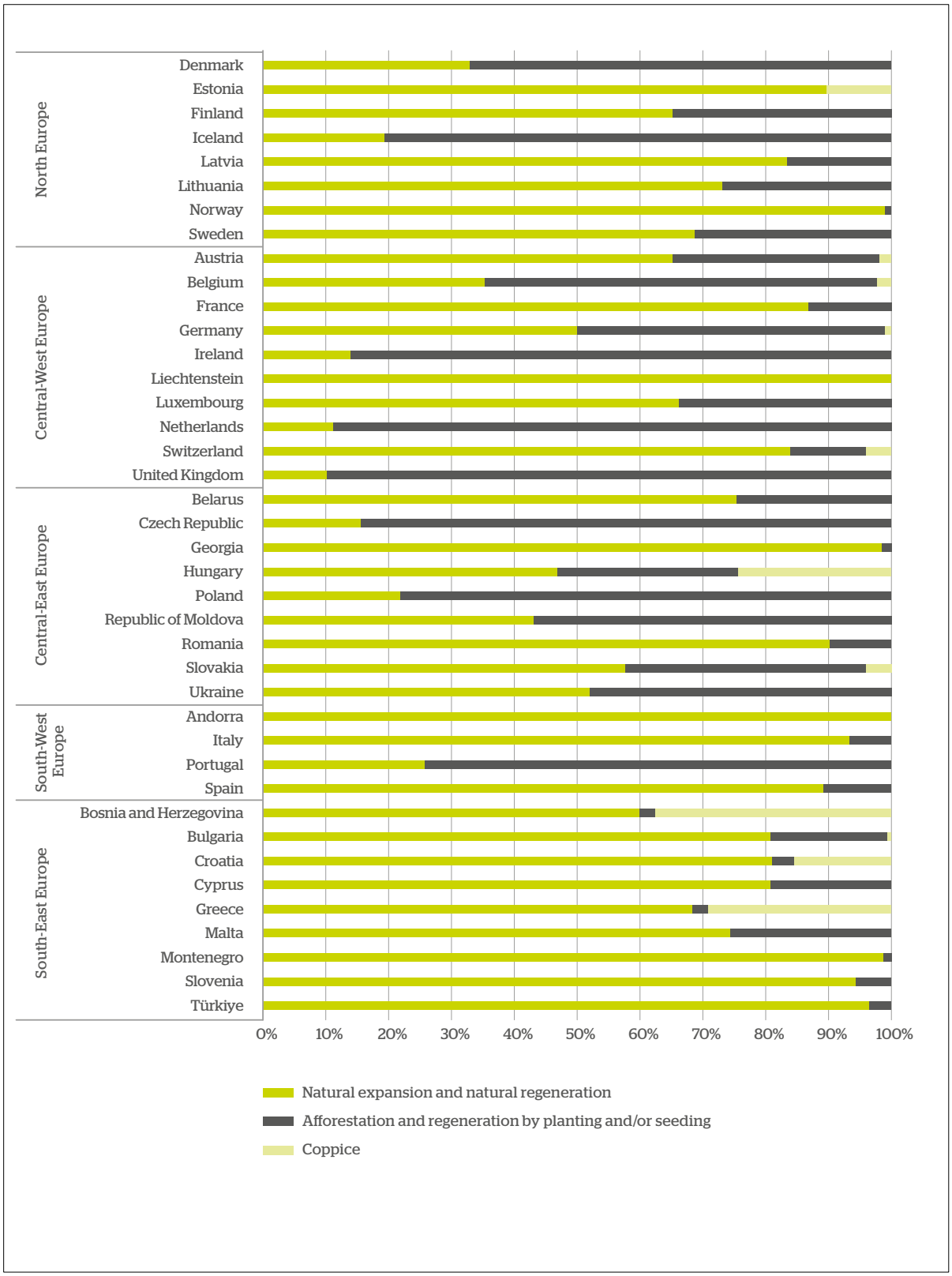


Figure 4.2-1: *Forest area by stand origin, by country, 2025*

Trends

Long-term trends in forest regeneration provide insight into how forest management practices and regeneration strategies have evolved over time. Changes in the relative use of natural regeneration, planting and seeding, and coppice systems reflect responses to shifting policy priorities, economic conditions, disturbance regimes, and emerging challenges such as climate change, while also revealing regional differences in adaptation pathways across Europe.

Thirty-six countries provided data on regeneration trends for the years 1990, 2000, 2010 and 2025. The total area established through afforestation or planting/seeding increased from 40.8 million ha in 1990 to 51.1 million ha in 2025 – a 27.2% rise. Coppice forests expanded by 732 000 ha over the same period.

The share of forests originating from natural regeneration or natural expansion has increased in most European regions since 1990 *(Figure 4.2-2)*. Central-East and Central-West Europe show relatively stable proportions. South-East Europe and particularly South-West Europe demonstrate noticeable increases. Northern Europe is the exception, where planting and seeding continue to dominate and the share of naturally regenerated forests has decreased since 1990.

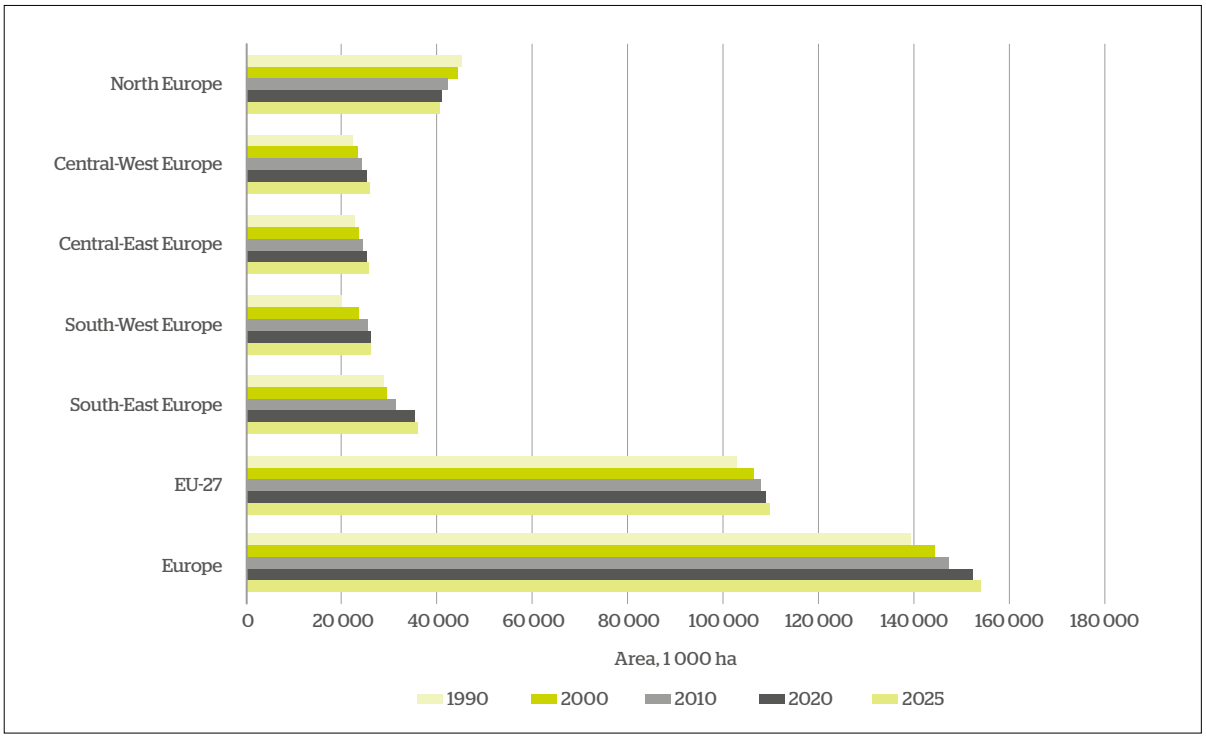


Figure 4.2-2: *Trend in forests originated from natural regeneration or natural expansion, by region, 1990–2025*

Notes: Data coverage as % of regional forest area: NE 82%, C-WE 100%, C-EE 80%, S-WE 100%, S-EE 98,2%, EU-27 87%, Europe 87%.

Indicator 4.3 *Naturalness*

Why it is important

Naturalness describes how close a forest is to its natural condition—shaped primarily by ecological processes rather than intensive human intervention. Forests with high naturalness typically contain native tree species, uneven-aged structures (trees of different ages), deadwood and few visible signs of human alteration. These forests provide important habitats for specialised and threatened species, support biodiversity conservation and deliver essential ecological functions such as carbon storage and water regulation.

Maintaining or improving naturalness is an important objective of sustainable forest management, especially in protected areas and ecological networks. It also supports resilience by allowing forests to adapt naturally to disturbances and climate change.

Monitoring naturalness helps assess how forest use affects ecosystems and guides conservation or restoration efforts. Although not all managed forests can have a high degree of naturalness, promoting elements of naturalness can improve their ecological values. Integrating these elements into forest management practices helps forests to remain healthy, resilient and self-sustaining ecosystems over the long term.

How it is defined

Area of forest and OWL by class of naturalness.

Key findings

- Over the period 1990–2025, the extent of semi-natural forests, forest plantations, and forests with minimal human intervention increased in Europe, in line with the overall growth of forest area.

Table 4.3-1: *Forest area by classes of naturalness and region, 2025*

Region	Undistributed		Semi-natural		Plantation	
	1000 ha	*% of forest area*	*1000 ha*	*% of forest area*	*1000 ha*	*% of forest area*
North Europe	3 033	4.2	67 682	94.8	705	1.0
Central-West Europe	107	0.3	35 506	97.0	1 006	2.7
Central-East Europe	943	2.1	44 435	96.6	606	1.3
South-West Europe	118	0.4	29 850	93.5	1 950	6.1
South-East Europe	798	2.0	38 191	95.3	1 071	2.7
EU-27	***3 801***	***2.4***	***153 775***	***95.1***	***4 053***	***2.5***
Europe	***5 000***	***2.2***	***215 664***	***95.4***	***5 339***	***2.4***

Notes: Data coverage as % of regional forest area: NE 100%, C-WE 92%, C-EE 100%, S-WE 99.9%, S-EE 92%, EU-27 100%, Europe 97%

- By 2025, semi-natural forests dominate European forest cover, accounting for approximately 95.4%, while forest plantations and forests undisturbed by humans represent 2.4% and 2.2%, respectively.
- Forests undisturbed by humans are most prevalent in northern, south-eastern, and central-eastern Europe, whereas plantations are most concentrated in south-western Europe.

Status

Analyses for 2025 draw on data from 39 European countries. Semi-natural forests dominate, covering 215.7 million ha (95.4% of forest area). Forests undisturbed by man account for 2.2% and plantations for 2.4% *(see Table 4.3-1 and Figure 4.3-1)*.

By definition, the semi-natural category encompasses a wide range of conditions. Countries further reported subclasses, including naturally established stands, naturalised introduced species, stands established by planting or seeding, coppice forests and stands of unknown origin. Roughly 48.1% of semi-natural forests are naturally established, while 27.2% originated from planting or seeding. Naturally established forests dominate in Northern Europe.

Forests undisturbed by humans cover about 50 million ha (2.2% of Europe's forest area), with the highest proportions in North, South-East and Central-East Europe. Sweden (approximately 2 096 000 ha), Bulgaria (596 000 ha), Georgia (684 000 ha) and Finland (603 000 ha) each report extensive undisturbed forest areas. National definitions of "undisturbed by humans" vary among countries. Sixteen European countries classify more than 1% of their forest area as undisturbed. Such forests are typically located in remote or inaccessible regions with harsh climatic or topographic conditions.

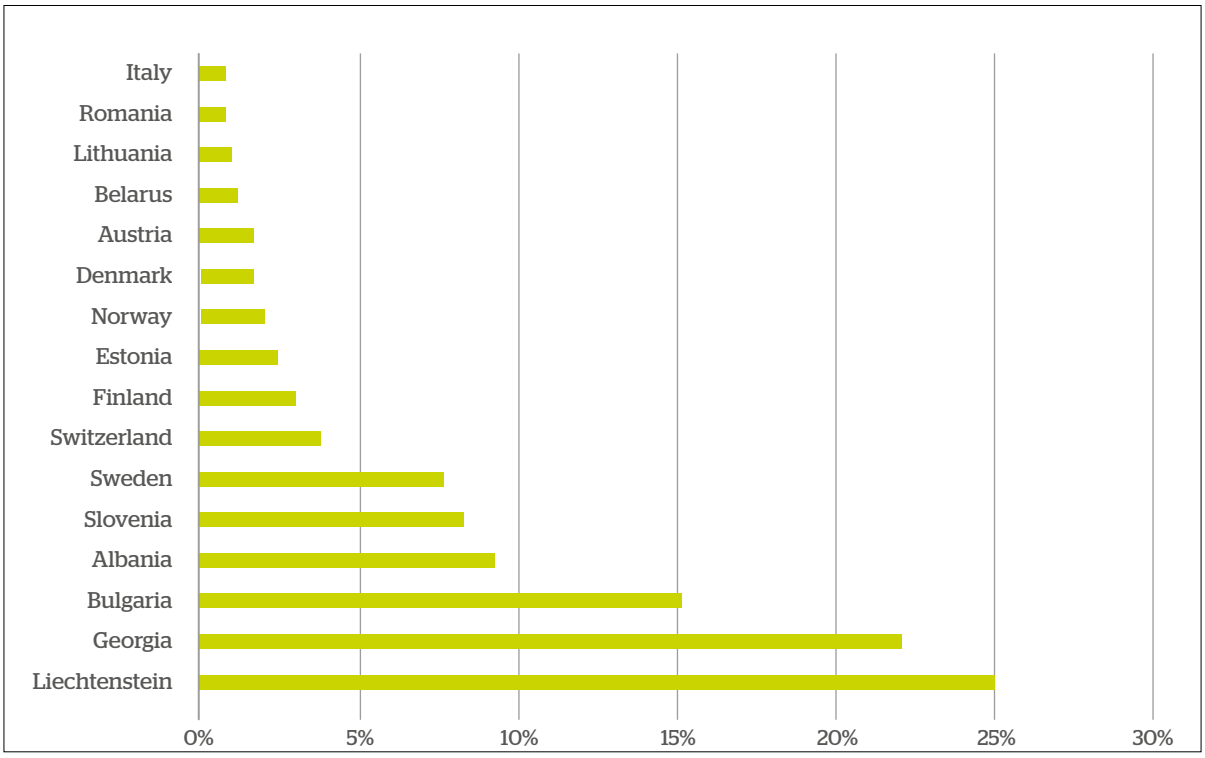


Figure 4.3-1: *Share of forest undisturbed by man in the total forest area, by country, 2025*

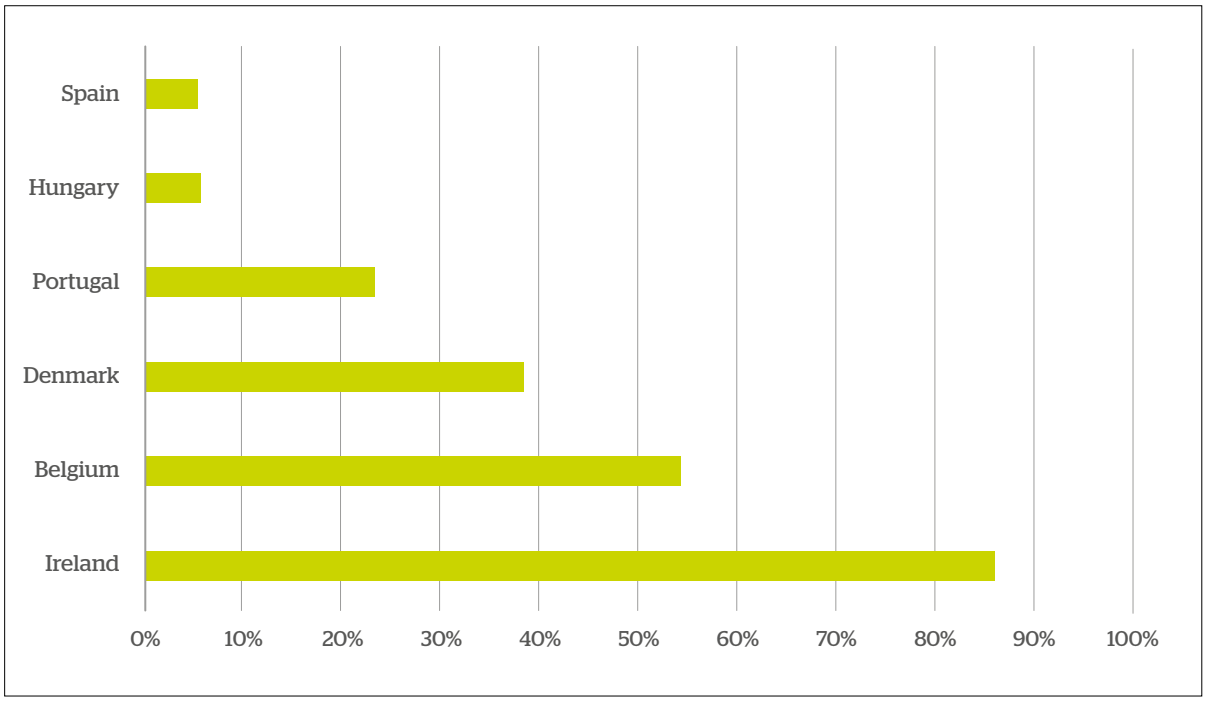


Figure 4.3-2: *Share of plantations in total forest area, 2025 (selected countries)*

Plantations cover about 5.3 million ha across Europe. They are important for wood production in many countries; nine countries report plantation shares of around 2.5% of their forest area. Stands of native species initially established as plantations but no longer intensively managed may be reclassified as semi-natural forests – potentially influencing national interpretations, especially for older plantations now developing towards semi-natural conditions.

Trends

Assessing trends in forest naturalness provides information on changes in the distribution of forests according to their degree of human influence over time. The classification of forests into semi-natural forests, forest plantations, and forests undisturbed by humans supports the analysis of long-term developments and regional patterns in forest management intensity and land-use history across Europe.

From 1990 to 2025, semi-natural forests expanded by 11.7%, plantations by 16.3% and forests undisturbed by humans by 30.5%. These increases partly reflect both the overall enlargement of forest area and evolving definitions. The reported growth in undisturbed forest area also mirrors strengthened protection measures, as many former semi-natural forests designated as protected have subsequently been reclassified as "undisturbed by humans". It has to be noted that the classification of forests by naturalness is based on broad categories that simplify a continuous gradient of human influence and may not fully capture differences in management intensity within forest types. Variations in national definitions, data sources, and inventory methods also affect comparability across countries and over time.

Indicator 4.4 *Introduced tree species*

Why it is important

Introduced tree species are often planted to meet economic, restoration or climate adaptation goals. When carefully selected and responsibly managed, they can provide valuable timber, enhance productivity and support forest resilience under changing conditions. However, some introduced species may pose ecological risks, such as outcompeting native flora, altering soil and water dynamics or reducing biodiversity. Sustainable forest management requires careful evaluation of the ecological impacts, site suitability and long-term consequences of introducing non-native species.

Monitoring their spread and performance helps prevent unintended negative effects and supports adaptive management. In some contexts, introduced species can complement native ones in mixed forests or degraded land restoration. However, prioritising native biodiversity and ecosystem integrity remains essential. Policy frameworks often regulate the use of introduced species to balance economic benefits with environmental safeguards. Responsible use of introduced tree species is part of a broader strategy to ensure forests remain productive, diverse and ecologically sound.

How it is defined

Area of forest and OWL dominated by introduced tree species.

Key findings

- Introduced tree species are uncommon in European forests, covering about 3.7% of the forest area. However, their potential may be reassessed in response to climate change and increasing demand for forest products and services, provided invasive species are avoided.
- Central-Western Europe shows the largest proportion of introduced tree species, reaching just under 9% in 2025, with a moderate upward trend since 2010, while other European regions have remained largely stable over the same period.

Status

As of 2025, 28 countries report a combined 6.9 million ha of forests dominated by introduced tree species, equivalent to 3.7% of Europe's total forest area. The largest proportions occur in Central-West and South-West Europe, where these species occupy 2.2 and 2.1 million ha respectively, corresponding to 9% and 7% of their forest area. In contrast, Northern Europe reports less than 1.3% (861 000 ha).

Ireland, Iceland, Denmark, Hungary, Belgium and Luxembourg have the highest national shares of introduced species, reflecting extensive afforestation programmes *(Figure 4.4-1)*. In Iceland, where *Betula pubescens* is the only native forest tree,

Table 4.4-1: *The forest area occupied by introduced tree species, by region, 2025*

Region	*Eucalyptus spp*	*Larix spp*	*Picea spp*	*Pinus spp*	*Populus spp*	*Pseudotsuga spp*	*Quercus spp*	*Robinia spp*	*Other*
	1 000 ha / percent of the total forest area								
North Europe	0.9	61.3	180.7	512.1	17.8				111.9
		0.1	0.3	0.7					0.2
Central-West Europe		48.5	196.6	261.8	170.8	539.3	95.6	272.2	102.4
		0.2	0.7	1.0	0.6	2.0	0.4	1.0	0.4
Central-East Europe	3.0		1.8	66.0	8.4	45.0	29.2	302.5	612.7
				0.5	0.1	0.3	0.2	2.2	4.4
South-West Europe	1 638.7			408.7	106.1	22.4	17.4	22.2	12.4
	5.1			1.3	0.3	0.1	0.1	0.1	0.0
South-East Europe	4.2	2.3		63.7	73.7	15.8		379.0	26.4
				0.2	0.2			1.2	0.1
EU-27	***1 641.7***	***96.7***	***320.4***	***1 205.6***	***335.6***	***616.4***	***141.2***	***799.6***	***828.5***
	1.3	***0.1***	***0.3***	***1.0***	***0.3***	***0.5***	***0.1***	***0.7***	***0.7***
Europe	***1 646.8***	***112.1***	***379.0***	***1 312.2***	***376.8***	***622.4***	***142.2***	***975.8***	***865.8***
	0.9	***0.1***	***0.2***	***0.8***	***0.2***	***0.4***	***0.1***	***0.6***	***0.5***

Note: Data coverage as % of regional forest area: NE 96,9%, C-WE 69%, C-EE30%, S-WE 99,9%, S-EE 74%, EU-27 - 76%, Europe 75%.

introduced species – mainly *Picea sitchensis*, *Pinus contorta* and *Larix* spp. – account for over 60% of forest cover. Ireland and Denmark report 60% and 42% respectively, largely comprising non-native conifers planted to increase timber production.

Key introduced species used in Europe include *Pseudotsuga menziesii*, *Picea sitchensis*, *Pinus contorta* (and other *Pinus* spp.), *Larix* spp., *Populus hybrids* and clones, *Robinia pseudoacacia*, *Quercus rubra* and various *Eucalyptus* species. The most extensive are *Eucalyptus* spp. (1.6 million ha) and *Pinus* spp. (just over 1.3 million ha). *Picea* spp. (notably *P. abies* (being introduced in some regions) and *P. sitchensis*) cover around 0.4 million ha in Central-West and Northern Europe, holding significant commercial importance.

Eucalyptus spp. dominates in South-West Europe, particularly in Portugal and Spain. *Pseudotsuga menziesii* (Douglas fir) has become a prominent introduced species in Central-West Europe due to its high growth rates, valuable timber, and relative resistance to pests, diseases and drought. Douglas fir currently covers around 0.6 million ha in Europe. *Larix* spp. (such as *L. decidua*, *L. kaempferi*, *L. europea*, *L. leptolepis*) and *Populus* spp. (excluding *P. tremula*) are reported across all European regions *(Table 4.4-1)*.

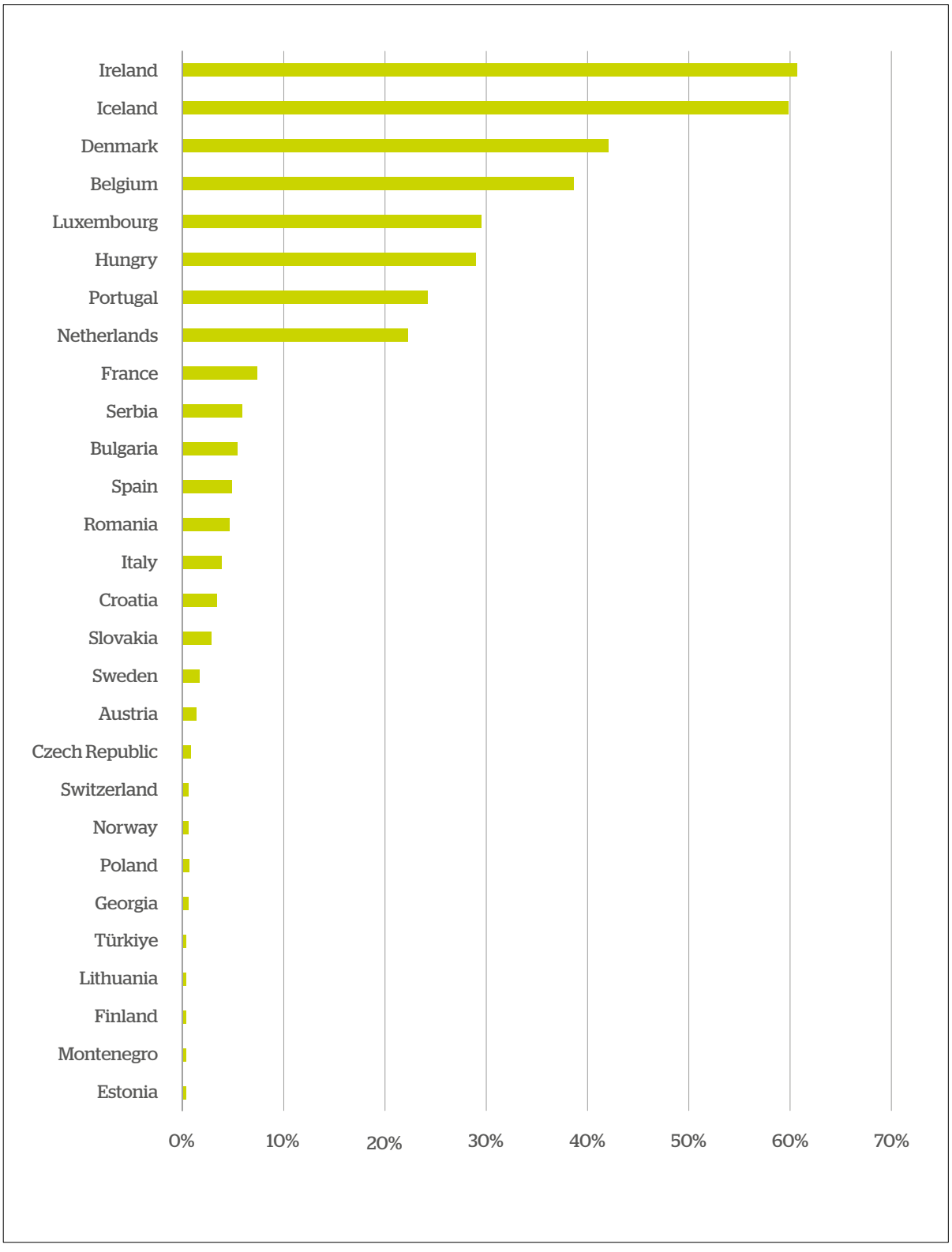


Figure 4.4-1: *Share of forest area dominated by introduced tree species, by country, 2025*

Among introduced species, some are considered invasive alien trees. Although their coverage is limited (around 1.4 million ha), their spread raises concern. *Robinia pseudoacacia* is the most widespread invasive alien tree species in Europe, occupying approximately 435 000 ha. Other notable invasive alien tree species include *Ailanthus altissima*, *Acer negundo*, *Acacia* spp., *Prunus serotina*, and *Quercus rubra*, which are subject to monitoring or management due to their invasive characteristics.

Trends

Assessment of temporal trends in invasive alien tree species is based on reported changes in their distribution and forest area over time. Consistent reporting of the presence and extent of introduced tree species enables analysis of long-term developments and regional patterns related to biological invasions in European forests.

Among the 21 countries providing time-series data, the total area of forests dominated by introduced species has remained relatively stable over the past 35 years. A slight decline is observed in Southern Europe, possibly reflecting shifting perceptions and a growing preference for native species. Only marginal changes are reported in the area occupied by invasive alien trees. Notable decreases occurred in Belgium and Sweden, while Hungary and Spain recorded modest increases.

Indicator 4.5 *Deadwood*

Why it is important

Deadwood – such as fallen trees, branches and standing dead trees – is an important component of healthy forests. It provides essential habitat for a wide range of organisms, including fungi, insects, birds and small mammals, many of which are dependent on decaying wood for survival. Deadwood also plays a key role in nutrient cycling, soil formation and carbon storage. Its presence is an indicator of natural forest dynamics and ecological continuity. In managed forests, retaining deadwood supports biodiversity and helps maintain ecosystem functions.

Sustainable forest management encourages the conservation of standing and fallen deadwood in forests by integrating retention practices during harvesting and avoiding unnecessary removal. Monitoring how much deadwood is present helps assess forest naturalness, habitat quality and long-term ecological health. While too much deadwood can increase wildfire risks or pest risks in certain regions, a balanced approach can protect forest ecosystems and public safety. Integrating deadwood into forest planning shows a commitment to managing forests not just for wood production, but also for nature conservation and ecosystem resilience.

How it is defined

Volume of standing deadwood and lying deadwood on forest and OWL.

Key findings

- A sustained increase in deadwood has been observed in European forests, resulting in an average volume of 14 m³/ha in 2020, equivalent to 8.6% of the growing stock density.
- Deadwood levels have increased across all European regions over the last 20 years. This is likely due to more frequent disturbances caused by changing climate conditions and the adoption of more nature-oriented forest management practices.

Status

Deadwood information is reported in absolute terms (volume per hectare) and relative to the growing stock. It can also be distinguished by type (standing or lying), species composition, size and degree of decay. Lying deadwood usually supports a greater diversity of species than standing deadwood, though some organisms depend exclusively on one form or the other.

For 2020, 29 countries reported data covering 84% of Europe's forest area. At the pan-European level, the weighted average total deadwood volume is 14 m³ per ha – equivalent to 8.6% of growing stock volume. For EU-27 countries, corresponding figures are 13.4 m³ per ha and 7.7% of growing stock volume.

Lying deadwood predominates, accounting on average for about 60% of total deadwood volume. However, in some countries – Italy, Hungary, the Netherlands and Türkiye – standing deadwood is more prevalent.

Regionally, total deadwood volume in 2020 ranged from 16.4 m^3 per ha in South-West Europe to 24.5 m^3 per ha in Central-West Europe. Nationally, values ranged from as little as 0.1 m^3 per ha (Iceland) to 31.8 m^3 per ha (Switzerland). The share of deadwood relative to growing stock volume varied from below 3% (Denmark, Romania, Moldova and Iceland) to around 10% (France, Georgia, Italy, Latvia and Türkiye) *(Figure 4.5-1)*.

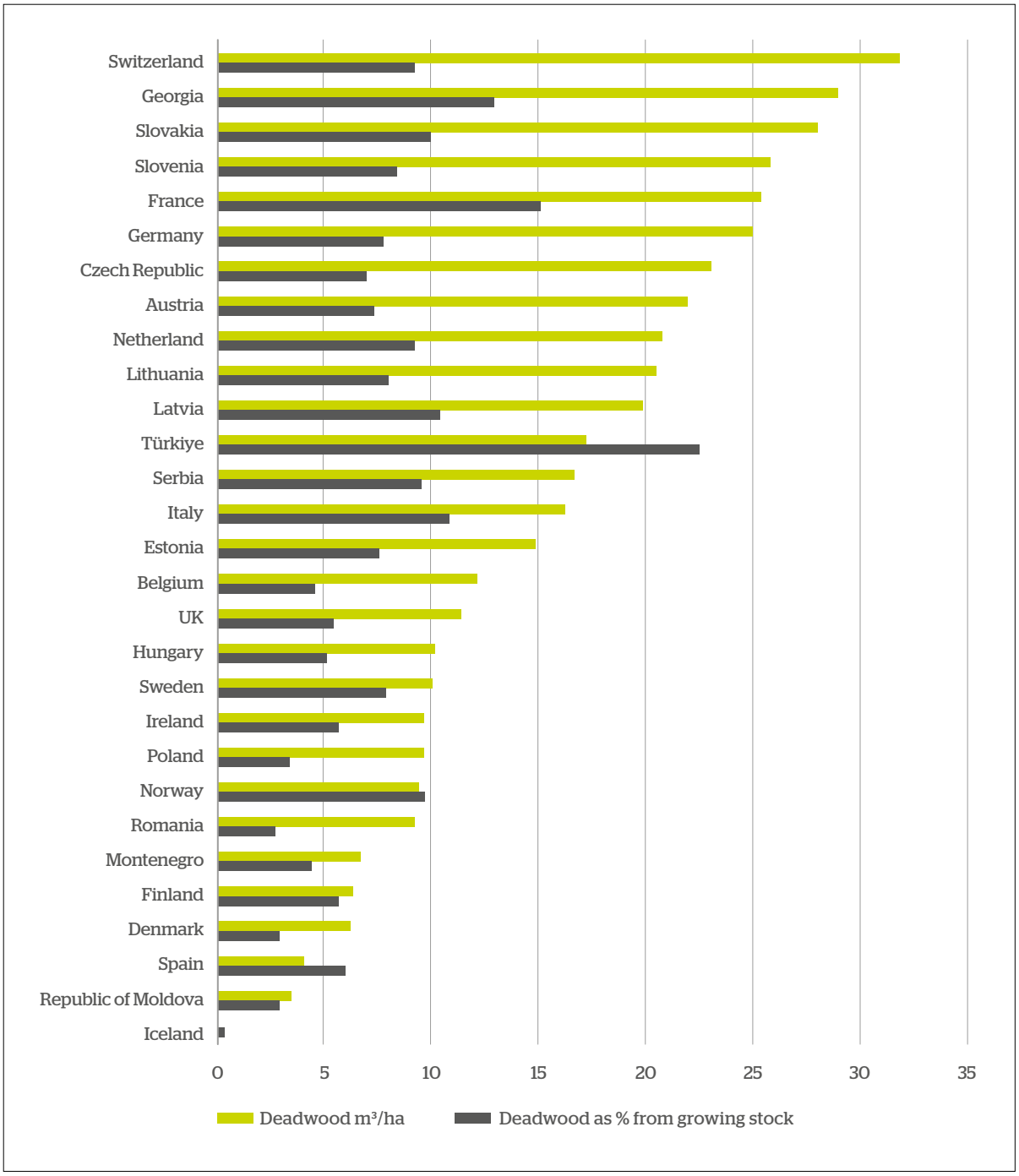


Figure 4.5-1: *Deadwood volume per hectare and proportion of deadwood volume to growing stock (in %), by country, 2020*

Trends

Trend analysis of deadwood is based on a subset of countries with continuous time series, covering a substantial share of Europe's forest area. The availability and consistency of data vary by region, with particularly robust reporting for Northern and Central-West Europe, allowing changes in standing and lying deadwood to be examined over time in relation to disturbance regimes and forest management practices.

Trend analysis is based on 21 countries with continuous data for 2000–2020, covering 62% of Europe's forest area. Data for Northern and Central-West Europe is particularly robust and show clear increases in both standing and lying deadwood volumes over the period. Figure 4.5-2 shows the changes in standing and lying deadwood by region. Data coverage is sufficient for Northern and Central-West Europe, where increases in both types of deadwood are evident over the period considered.

A general upward trend can also be inferred for the southern regions, although data coverage there is lower. The rise in deadwood volumes reflects multiple drivers: more frequent natural disturbances (storms, insect outbreaks and fires) associated with changing climatic conditions, and the wider adoption of close-to-nature management practices and certification schemes that favour deadwood retention.

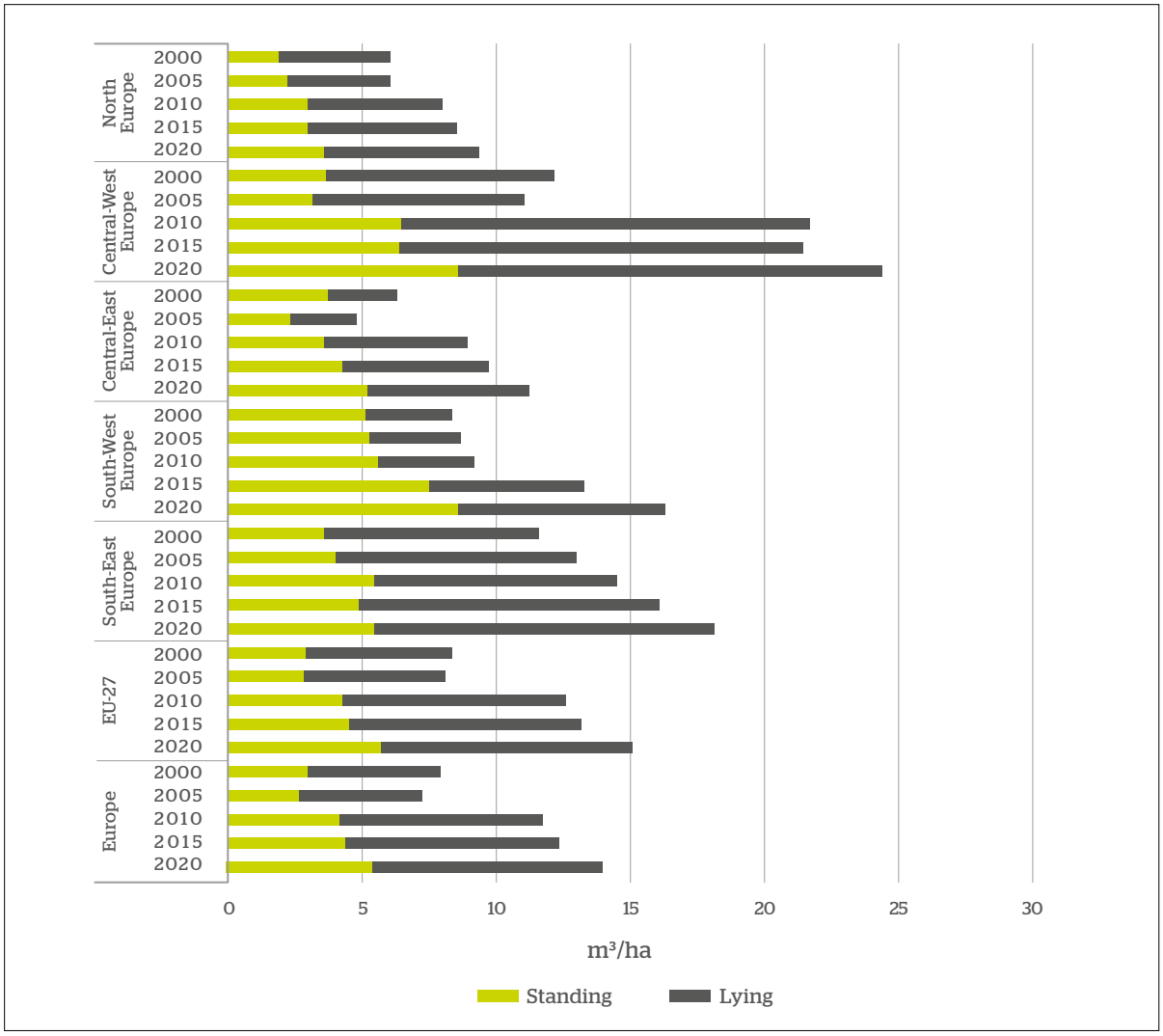


Figure 4.5-2: *Weighted average volume of standing and lying deadwood, by region, 2000–2020*

Note: Data coverage as % of regional forest area: NE 96%, C-WE 91%, C-EE57%, S-WE 30%, S-EE 9%, EU-27, Europe 62%

Indicator 4.6 *Genetic resources*

Why it is important

Forest genetic resources is the hereditary material maintained within forest trees that determines how well trees grow, resist diseases and cope with changes to climate. Conserving genetic diversity is essential for the long-term resilience and adaptability of forest ecosystems, especially in the face of climate change, pests and other disturbances. It ensures that forests can continue to evolve naturally and remain resilient under changing conditions, supporting their ecological and economic value.

Sustainable forest management actively supports the conservation and use of forest genetic resources through practices such as natural or artificial regeneration, seed collection from diverse sources, and the protection of rare or locally adapted tree species and populations. *In situ* conservation areas are the primary tool for safeguarding this diversity, supplemented by *ex situ* methods such as forest gene banks and seed orchards. Monitoring and managing genetic resources strengthens the adaptive capacity of forests and supports restoration, breeding programmes and reforestation efforts.

How it is defined

In situ and *ex situ* conservation of forest genetic resources and potential for the production of forest reproductive material.

Key findings

- The total number of conserved native species populations has risen from 495 across 50 species in 1990 to 5 177 encompassing 103 species in 2025 across 36 countries. Although the proportion of populations identified as conservation targets remains relatively low, the number of established genetic conservation units is steadily increasing. Twenty-eight countries reported capacity for producing forest reproductive material, covering a total of 165 tree species.

- The uneven geographical distribution of populations managed for genetic conservation of native species demonstrates that conservation efforts must intensify significantly. Current gaps indicate that a large proportion of European species' valuable genetic resources are not being conserved. On average, each country conserves genetic resources for only 21% of its native tree species.

- Progress can now be monitored over time through EUFORGEN's synthetic radar chart[6], which also allows for retrospective analysis dating back to the onset of conservation efforts for forest genetic resources.

The conservation and use of forest genetic resources is essential for sustainable forest management. Genetic diversity enables forest trees to survive, adapt and evolve in response to environmental changes and pests. In Europe, forest management relies heavily on wild and semi-wild tree populations. Natural and artificial forest regeneration also requires the strategic use of genetic material.

In this context, native species' populations are defined as local populations of those 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 considered non-native in the country concerned and, as a result, can only be conserved *ex situ*.

[6]*Lefèvre, F., Alia, R., Bakkebø Fjellstad, K., Graudal, L., Oggioni, S.D., Rusanen, M., Vendramin, G.G., Bozzano, M. 2020. Dynamic conservation and utilization of forest tree genetic resources: indicators for in situ and ex situ genetic conservation and forest reproductive material. European Forest Genetic Resources Programme (EUFORGEN), European Forest Institute. 33 p. www.euforgen.org/fileadmin/templates/euforgen.org/upload/Publications/Thematic_publications/EUFORGEN_IGR_4.6.pdf*

Following the establishment of the European Information System on Forest Genetic Resources (EUFGIS) in 2010, 36 European countries started to make use of the pan-European minimum requirements for dynamic genetic conservation units of forest trees[7], as the minimum 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 marketed for forestry purposes, such as fruits, seeds, cones and parts of plants for vegetative propagation, is sourced from one of six types of registered basic material —seed sources, stands, seed orchards, parents of families, clones or clonal mixtures.

Since the State of Europe's Forest 2020 report, the EUFORGEN Programme has revised the analytical framework for genetic resource indicators. The new framework uses specific verifiers to better assess the status of forest genetic resources in Europe and monitor progress in forest genetic resources conservation. The verifiers assess dynamic conservation of native species populations (both *in situ* and *ex situ*) by species and country: (a) Dynamic Conservation Effort, (b) the Species Diversity Index, (c) the Ecotype Diversity Index, and (d) the Insurance Index.

Status

A total of 36 countries reported their 2025 data on the revised indicator (or part of it) to the EUFORGEN Secretariat at the European Forest Institute. Most of the countries used EUFGIS to report on the dynamic conservation of native and non-native populations. The EUFGIS database is populated by national data providers and, in March 2025, contained data on 3 516 genetic conservation units.

The genetic conservation units comprise 4 640 distinct tree populations registered in EUFGIS, most of which (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 forest genetic resources (5 177) is the result of a consultation process with all countries, which allowed some of them to report data independently from EUFGIS.

Twenty-eight countries provided current data on the potential for producing forest genetic resources. Areas managed for forest reproductive material production include seed sources, stands and seed orchards for all four categories of Council Directive 1999/105/EC. The data on forest reproductive material is the result of a consultation process between all countries.

Tree populations managed for genetic conservation

A total of 5 595 populations are actively managed for dynamic genetic conservation: 5 177 populations in 36 countries for native species and 418 populations in 12 countries for non-native species. For forest reproductive material production, 135 023 genetic conservation units are registered in 28 countries covering 165 tree species.

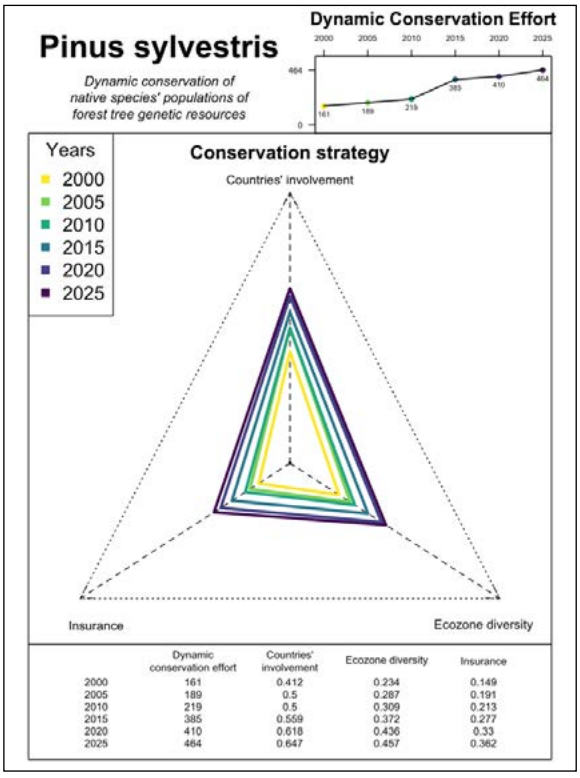
A large proportion of the species targeted for genetic conservation of native species are widely occurring and stand-forming, which are important for forestry. Five economically relevant tree species (*Picea abies*, *Fagus sylvatica*, *Pinus sylvestris*, *Quercus robur* and *Quercus petraea*) account for about half of the total number of genetic conservation units of native species. Many others are economically important tree species but have only a few populations registered as genetic conservation units. Furthermore, very few populations of scattered tree species are managed as genetic conservation units with scattered distributions. These species may have low economic importance, but they

[7] *EUFORGEN. Pan-European minimum requirements for dynamic genetic conservation units of forest trees. (2008).*

often have high value in terms of maintaining forest biodiversity and ensuring ecosystem stability.

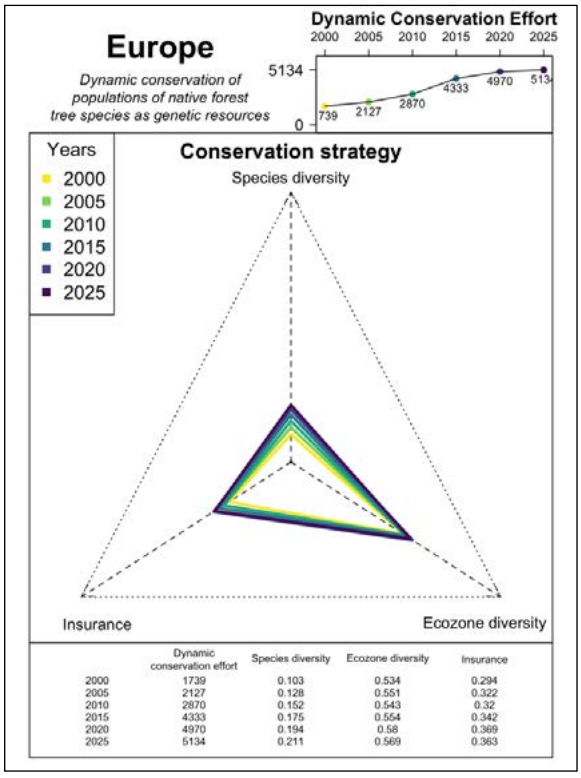
Radar charts *(Figure 4.6-1)* show the actual conservation status of the genetic resources and the efforts that should be made. The chosen species, *Pinus sylvestris*, is one of the five most conserved species in Europe. The top right plot shows how the Dynamic Conservation Effort (number of genetic conservation units) 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 2025 *Pinus sylvestris* is managed in 464 genetic conservation units across almost 65% of the countries where it occurs (Countries' Involvement Index is 0.647). More than 45% of the ecotypes (the different environmental zones in which the species occurs in each country) are represented in the conservation effort (Ecozone Diversity Index is 0.457). One-third of the ecotypes host at least two genetic conservation units (Insurance Index is 0.36). The increase in each verifier shows how conservation status has improved over the time series.

Similarly, there is a new radar chart at the European level for 141 species *(Figure 4.6-2)*, using the data in EUFGIS. On average, only 21% of species are conserved for genetic resources in each country. Almost 60% of the ecotypes in Europe host at least one genetic conservation unit of each species (Ecozone Diversity Index = 0.591) and more than 35% at least two genetic conservation units (Insurance Index is 0.377).



	Dynamic conservation effort	Countries' involvement	Ecozone diversity	Insurance
2000	161	0.412	0.234	0.149
2005	189	0.5	0.287	0.191
2010	219	0.5	0.309	0.213
2015	385	0.559	0.372	0.277
2020	410	0.618	0.436	0.33
2025	464	0.647	0.457	0.362

Figure 4.6-1 *Pinus sylvestris graphical visualization. Scatter plot of dynamic conservation effort and radar chart of countries' involvement index, ecozone diversity index, and insurance index. The numeric values are provided in the table below. Source: EUFGIS, March 2025.*



	Dynamic conservation effort	Species diversity	Ecozone diversity	Insurance
2000	1739	0.103	0.534	0.294
2005	2127	0.128	0.551	0.322
2010	2870	0.152	0.543	0.32
2015	4333	0.175	0.554	0.342
2020	4970	0.194	0.58	0.369
2025	5134	0.211	0.569	0.363

Figure 4.6-2. *Europe graphical visualization. Scatter plot of dynamic conservation effort and radar chart of species diversity index, ecozone diversity index, and insurance index. The numeric values are provided in the table below. Source: EUFGIS. March 2025.*

Regarding the genetic conservation of non-native species, the data reveal that the efforts concentrate on very few species. Three species (*Pseudotsuga menziesii*, *Pinus nigra* and *Robinia pseudoacacia*) account for more than 86.5% of the conserved non-native populations. *Pseudotsuga menziesii* alone accounts for 37% of the conserved populations of non-native species.

Pinus sylvestris, *Picea abies* and *Fagus sylvatica* account for around 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

For the 36 countries that provided data, the conservation of genetic resources of native species has shown progress in recent years. In 1990, six economically important tree species accounted for approximately 70% of populations managed for genetic conservation. By 2015, this percentage encompassed 10 species, rising to 14 species in 2025.

Following inter-country consultation, the total number of conserved native species populations grew from 4 300 in 2015 to 5 177 in 2025. The number of conserved native species has doubled from 50 in 1990 to 103 in 2025. Notably, around 2010 there was a significant increase in the number of countries initiating conservation activities for new species and in the total number of genetic conservation units, largely in response to the launch of EUFGIS in 2010.

At the European level, Dynamic Conservation Effort has tripled since 2000 and Species Diversity Index has more than doubled. However, the other two indices decreased slightly in 2025. While the number of genetic conservation units and species represented has grown, this has not been matched by equivalent growth in either Ecotype Diversity or Insurance Index coverage.

This indicates that further investment in forest genetic resource conservation is needed to support sustainable forest management. Priority areas include increasing representation of species, ecotypes and insurance units—particularly in underrepresented ecozones and especially those with only one genetic conservation unit.

Indicator 4.7 *Forest fragmentation*

Why it is important

Forest fragmentation occurs when large, continuous forest areas are split into smaller and more isolated pieces. This is often caused by roads, agriculture, urban development or infrastructure. This disrupts ecological connectivity, reduces habitat availability and isolates wildlife populations, making them more vulnerable to extinction.

Fragmentation also affects how forests work. It can reduce their ability to regulate water, store carbon and cope with climate change. Sustainable forest management tries to minimise fragmentation by maintaining connected forest landscapes, promoting ecological (for example, wildlife) corridors, and planning land use in a way that preserves large, intact habitats.

Monitoring fragmentation helps identify important areas for conservation, restoration and landscape-level planning. Fragmented forests often experience edge effects, including altered microclimates and increased exposure to invasive species or human disturbance. Reducing forest fragmentation supports biodiversity and ecosystem stability, and facilitates the delivery of forest ecosystem services. Integrated approaches that link forestry, agriculture, and urban planning are essential to address fragmentation.

How it is defined

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

Key findings

- A new metric for connectivity measures forest connectivity across the entire reporting area.
- Forest connectivity in Europe remains moderate overall, with an average connectivity index of about 25%, but there is strong regional variation. Northern Europe shows the highest connectivity (around 32%) due to large continuous forest areas, while Central-West Europe records the lowest (around 18%) because of higher land-use intensity and landscape fragmentation.
- Across Europe, most forests fall into low to medium connectivity classes, indicating that fragmentation still limits ecological coherence. Nonetheless, significant areas of Europe's forests maintain functional connectivity, particularly in the north and east, supporting biodiversity and ecosystem resilience.

Status and trends

The Joint Research Centre (JRC) developed a new methodology to assess forest fragmentation across Europe for the 2025 State of Europe's Forests report. This indicator is based on the results of that assessment. The study provides a harmonised overview of how forests in Europe are structured and to what extent they are broken into smaller patches. Forest fragmentation was measured using the Forest Area Density method at a fixed scale of approximately 500 ha. The analysis is based on the Copernicus High Resolution Forest Type dataset for the year 2021, which has a spatial resolution of 10 metres. This dataset follows the FAO definition of forest and offers consistent coverage across all European countries included in the assessment.

The forest map used in the study combines broadleaved and coniferous forests according to the FAO definition. A moving window of about 500 ha was applied to calculate the degree of connectivity within each local neighbourhood. The results were grouped into five categories of fragmentation, ranging from very high to very low. Outputs include spatial maps, histograms and tabular statistics. In total, 44 reporting units were analysed, comprising the European Union as a whole, five European regions, and 38 individual countries. Because the Copernicus dataset only covers a short period from 2018 to 2021, the report presents results for 2021 only, without any trend analysis over time.

The statistical tables report the area of each reporting unit, the total forest area, the share of forest cover, the distribution of forest across the five fragmentation classes, and two summary indicators. These are the average connectivity within forest cover (FADAV), and the average connectivity within the entire

reporting unit (AVCON). Together with the maps and histograms, these outputs provide a consistent basis for comparing levels of fragmentation between different countries and regions.

Only data from 2021 is assessed, which is not sufficient to identify changes in forest fragmentation over time. Furthermore, the FAO definition of forest was applied to ensure consistency, but national definitions vary and therefore national statistics may not always match the values reported here. Despite these limitations, the analysis provides a harmonised and comparable overview of forest fragmentation at the European scale.

The results show considerable variation across Europe. Austria's forests are mainly characterised by medium and low fragmentation, while Belgium shows a more even distribution across all categories. Ireland has a higher proportion of forests in the very high and high fragmentation classes. Slovenia records the highest overall connectivity, with an average connectivity value of 47.55%. Bulgaria has the highest proportion of forests in the very low fragmentation class, with 35.42%.

In conclusion, the pan-European assessment delivers a clear picture of the spatial distribution and intensity of forest fragmentation across the continent. The products of this study, including maps, statistical summaries and histograms, serve as the official input for indicator 4.7 in the State of Europe's Forests 2025 report and provide essential support for European forest and biodiversity policies.

Forest connectivity in Europe remains moderate overall, with an average connectivity index of around 23%, though regional variation is considerable. Northern Europe shows the highest connectivity (about 32%), reflecting large continuous forest areas and low population density, while Central-West Europe exhibits the lowest level (around 18%) due to more fragmented landscapes and intensive land use. Most forests fall into the low to medium connectivity classes, indicating that fragmentation continues to limit ecological coherence, especially in densely populated areas. Despite these differences, the overall pattern suggests that substantial parts of Europe's forest area still maintain functional connectivity, supporting biodiversity and ecosystem resilience, though further restoration and landscape-level planning are needed to enhance linkages between forest habitats.

Table 4.7.1: *Level of forest connectivity*

Region	Proportion of forest in fragmentation class					Average % of forest connectivity
	Very high	*High*	*Medium*	*Low*	*Very low*	
North Europa	0.42	7.25	17.36	67.54	7.42	31.79
Central West Europe	2.69	23.98	24.20	38.89	10.24	17.65
Central East Europe	1.89	16.59	19.83	40.61	21.08	21.96
South West Europe	2.24	20.14	23.11	41.29	13.22	19.11
South East Europe	1.83	13.91	17.98	43.59	22.69	20.37
EU 27	***1.55***	***14.86***	***19.81***	***50.56***	***13.22***	***24.82***
Europe	***1.58***	***14.80***	***19.91***	***50.04***	***13.67***	***22.74***

Note: Forest fragmentation classes based on connectivity levels: very high (<10%), high (10-39%), medium (40-59%), low (60-89%), and very low (>90%). Data coverage as % of regional forest area: NE 93%, C-WE 92%, C-EE 57%, S-WE 89%, S-EE 92%, EU-27 98%, Europe85%.

Indicator 4. 8 *Threatened forest species*

Why it is important

Threatened forest species are plants and animals in danger of disappearing because of pressures such as habitat loss, overexploitation, climate change, pollution or invasive species. Their presence and status serve as sensitive indicatorsof forest ecosystem health and integrity. A decline in these species often signals broader environmental degradation and unsustainable management practices.

Sustainable forest management aims to protect and enhance the habitats of threatened species by preserving critical areas, maintaining habitat connectivity and minimising disturbance. Conserving these species maintains biodiversity and strengthens ecosystem resilience and the long-term provision of forest services.

Monitoring threatened species helps assess the effectiveness of forest policies and informs adaptive management and restoration efforts. Integrating species protection into forest planning is essential to meet national and international biodiversity commitments, such as the EU Biodiversity Strategy and the Convention on Biological Diversity.

How it is defined

Number of threatened forest species, classified according to IUCN red list categories, in relation to total number of forest species.

Key findings

- The level of information available on threatened forest species in Europe shows no substantial change compared with earlier reporting cycles.

- The majority of nationally reported threatened tree species fall within the vulnerable or endangered IUCN Red List categories (around 82%), while critically endangered species account for roughly 17%; a small fraction (just over 1%) is considered extinct at the national level, including species that occur only at the margins of their natural distribution and are therefore inherently rare in some countries.

Status

The indicator covers seven main taxonomic groups: trees, birds, mammals, vascular plants, other vertebrates, other invertebrates, and cryptogams and fungi. Since 1990, 21 countries have reported data on forest tree species, with the number of taxa ranging from five (Iceland) to 185 (Spain).

Spain reported the highest number of threatened forest bird species (54), followed by Estonia (40), France (29), Hungary (32) and Finland (22). In total, 19 countries submitted data on threatened forest birds.

For mammals, Switzerland reported the highest number of threatened species (29). Eighteen countries reported on mammals, though data remains sparse in South-East Europe - only Bulgaria, Croatia and Greece provided information. North Europe has the best data coverage, where threatened mammal species range from none (Iceland) to nine (Sweden, Latvia and Norway).

The largest numbers of threatened vascular plant species were reported by Spain (1 141), France (632), Austria (318) and Hungary (264). Slovakia also recorded a high number (242). Seventeen countries provided data for vascular plants.

Eleven countries supplied information on other threatened vertebrates, 14 on other invertebrates, and 14 on cryptogams and fungi. North Europe has the most complete coverage, with many threatened invertebrate and fungal species recorded. Germany and Switzerland reported particularly high numbers of threatened fungi - 1 475 and 913 species respectively.

Table 4.8-1: *Numbers of 'extinct in the wild' forest species reported by species group, by region, 2020*

Region	Birds	Mammals	Other vertebrates	Inverte-brates	Vascular plants	Crypto-gams and fungi
North Europe	114	39	7	1777	313	1878
Central-West Europe	73	44	27	384	1235	2787
Central-East Europe	69	40	30	745	637	100
South-West Europe	54	20	30	156	1141	65
South-East Europe	50	17	4	3	142	122
EU 27	***342***	***151***	***98***	***2412***	***3399***	***4341***
Europe	***360***	***160***	***98***	***3065***	***3468***	***4952***

Notes: Data coverage as % of regional forest area: NE 96%, C-WE 91%, C-EE 30%, S-WE 60%, S-EE 17%, EU-27 81%, Europe 62%. Data coverage as % of total forest area 65%

Several countries also reported forest species that have become extinct within their territories *(see Table 4.8-1)*.

Overall, while data quality and coverage vary widely, the proportion of threatened forest species appears to have remained relatively stable in recent years. However, pressures from habitat loss, fragmentation, invasive species and climate change continue to endanger many forest-dependent taxa.

Trends

Tracking developments in the conservation status of forest species over time provides insight into long-term pressures affecting forest biodiversity. Trend-oriented information on threatened tree species, based on national reporting and Red List assessments, supports the evaluation of changes in risk levels and data availability across Europe. However, Information on threatened forest species is largely derived from national Red List assessments, which vary in scope, update cycles, and methodological approaches, limiting comparability across countries.

Overall, the number of countries reporting data on threatened species has remained stable, although the datasets remain heterogeneous. Changes in reported numbers should be interpreted cautiously, as they may reflect improved data collection, revised taxonomic classifications, or updated red list assessments rather than actual changes in conservation status.

Despite these limitations, overall trends indicate that the proportion of threatened forest species in Europe has not substantially changed. Nevertheless, continued habitat loss and degradation of habitats, fragmentation and climate-induced stress remain major risks to forest biodiversity, underlining the importance of sustained monitoring and conservation action.

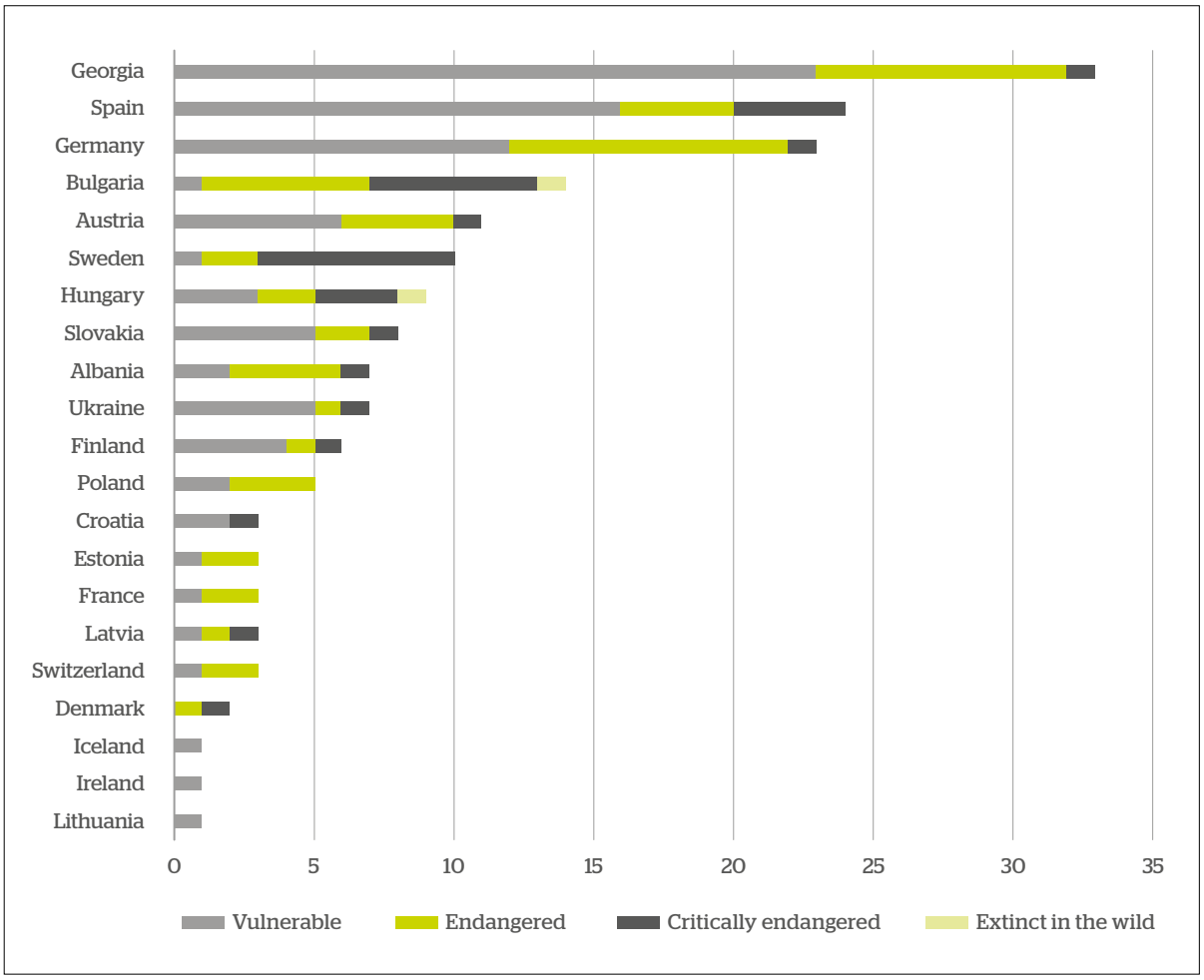


Figure 4.8-1: *Number of threatened forest tree species by IUCN categories, by country*

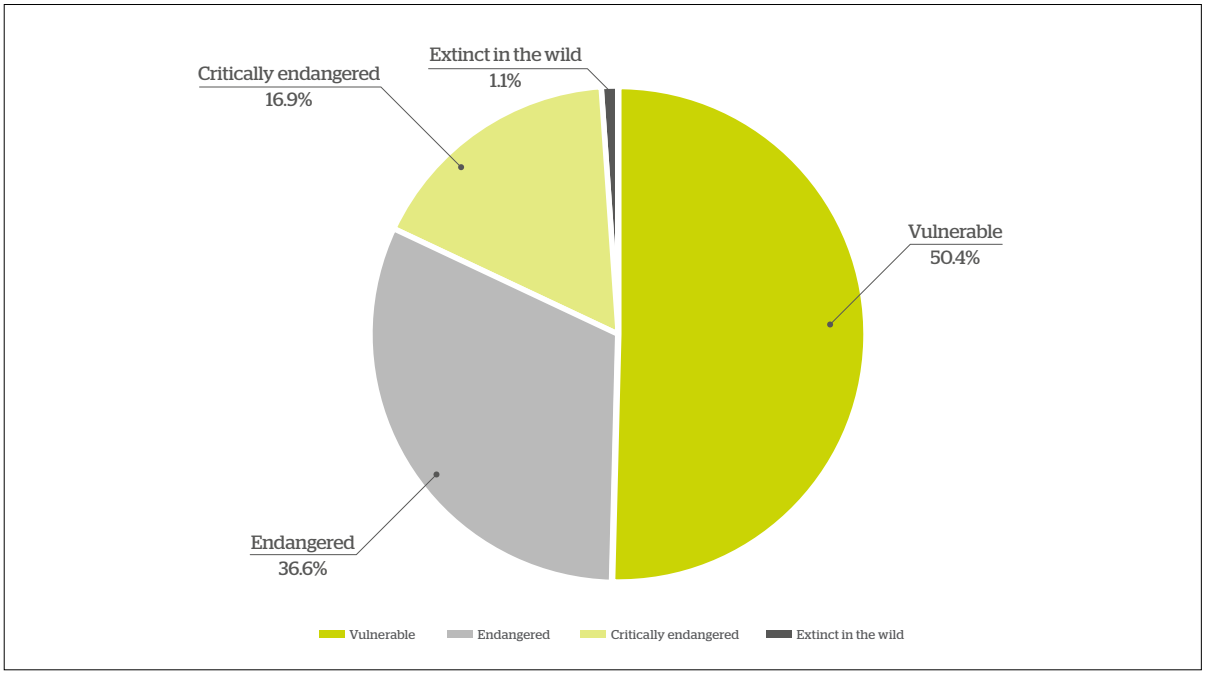


Figure 4.8-2: *Share of vulnerable, endangered, critically endangered and extinct forest tree species compared to the total number of threatened forest tree species, 2020. Data coverage as % of total forest area 65%.*

Indicator 4.9 *Protected forests*

Why it is important

Protected forests are areas designated to conserve biodiversity, ecosystem functions and cultural or recreational values by limiting or excluding intensive human activities. They play a crucial role in preserving rare species, safeguarding natural processes and maintaining ecological balance.

As core components of sustainable forest management, protected forests serve as reference areas for natural dynamics and contribute to climate regulation, water protection and soil conservation. They also support national and international conservation goals, including meeting the objectives of Natura 2000, the EU Biodiversity Strategy and the Convention on Biological Diversity.

The extent and effectiveness of protected forests indicate a society's commitment to long-term forest sustainability. These areas provide opportunities for research, education and low-impact recreation, supporting citizens to better understand and value forests. Managing protected forests requires balancing conservation with surrounding land uses and ensuring they are well connected within the wider landscape.

How it is defined

Area of forest and OWL protected to conserve biodiversity, landscapes and specific natural elements, according to Ministerial Conference on the Protection of Forests in Europe (MCPFE) categories.

Key findings

- By 2025, protected forests reported under all MCPFE categories cover 50.4 million ha, representing 26.4% of forest area in reporting countries; in addition, 4.5 million ha of other wooded land (OWL) are protected (17.9% of OWL). Of the total forest area, 32.2 million ha (16.9%) are designated primarily for biodiversity conservation, while 18.1 million ha (9.5%) are protected to safeguard landscapes and specific natural features.
- The distribution and management approach of protected forests differs markedly across Europe: non-intervention regimes are most prevalent in northern and south-western Europe, whereas central Europe has a higher share of protected forests managed through active conservation measures; protection aimed at landscapes and specific natural elements is concentrated mainly in central-western Europe.
- Since the late 1990s, the extent of forests protected for biodiversity and landscape objectives has expanded steadily, with an average annual increase of around 635 000 ha over the past 25 years; this growth has slowed in recent years, averaging about 183 000 ha per year over the last five-year period.

Status

Protected areas are one of the oldest instruments for conserving nature and natural resources and remain central to European nature conservation law. Countries report areas in two classes defined by the MCPFE Assessment Guidelines (2003): Class 1 for biodiversity protection and Class 2 for protection of landscapes and specific natural elements. Class 1 is subdivided by degree of human intervention:

- 1.1 no active intervention
- 1.2 human intervention is limited to a minimum
- 1.3 conservation through active management

All four classes support biodiversity conservation, but Class 2 focuses primarily on landscape diversity, cultural heritage, aesthetic and spiritual values, and recreation.

Information on MCPFE classes varies between countries and across reporting years, and was provided by 30 countries. Four countries did not provide information for 2025 but had submitted data for 2020; therefore, the 2020 figures were used in the analysis.

In 2025, the reported total area of protected forest (Classes 1.1 to 1.3 and 2) accounted for 50.4 million ha (or 26.4% of forests in reporting countries) and 4. 5 million ha of OWL (or 17. 9% of OWL). About 32.2 million ha (or 16.9%) of forests were protected with the main objective of protecting biodiversity (Classes 1.1 to 1.3), while 18.1 million ha (about 9.5%) 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%), Slovakia (58.9%), Netherlands (58.9%), Croatia (44.9%), Albania (55.6%) and Italy (44.2%); these include countries with forest cover ranging from about 11% (Moldova) to above 40% (Slovakia) of their total land area.

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

In 2025, the reported forest area within the category protected for the conservation of biodiversity (MCPFE Class 1 subdivided into subclasses 1.1-1.3) accounted for 32.2 million ha. This is equivalent to 16.9% of the total forest area of reporting countries, which represent 82% of forests in Europe. OWL area within the same classes accounted for 3.3 million ha. European countries show considerable differences in proportions of the respective protected forest areas to their total forest area. The largest total areas of forest protected for biodiversity conservation overall are reported Italy (3.3 million ha), Poland (3.1 million ha), Türkiye (3.2 million ha), Finland (2.7 million ha) and Sweden (2.4 million ha).

Table 4.9-1: *Area of forest and OWL protected to conserve biodiversity (MCPFE Classes 1.1-1.3) and for protecting landscapes and specific natural elements (MCPFE Class 2) in Europe, 2025*

Management objective	Area of protected forests	Share of protected forest area in total forest area	Area of protected OWL	Share of protected OWL in total forest area
	1 000 ha	*%*	*1 000 ha*	*%*
Biodiversity, MCPFE Classes 1.1-1.3	32 238	16.9	3349	13.4
1.1 No active intervention	1 398	0.7	190	0.8
1.2 Minimum Intervention	9 462	5.0	1444	5.8
1.3 Conservation through active management	21 379	11.2	1715	6.8
Landscape MCPFE Class 2 'Protection of Landscape and Specific Natural Elements'	18 120	9.5	1127	4.5
Total	***50 358***	***26.4***	***4476***	***17.9***

Note: Data coverage as 82% of total forest area

The share of MCPFE Class 1 from total forest area in percent is highest in Central-West, Central-East and South-West Europe. The Republic of Moldova, Croatia, Italy, Albania, Poland, Hungary Slovakia, and Czech Republic show a share of protected forest area for biodiversity of over 25% of their forest area *(Figure 4.9-1)*.

The share of the Class 1.1 (with no active intervention) is 0.7% in total for all reporting countries *(Table 4.9-1)*, of which 388 000 ha (or 27.8%) is located in Sweden alone. Noticeable areas of over 100 000 ha with no active intervention are also located in Italy, Czechia and Georgia *(Figure 4.9-1)*.

The largest forest areas with minimum intervention (Class 1.2) are in North Europe and South-West Europe, namely in Sweden, Italy, Finland and Norway. The highest percentages of protected forest areas with minimum intervention as a percentage of the total forest area are reported by Italy (15.8%,) Albania (24.5%), Estonia (15.8%,), and Finland (11.8%)

Large forest areas with active conservation management for biodiversity (Class 1.3) can be found in Central-East and South Europe. Poland, Italy and Türkiye have protected areas under this class with over one million hectares each.

Forests protected for landscape and specific natural elements (MCPFE Class 2)

The area protected for landscape conservation amounts to 18.1 million ha or 9.5% of the forest area. Türkiye reports the largest forest area designated for landscape protection (Class 2), with more than 1.5 million ha. The share of protected forest in Class 2 reaches nearly 50% of the forest area in the Netherlands *(Figure 4.9-2b)*.

Trends

Long-term trends in protected forest area provide insight into how conservation priorities and protection objectives have evolved over time. Analysing changes in the extent and designation of protected forests supports the assessment of developments in forest protection policies and their implementation across European regions.

A clear trend in forest protected area for biodiversity and landscape in Europe can be observed over the last 25 years with an annual increase of approximately 635 000 ha (about 1.8%). During the last five years, the annual increase of the area of protected forest was about 183 000 ha.

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

Between 2000 and 2025, the area of protected forests with no active intervention (Class 1.1) increased by more than 54% (1.4 million ha). However, this category has shown little growth over the last five years.

Forest areas with minimum intervention (Class 1.2) increased by 1.7 million ha (25% growth) since 2000. Protected forest area with active management for biodiversity (Class 1.3) has increased most extensively – by 3.5 million ha (19%) since 2000.

Forests protected for landscape and specific natural elements (MCPFE Class 2).

The area designated for forest landscape protection and specific natural elements increased by 4.5 million ha (or 33%) since 2000. Over the last five years, growth has slowed, remaining below 1%.

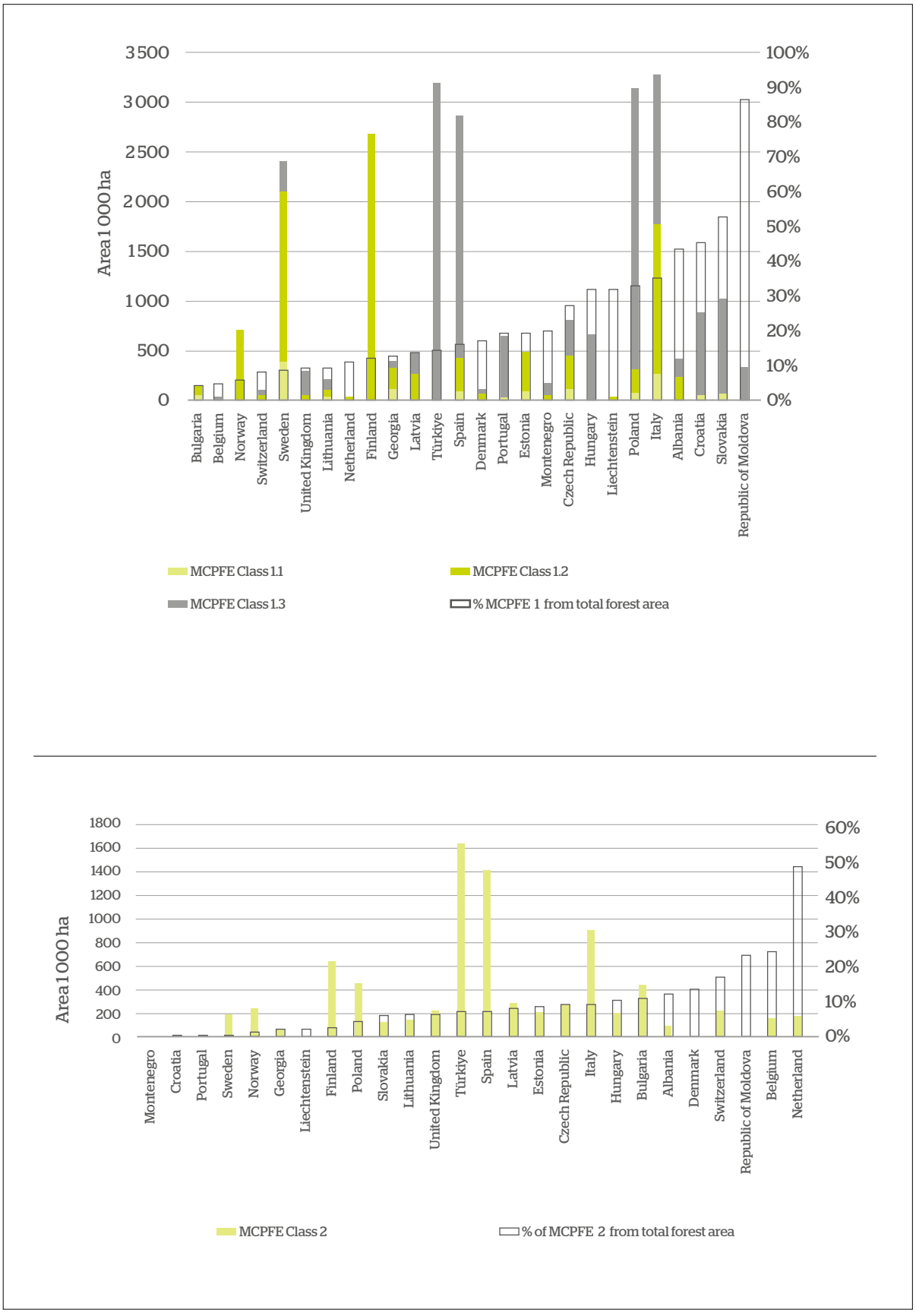


Figure 4.9-1: *Forest area protected in MCPFE Class 1 (a, top panel) and MCPFE Class 2 (b, bottom panel), and their shares to total forest area, by country, 2025.*

Indicator 4.10 *Common forest bird species*

Why it is important

Forest birds are vital indicators of forest ecosystem health and biodiversity. Their presence, abundance and diversity reflect the quality, structure and continuity of forest habitats. Because different bird species depend on specific forest conditions, such as tree age, canopy cover and deadwood, changes in their populations can signal shifts in habitat quality. Declines in forest bird populations may indicate habitat loss, fragmentation or unsustainable forestry practices.

Conversely, stable or increasing trends suggest that forests are being managed in a way that supports ecological integrity. Forest bird monitoring supports adaptive forest management by providing early warning signs of environmental stress. It also links directly to broader conservation goals under frameworks such as the EU Birds Directive and the Convention on Biological Diversity.

Table 4.10-1: *List of all 34 common European forest bird species included in the indicator and an indication of their population trends, 1980–2024*

Accipiter nisus =	*Emberiza rustica -*	*Poecile montanus -*
Anthus trivialis -	*Ficedula albicollis +*	*Poecile palustris -*
Bombycilla garrulus +	*Ficedula hypoleuca -*	*Pyrrhula pyrrhula -*
Carduelis citrinella -	*Garrulus glandarius +*	*Regulus ignicapilla +*
Certhia brachydactyla +	*Leiopicus medius +*	*Regulus regulus -*
Certhia familiaris =	*Lophophanes cristatus -*	*Sitta europaea +*
Coccothraustes coccothraustes =	*Nucifraga caryocatactes =*	*Spinus spinus -*
Columba oenas +	*Phoenicurus phoenicurus +*	*Tetrastes bonasia -*
Cyanopica cooki +	*Phylloscopus bonelli +*	*Tringa ochropus =*
Dryocopus martius +	*Phylloscopus collybita +*	*Turdus viscivorus -*
*Dryobates minor **	*Phylloscopus sibilatrix -*	
	Picus canus =	
	Periparus ater -	

*Note: Trend categories: + moderate increase, - moderate decline, = stable, * uncertain, Periparus ater -*

How it is defined

Occurrence of common breeding forest bird species related to forest ecosystems.

Key findings

- Compared with the Farmland Bird Index, the Common Forest Bird Index has been relatively stable during the last 43 years.
- The Forest Bird Index even shows a slight recovery in the last 10 years.

Status

This indicator tracks changes in the abundance of common forest bird species by expressing annual population levels relative to a fixed baseline year (1980) *(Table 4.10-1)*. In 2023, the combined population index reached 96% of the 1980 level, while the smoothed index value was 91.6%, reflecting population developments in preceding years. Overall, the indicator shows that the population levels of common forest bird species remain broadly comparable to those observed in the reference year, with no clear long-term upward or downward trend.

Trends

Over the period 1980-2023, the overall European Common Forest Bird Index declined by about 8%, with the EU-27 showing a similar reduction of 5%. Regional patterns vary considerably. North Europe experienced the strongest decrease (-17%), mainly due to declines in species dependent on mature coniferous forests. Central-West Europe recorded a slight increase (+5%), reflecting more diversified forest structures and improved habitat management. Central-East and South-West Europe both showed notable declines (-14% and -32% respectively), the latter largely linked to drought impacts, land-use change and fire frequency.

The index fluctuated within a 15% range during this period (between 85% in 1986 and 115.7% in 1991, compared to the 1980 baseline). The smoothed trend line indicates stable populations in the 1980s, a small decline from the 1990s and stable to moderate recovery from 2013 onwards *(Figure 4.10-1)*.

Across all regions, most species were classified as having stable or moderately decreasing populations, while only a smaller share showed moderate

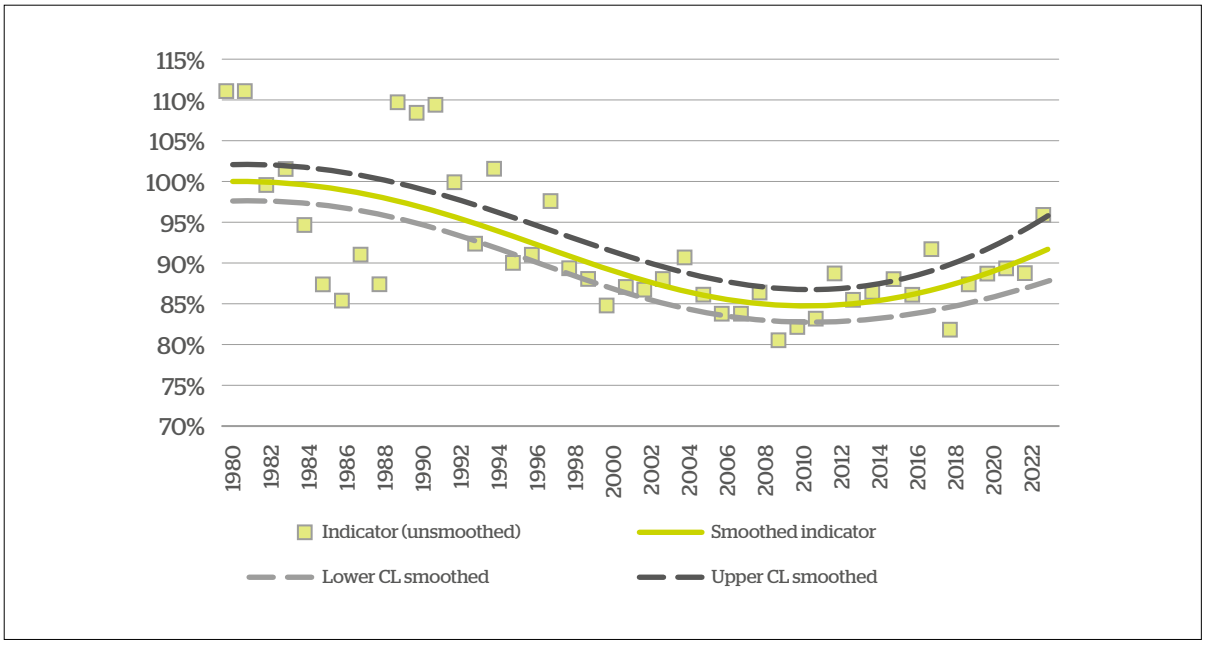


Figure 4.10-1: *Trend in common forest bird species indicator for Europe, 1980–2023*

Notes: Data coverage as % of regional forest area: NE 87%, C-WE 100%, C-EE 58%, S-WE 100%, EU-27 100%.

increases. These differences underline the influence of regional forest types, management practices and climate conditions on bird populations and highlight the need for continued monitoring to assess the effectiveness of conservation and sustainable forest management measures.

The population trend of common forest birds in Europe has shown an overall decline since 1980, although with signs of partial recovery in recent years. The indicator, which tracks 34 widespread forest bird species, fell from the reference value of 100% in 1980 to around 85% in the mid-2000s, reflecting long-term habitat changes, forest management intensity and landscape fragmentation. Since then, the index has stabilised and shows a gradual increase, reaching approximately 92% in 2023, with confidence limits indicating moderate variability between years *(Figure 4.10-1)*. This pattern suggests that, while many forest bird populations remain below their historical levels, recent trends are more stable and may reflect improved forest conditions, more diverse management practices and an expanding area under conservation-oriented management. Continued monitoring is essential to determine whether the recent upturn represents sustained recovery or a short-term fluctuation in response to climatic and habitat dynamics.

Indicator C.4: *Policies, institutions and instruments to maintain, conserve and appropriately enhance the biological diversity in forest ecosystems*

Key findings

Almost all reporting countries have adopted policy objectives that address the maintenance, conservation and enhancement of forest biodiversity. The quantitative targets reported most often relate to strengthening forest resilience and biodiversity outcomes through increasing the proportion of broadleaved species, promoting mixed stands, expanding natural regeneration and enlarging protected forest networks. Several countries also emphasise the need to integrate biodiversity objectives more closely into forest planning and restoration programmes.

Institutional measures and policy tools reported by 23 countries mainly focus on implementing existing national and international obligations, updating legislation and integrating nature conservation objectives more closely into forest management. Over the past five years, notable achievements include expanding national and Natura 2000 protected areas, supporting close-to-nature and sustainable forest management practices, as well as improving biodiversity monitoring.

Reported challenges include difficulties in effectively monitoring forest biodiversity, limited financial and administrative capacity, as well as social or ownership-related barriers, particularly among small private forest owners.

Policy objectives

Twenty-five of the 31 countries that submitted reports stated explicit policy objectives for the maintenance, conservation, and enhancement of forest biodiversity. These objectives are enshrined in national forest and biodiversity legislation, strategies, programmes and action plans. Many EU Member States referenced their obligations under the Natura 2000 network, the Habitats Directive, the Birds Directive, and the EU Biodiversity Strategy.

While most countries emphasised the maintenance and enhancement of biodiversity as their central goal, a smaller number reported specific quantitative targets. Five countries emphasised the role of close-to-nature forest management in achieving biodiversity objectives; three highlighted sustainable forest management and the recognition of forest ecosystem functions; and two focused on

improving their legislative frameworks. One country specifically mentioned compensation payments linked to Natura 2000 restrictions.

Quantitative targets

The targets reported by countries commonly address:

- Increasing the proportion of broadleaved species and mixed stands.
- Expanding the area of natural regeneration.
- Enlarging the extent of protected forests.

These measures aim to enhance the resilience and ecological stability of forests and ensure the long-term conservation of forest biodiversity.

Institutional measures and policy tools

Twenty-three countries reported using institutional or policy instruments to support biodiversity objectives. These include legal reforms, financial incentives, and communication tools designed to encourage sustainable, biodiversity-friendly management. Several countries also reported updates to legislation or management plans aimed at strengthening nature protection. Nine countries implemented compensation payments to private forest owners and additional funding mechanisms. Policy references included the Carpathian and Bern Conventions, the EU Habitats and Birds Directives as well as Natura 2000 legislation. Countries also noted that implementation capacity, advisory services, and monitoring systems were key enablers of biodiversity delivery where such instruments are in place and sufficiently resourced.

Overall, these measures demonstrate the progressive integration of biodiversity considerations into national forest governance.

Achievements

Over the past five years, eighteen countries have reported concrete achievements in maintaining and enhancing biodiversity. Key accomplishments included:

- Increases in the area of protected forests within national systems and Natura 2000 networks.
- Adjustments in management practices, such as higher proportions of broadleaved and mixed stands, greater use of natural regeneration, temporary moratoria on felling or hunting, and reduced clear-cutting.
- Strengthening of legal and administrative frameworks.
- Improvements in biodiversity monitoring, indicator development and data quality.

Together, these developments demonstrate the practical implementation of set quantitative targets and a gradual but steady shift towards more ecologically sensitive forest management across Europe.

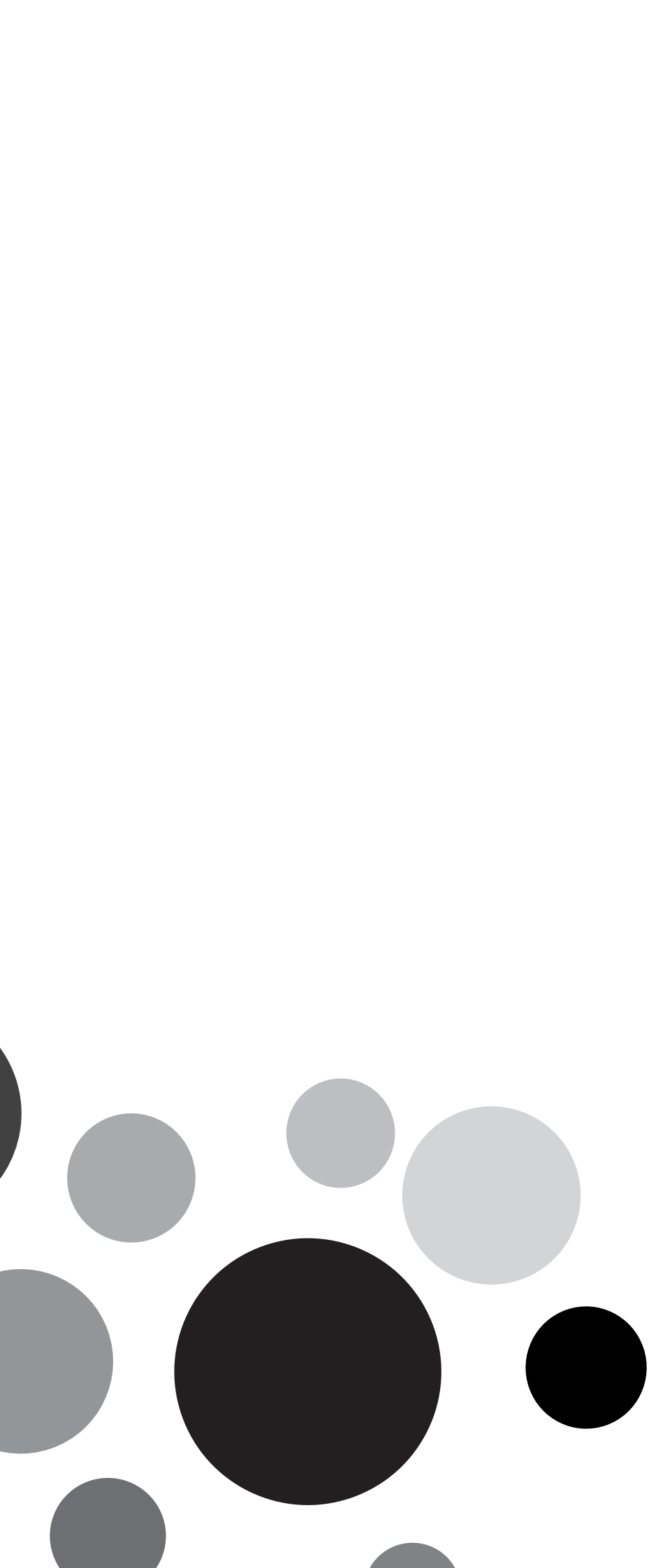
Challenges

Twenty-three countries reported ongoing difficulties in conserving forest biodiversity. The most common were:

- Insufficient administrative and financial resources.
- Limited monitoring capacity and data gaps, particularly in privately owned forests.
- Conflicts between conservation and production objectives.
- Resistance from stakeholders or a lack of public awareness.

Additional challenges included uncertainties around climate change, inconsistent legal frameworks, and the need for better coordination among forestry, biodiversity, and land-use policies. Several countries emphasised the need for clearer incentives and more consistent implementation to address trade-offs between objectives.

Overcoming these challenges will require greater investment in capacity building and data collection, stronger alignment between national and European biodiversity policies, as well as clearer policy instruments and measures for active stakeholders in forest management and protection.



Criterion 5

Criterion 5:

Maintenance *and* ***Appropriate Enhancement*** *of* ***Protective Functions in Forest Management*** *(Notably Soil and Water)*

Protective functions of forests—particularly for soil and water—are essential for maintaining landscape stability and reducing natural hazards. Forests help prevent soil erosion, regulate water cycles, reduce flood risks and stabilise slopes, especially in mountainous and erosion-prone regions. Sustainable forest management maintains ground cover, root structures and canopy layers that protect these resources. Enhancing protective functions involves selecting suitable species, preserving riparian zones and minimising soil disturbance during operations. Recognising and managing forests for their protective roles supports long-term environmental health, human safety and the resilience of downstream ecosystems.

The maintenance and enhancement of protective functions of forests are assessed on one respective indicator.

Indicator 5. 1 *Protective forests—soil, water and other ecosystem functions—infrastructure and managed natural resources*

Why it is important

Protective forests are managed primarily to preserve essential ecosystem functions including soil stabilisation, water regulation, local climate moderation and the protection of infrastructure, settlement and natural resources. They function as natural barriers to against erosion, landslides, avalanches and floods, and particularly in mountainous or vulnerable landscapes.

By slowing down runoff and promoting water infiltration, protective forests help maintain both water quality and quantity and support the replenishment of groundwater resources. They also mitigate the impacts of extreme weather events and enhance climate resilience at local and regional scales. In areas close to infrastructure, agricultural land or settlements, these forests reduce environmental risks and contribute to public safety.

Sustainable forest management in protective forests places ecosystem service delivery over timber production. Management typically includes targeted interventions such as selective thinning, diversification of tree species and the promotion of natural regeneration to sustain their stabilising functions. Continuous monitoring of forest condition and effectiveness is essential for long-term land-use planning and disaster risk reduction. Given their wide benefits, protective forests are recognised in national and international policy frameworks as key for environmental protection and disaster prevention.

How it is defined

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

- Forests designated for protection of soil, water and other ecosystem functions play an important role in about 40% of European forests. The area of these forests is increasing since 1990. Additionally, protective functions are often integrated into multifunctional forestry.

- Forests 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 in mountainous areas.

Status

Protective forests - soil, water and other ecosystem functions

Eighteen countries reported data for 2025 on forests designated to prevent soil erosion, conserve water and maintain other ecosystem functions; two others provided their most recent information for 2020. Together, European countries recorded 42.9 million ha (of which 27.8 million ha are within the EU-27), representing 38.7% of the reporting countries' forest area *(Table 5.1-1)*.

Depending on national conditions the reported share of such protective forests varies widely - from close to 0% to 100% -. Six countries reported that between 20% to 40% of their forests are managed primarily for protective purposes. The lowest shares are found in parts of Central and Northern Europe, where gentler terrain and soil conditions reduce the need for specific protective designations. In several of these countries, however, the categories "protection of soil, water and ecosystem functions" and "protection of infrastructure and managed natural resources" are not distinguished, leading to single aggregated reporting figures *(Figure 5.1-1)*.

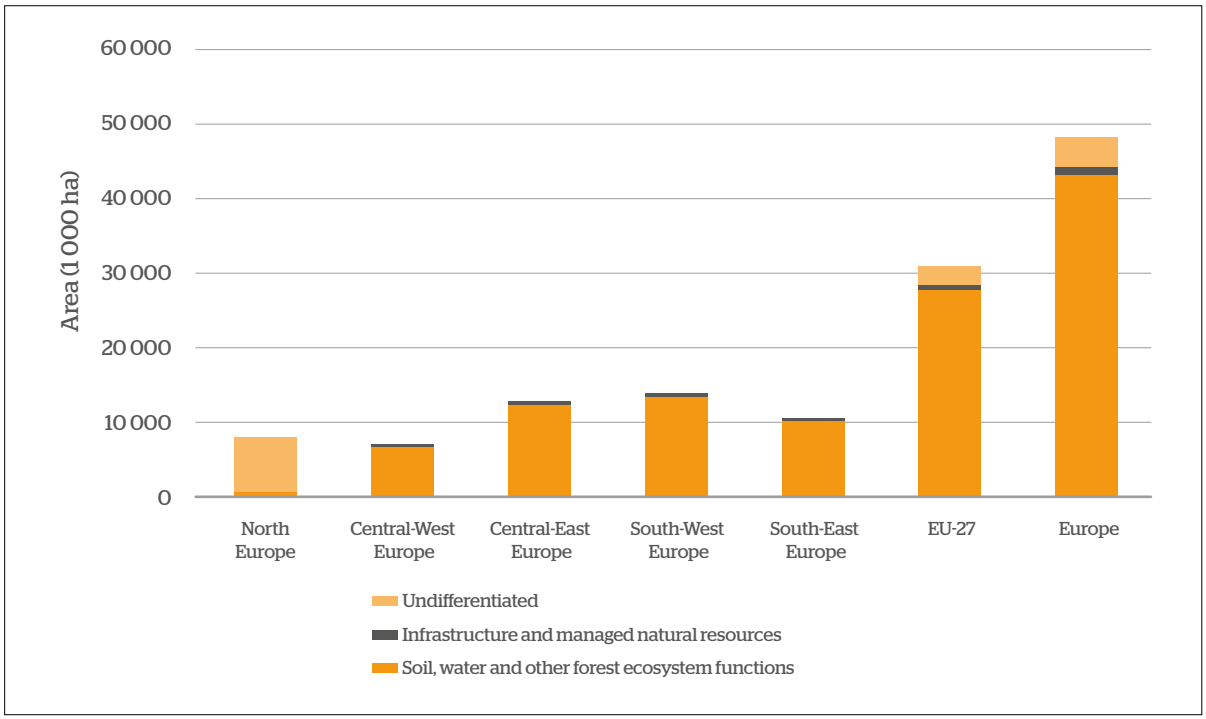


Figure 5.1-1: *Area of protective forests, by region, 2025*

Notes: Data coverage as % of regional forest area: NE 12%, C-WE 45%, C-EE 58%, S-WE 89%, S-EE 68%, EU-27 51%, Europe 48%

Protective forests—infrastructure and managed natural resources

Only 10 countries provided quantitative data for 2025, and several other countries indicated that available datasets do not allow a clear separation of this category. Based on the submissions, about 2% of Europe's forests are designated for these protective functions. In Central-West Europe, only Switzerland reported corresponding data. Therefore, information on forests designated for the protection of protecting infrastructure and managed natural resources remains fragmentary.

Table 5.1-1: *Forest area designated for the protection of infrastructure and managed natural resources, by region, 2025*

Region	Protective forests - infrastructure and managed natural resources	
	1 000 ha	*% of forest area*
North Europe	74	3.3
Central-West Europe	559	44.1
Central-East Europe	200	2.1
South-West Europe	61	0.6
South-East Europe	87	0.3
EU 27	***399***	***0.9***
Europe	***980***	***1.9***

Notes: Data coverage as % of regional forest area: NE 3%, C-WE 3%, C-EE 20%, S-WE 30%, S-EE 66%, EU-27 28%, Europe 22%

Trends

Protective forests—soil, water and other ecosystem functions

Trend analysis is based on data from 23 countries providing time series data for 1990–2025. Overall, the area of forests managed for soil, water and ecosystem protection has increased steadily since 1990 *(Figure 5.1-2)*. This confirms that the designation and recognition of forests serving protective functions continue to expand across Europe.

However, the relative importance of these functions varies by country, reflecting differences in topography, soil conditions and management priorities. Mountainous countries with erosion-prone or steep terrain report the highest shares of protective forest area, whereas in lowland regions these functions are often embedded in multifunctional management rather than formal designations.

Protective forests—infrastructure and managed natural resources

Trends related to forests that protect infrastructure and managed natural resources should be interpreted with great caution, as data availability remains clearly limited and inconsistent. In most countries, information on these categories is not collected separately from broader protective forest designations and therefore reporting remains difficult.

Despite these limitations, the available evidence indicates a moderate increases in the total area of forests providing protective functions for infrastructure, agricultural land and other managed resources. This trend is likely driven by growing awareness of climate-related risks such as landslides, floods and avalanches.

These developments highlight the increasing role of forests in disaster risk reduction, landscape stability and climate adaptation strategies across Europe.

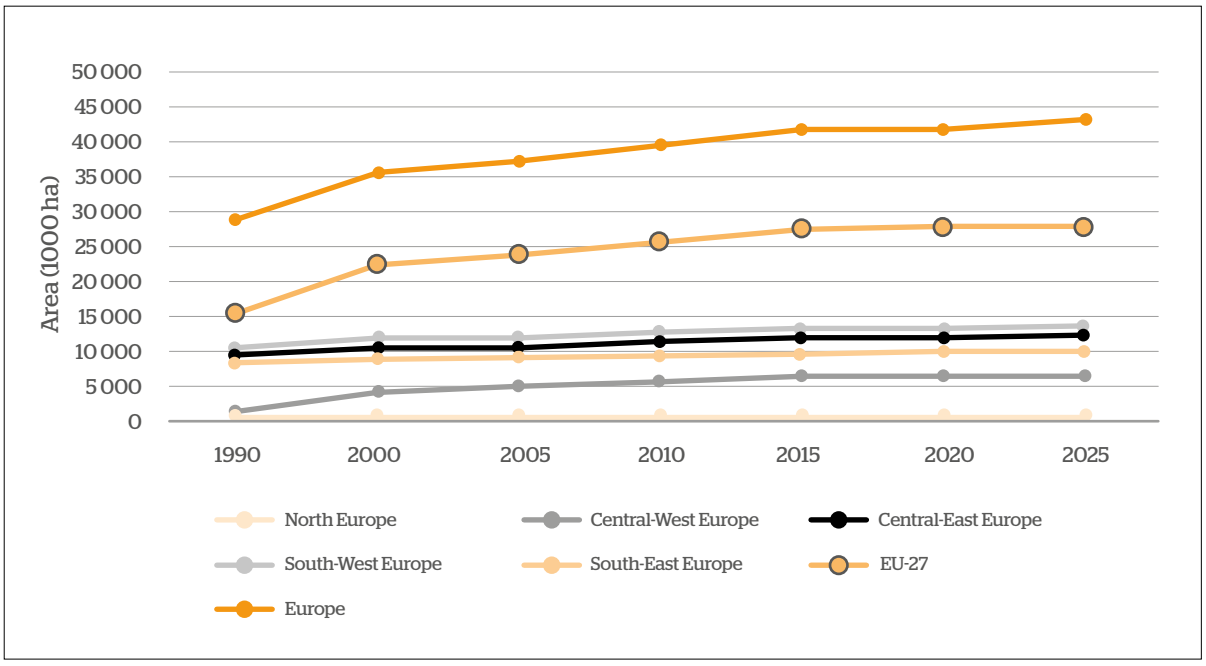


Figure 5.1-2: *Trends in the area of protective forests for soil, water and other ecosystem functions, by region, 1990–2025*

Notes: Data coverage as % of regional forest area: NE 3%, C-WE 3%, C-EE 20%, S-WE 30%, S-EE 66%, EU-27 28%, Europe 22%.

Indicator C.5: *Policies, institutions and instruments to maintain and appropriately enhance the protective functions in forest management*

Key findings

Most reporting countries have established policy objectives aimed at maintaining and enhancing forests' protective functions. Reported quantitative targets generally focus on erosion control measures and strengthening forests' protective capacity through targeted management.

Twenty-two countries reported institutional measures and policy instruments, with most emphasising the importance of effectively implementing existing legislation and securing related financial resources. Many countries also highlighted the need for stakeholder cooperation and effective public communication to engage the general public.

Reported achievements over the past five years include expanding areas designated as protective forests, legislative progress, improved interdepartmental coordination, and implementing targeted management actions to support soil and water protection. Key challenges identified include financial constraints, the transfer of scientific data into practice, and the need for more concrete, implementable action programmes, particularly in the context of climate change.

Institutional measures and policy tools

Twenty-two countries reported having specific legal, financial and communication instruments in place to maintain and enhance protective forest functions. Twenty countries have explicit protective measures defined in Forest Acts or equivalent legislation, and two have recently amended their legislation to strengthen these provisions.

Eight countries cited financial mechanisms, including direct funding, tax exemptions and subsidies. Rural Development Programmes were frequently mentioned as an important source of funding.

Two countries reported public information and awareness campaigns on protective forest management, while four emphasised related research and education initiatives. Two countries highlighted progress in monitoring protective functions, and one reported improved intersectoral cooperation.

Taken together, these measures demonstrate a strong policy commitment to integrating protective forest functions into forest governance frameworks. Several countries emphasised that effective implementation depends on sustained financing and the availability of practical guidance and capacity for delivery on the ground.

Achievements

Over the past five years, seventeen countries have reported concrete achievements. These include:

- Expansion of forest areas designated or managed for protective purposes.
- Implementation of new legal provisions and improved departmental cooperation.
- Integration of protective forest functions into spatial planning.
- Ongoing research and monitoring programmes.

Specific examples include anti-erosion and water protection measures in several countries, as well as ongoing efforts to strengthen coordination between forestry and disaster risk management institutions.

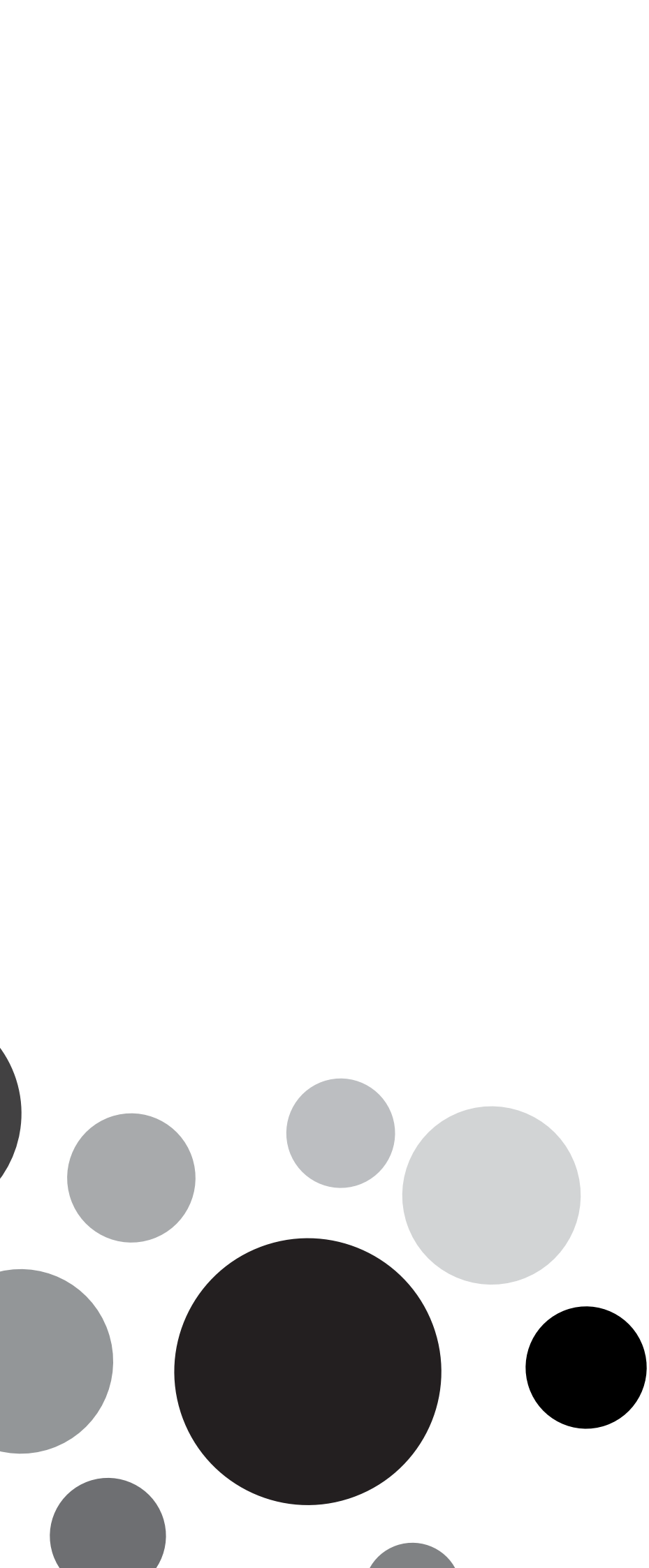
Challenges

Twenty-one countries reported ongoing challenges in maintaining or improving the protective functions of forests. The most frequently mentioned issues include:

- Financial constraints and inadequate funding mechanisms.
- Knowledge gaps, particularly the need to translate scientific findings into practical management measures.
- Difficulties in identifying appropriate management interventions to safeguard the protective functions of forests in the context of climate change, including the increased risk of storms, droughts and landslides.
- Fragmented forest ownership, administrative complexity, and declining rural populations affecting active management.

Some countries highlight the challenge of reconciling forest management objectives with those of other sectors, as well as the lack of comprehensive data needed to assess the extent of protective functions fully.

Overall, although institutional frameworks for the management of protective forests are well established across Europe, their effectiveness increasingly depends on sufficient financial resources, effective knowledge transfer, as well as adaptive management approaches to address emerging environmental and socio-economic challenges.



Criterion 6

Criterion 6:

Maintenance** of other **Socioeconomic Functions** and **Conditions

Forests provide a wide range of socio-economic functions that support employment and income generation, as well as cultural values. They contribute to rural development by providing wood and non-wood forest products, recreation and a sense of identity, as well as services such as tourism. Forests also offer opportunities for education, research, and traditional practices. Ensuring access to forests, protecting ownership rights, and promoting fair and safe working conditions are all important for sustaining these functions. Reliable data on forest-related employment and economic contributions help to track progress and inform planning. Maintaining these functions supports the broader goals of sustainability and inclusive development. In the current reporting cycle, a recurring challenge is that several of these benefits are increasingly delivered through mixed governance and financing arrangements involving public budgets, private markets and hybrid payments, which can make consistent, comparable reporting across countries and indicators difficult. This is particularly relevant for non-market services (e.g. recreation without fees and protective functions) and for "blended" public–private delivery models.

To assess the maintenance of these functions and conditions in the context of forest management and protection, the following ten indicators are used: (1) forest holdings; (2) the contribution of the forest sector to Gross Domestic Product (GDP); (3) net revenue; (4) investments in forests and forestry; (5) the forest sector workforce; (6) occupational health and safety; (7) wood consumption; (8) wood trade; (9) wood energy; and (10) forest recreation. Comparability for several of these themes is influenced by differences in definitions (e.g., what constitutes the 'forest sector'), how informal or subsistence use of forests is treated, and whether figures are derived from forestry statistics, labour accounts, or wider national accounts.

In addition, data coverage varies substantially by indicator and region (as shown in respective table notes). Regional comparisons should therefore be interpreted alongside the reported coverage percentages and any breaks in reporting series.

Indicator 6.1 *Forest holdings*

Why it is important

Forest holdings provide information on ownership of forest land, the size of forest areas, and whether the state holds ownership, private individuals, or communities. Ownership has a strong influence on forest management, management objectives and their prioritisation, as well as on how benefits are distributed. The wide diversity of forest ownership, ranging from small, family-run plots to large, industrial or state-managed forests, affects access to resources, the implementation of sustainable practices and long-term planning.

While small owners often possess extensive local knowledge and implement close stewardship, they may struggle to apply modern forestry techniques or access markets to sell their timber. By contrast, larger holdings may benefit from economies of scale and typically have better infrastructure for monitoring and certification. Forest owner associations play an important role in supporting small forest owners by facilitating knowledge sharing, providing access to management and operational services, as well as improving access to markets.

Policies that support all types of forest owners through training, financial incentives, advisory services and cooperation among owners are essential for sustainable forest management. Clear, transparent and secure tenure rights are integral to promoting responsible forest stewardship and long-term investment. Therefore, a sound understanding of forest ownership patterns and holding structures is key to ensuring that forests are managed in ways that benefit nature, the economy, and society.

How it is defined

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

Key findings

- Public forest ownership accounts for 51.2% of Europe's forests, while 48.8% are privately owned.
- Change in ownership: there was a slight shift from public to private ownership during the reporting period, with the share of public forests decreasing from 53.5% in 2015 to 51.2% in 2020, primarily associated with restitution process and in some cases the sale of public forest land.
- Regional differences: there are significant contrasts in ownership between Central-East and South-East Europe and the rest of Europe.
- Holding size remains highly uneven: private holdings are generally much smaller than public ones. Small holdings dominate in terms of numbers, but account for a comparatively small area. The bulk of private forest area is typically concentrated in the medium- and large-holding size classes.

Box 6.1-1: Interpreting pulic vs private ownership statistics

International reporting often simplifies ownership into 'public' and 'private', but national categories do not always align neatly with this. Public ownership can include forests belonging to national, subnational and local governments, and management responsibilities may be devolved without a change in ownership title. Countries differ in how they group these categories for reporting purposes. For instance, municipal forests are sometimes recorded as private in national systems, and the definition and legal form of 'community forests/commons' can vary widely. These differences in classification can affect the comparability of ownership shares and holding counts across countries and reporting exercises.

Status

In total, around 51.2% of Europe's forests are publicly owned, with the remaining 48.8% being privately owned *(Table 6.1-1)*. There is considerable variation in the regional distribution. Private ownership predominates in Western and Northern Europe

(Central-West, South-West and North Europe). In contrast, public ownership remains dominant in Central-East and South-East Europe, even after most restitution processes have been completed.

In Northern Europe, around 72% of forests are privately owned, whereas in South-East Europe, approximately 87% are publicly owned. In several countries, forests remain overwhelmingly publicly owned, reflecting long-standing tenure systems and, in some cases, the incomplete nature of restitution or privatisation processes. In the wider ECE region, some countries report near-total public ownership (e.g., 100% in Georgia and Türkiye in the FACESMAP/UNECE/FAO enquiry).

Table 6.1-1: *Share of public and private ownership, by region, 2020*

Region	In public ownership - 2020		In private ownership - 2020	
	1 000 ha	*%*	*1 000 ha*	*%*
North Europe	20 050	28.3	50 682	71.7
Central-West Europe	13 193	35.5	24 015	64.5
Central-East Europe	38 782	85.2	5 454	14.8
South-West Europe	8 575	27.2	22 913	72.8
South-East Europe	32 780	87.0	4 905	13.0
EU 27	***61 165***	***39.5***	***93 529***	***60.5***
Europe	***113 382***	***51.2***	***107 969***	***48.8***

Notes: Data coverage as % of regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 100%, S-EE 89%, EU-27 96.2%, Europe 98%.

Trends

Among countries for which data were available for both 1990 and 2020, the area of private forests increased by 36.1%, while the area of public forests grew by only 2.3%. This reflects both overall forest expansion and ongoing privatisation.

In Northern Europe, the area of public forests declined by 3.5%, primarily due to restitution and privatisation in the Baltic states. Meanwhile, Scandinavian countries experienced minimal change. Over the same period, the private forest area in Northern Europe rose steadily by 36.9%.

In Central and Western Europe, both public and private forest areas expanded slightly, mainly due to afforestation programmes. A similar pattern emerged in South-West Europe, where public forests grew by 22.4% and private forests by 29%.

Since 1990, restitution processes have restored private ownership in several Central and South-East European countries, particularly in Central Europe, where public forest area has decreased moderately in favour of private holdings. This pattern is consistent with evidence from the FACESMAP/UNECE/FAO enquiry, which documents substantial public-to-private shifts in several post-socialist countries due to restitution and privatisation after 1990.

In Northern Europe, public holdings increased slightly, while private holdings increased notably, particularly in the Baltic region. Central-West Europe experienced a modest decline in both public and private holdings, although the rate of decrease has slowed in recent years. In South-East Europe, both public and private forest areas have grown, with public forests increasing by 10.6% and private forests by 69.6%, reflecting significant privatisation and restitution, particularly in Bulgaria.

Public forest land continues to dominate in Central and Eastern Europe and South-Eastern Europe *(Figure 6.1-1)*. The high prevalence of public forests in several non-EU South-Eastern countries explains why the proportion of public ownership is higher across Europe as a whole than in the EU-27 alone. Overall, the proportion of public forests in Europe has declined slightly.

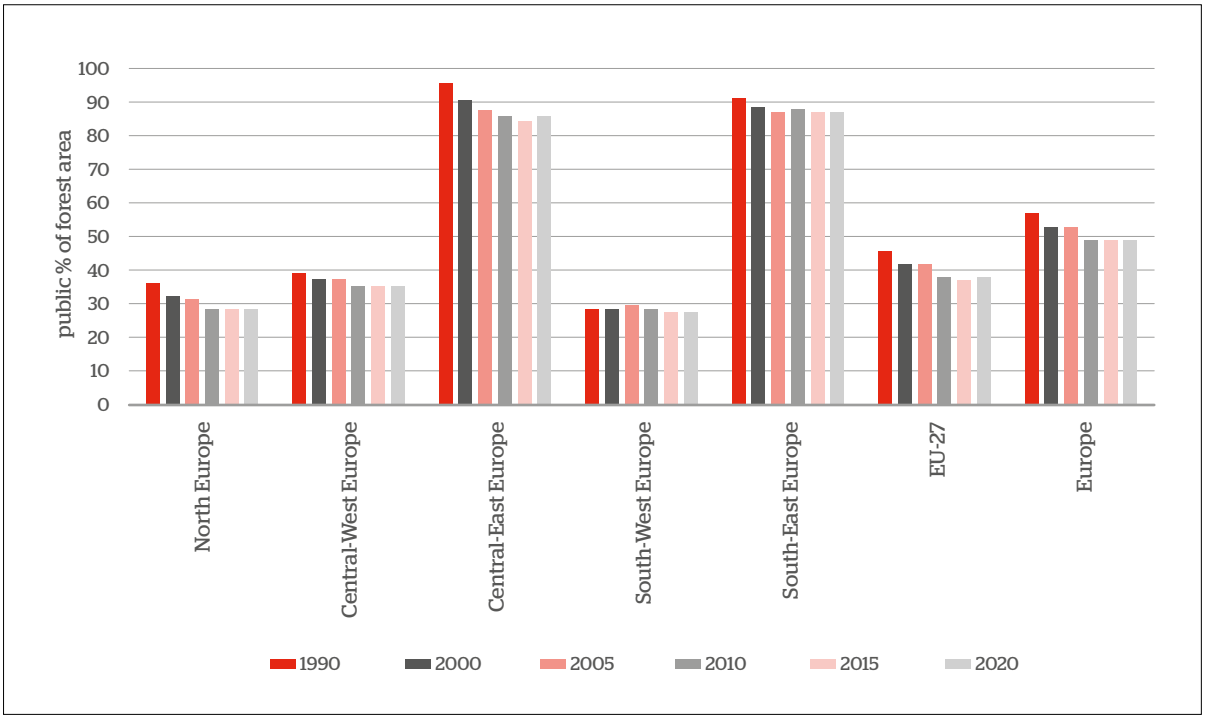


Figure 6.1-1: *Trends in the share of public forest area, by region, 1990–2020*

Notes: Data coverage as % of regional forest area: NE 100%, C-WE 100%, C-EE 100%, S-WE 100%, S-EE 89%, EU-27 96.2%, Europe 98%.

Indicator 6. 2 *Contribution of forest sector to Gross Domestic Product (GDP)*

Why it is important

The economic value derived from sustainably managed forest resources, including timber production, wood processing and paper manufacturing, is reflected in the forest sector's contribution to Gross Domestic Product (GDP). While the industry may appear small at the macro level, it plays a significant role in rural economies by providing employment and income and by supporting environmentally sound value chains.

However, conventional national accounts primarily capture market activity. Many forest benefits that are clearly economically relevant, such as recreation without fees, watershed protection, biodiversity and landscape values, are either not priced or recorded outside the "forest sector" in national accounts. This means that the forest sector's contribution, as measured by gross value added, is an incomplete indicator of forests' overall economic significance.

Sustainable forest management enables income generation without depleting forest capital, thereby safeguarding forests' long-term productivity and ecological functions. By integrating environmental stewardship with economic activity, the forest sector contributes to a circular bioeconomy, promotes the use of renewable materials and reduces dependence on fossil fuels.

Forest-based industries also mitigate climate change by storing carbon in wood products and replacing more polluting materials and energy sources. Monitoring the forest sector's contribution to GDP within a sustainability framework helps ensure economic growth remains aligned with broader sustainability goals. However, earlier SoEF editions have noted that conventional GDP/GVA (Gross Value Added) statistics capture only market activity and understate the broader economic significance of forests when non-market services are significant or poorly recorded.

How it is defined

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

Key findings

- In 2020, the forestry sector contributed around 0.83% to Europe's GDP, measured as total gross value added. The industry is most economically important in Northern and Central-Eastern Europe, accounting for almost 1.6% of GDP.
- The actual economic impact of the forest sector is likely underreported, as many public ecosystem goods and services – including non-wood forest products and numerous forest-related services – are not fully reflected in official economic statistics. This is particularly relevant where forests deliver substantial recreational and protective functions, as well as other non-market benefits.
- Although the forest sector's gross value added increased from EUR 106,874 million in 2000 to EUR 113,335 million in 2020, its growth was slower than average economic growth. Consequently, the sector's share of GDP in Europe declined from 1.13% in 2000 to 0.83% in 2020.
- The forest sector's relative importance varies widely by country. In several forest-rich economies, it represents a materially larger share of GDP than the European average, reflecting both resource endowments and the structure of wood-processing industries.

Status

The forest sector encompasses forestry, the production of wood and wood products, and the production of paper and paper products. Its contribution to GDP reflects the sector's economic importance, which is measured by gross value added (GVA). GVA is calculated by subtracting the value of intermediate goods and services used during production from the total value of the sector's output.

In 2020, the total GVA of the forest sector in Europe was EUR 113.3 billion, accounting for 0.83% of Europe's GDP. Forestry accounted for 20.5% of the sector's GVA, while the wood industry accounted for 38.2% and the paper industry for 41.3%.

Table 6.2-1 shows the GVA of the forest sector and its subsectors, alongside their respective contributions to GDP by region in 2020. The economic importance of the forest sector and the distribution of value amongst the three subsectors vary considerably across countries and regions. The EU-27 aggregate is shown for comparability purposes, but the indicator and reporting scope cover the entire FOREST EUROPE region.

The forest sector is of particular economic importance in Northern and Central and Eastern Europe, where it contributes approximately twice the European average to GDP (1.56% and 1.59% respectively, compared to 0.83%). Around 85% of

Table 6.2-1: *Value added in forest sector, by subsectors and relative contribution to gross domestic product, by region, 2020*

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)	Contri-bution to total GDP
	EUR million	*%*	*EUR million*	*%*	*EUR million*	*%*	*EUR million*	*%*
North Europe	7 884	34.2	7 137	31.0	7 998	34.7	23 019	1.59
Central-West Europe	4 926	10.1	21 392	43.8	22 574	46.2	48 892	0.64
Central-East Europe	5 172	30.8	6 605	39.4	4 993	29.8	16 771	1.56
South-West Europe	4 178	19.2	7 172	33.0	10 395	47.8	21 745	0.80
South-East Europe	1 024	35.2	999	34.4	886	30.4	2 909	0.37
EU-27	***22 294***	***21.0***	***38 441***	***36.2***	***45 372***	***42.8***	***106 107***	***0.87***
Europe	***23 184***	***20.5***	***43 305***	***38.2***	***46 846***	***41.3***	***113 335***	***0.83***

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 91%, C-EE 51%, S-WE 99%, S-EE 41%, EU-27 100%, Europe 78%.

the value added by the European forest sector is produced in three regions: North Europe, Central-West Europe, and South-West Europe. This is largely due to high levels of value added in the processing subsectors. At a country level, the total value added by the forest sector in 2020 was highest in Germany (EUR 31.0 billion), followed by France (EUR 20.6 billion), Italy (EUR 15.0 billion) and Spain (EUR 10.3 billion).

As a subsector, forestry is most economically significant in South-East Europe, accounting for around 35.2% of the total added value in the forest sector. In Northern and Central-Eastern Europe, the share is also above the European average, reaching 34.2% and 30.8%, respectively.

The European wood industry generated 38.2% of the forest sector's value added. In Central and Western Europe and the South-West, the forest sector's value added is dominated by the paper industry.

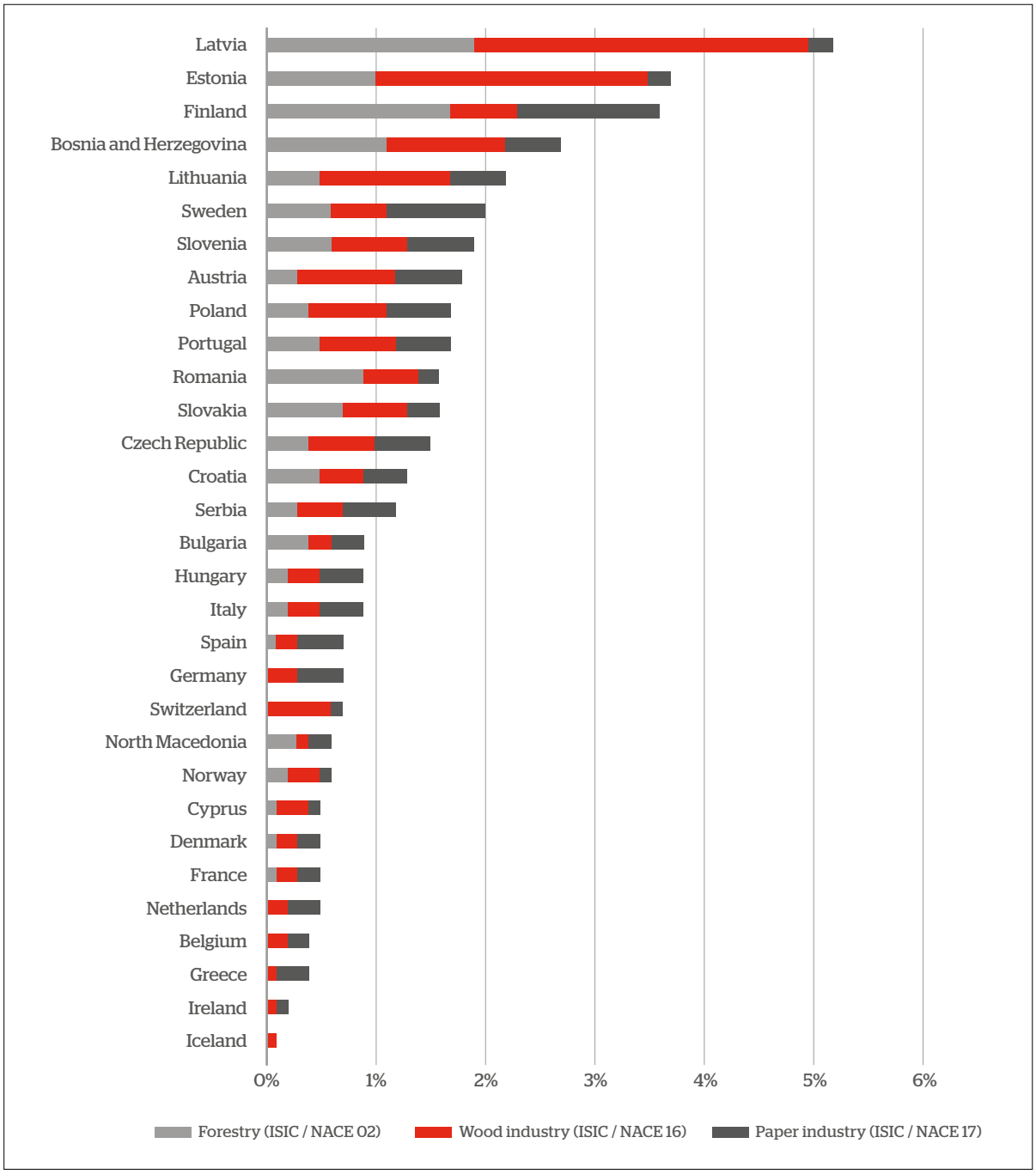


Figure 6.2-1: *Contribution of the forest sector to gross domestic product, by country, 2020.*

The forest sector's structure, based on GVA production, highlights clear regional differences. South-West Europe (80.8%) and Central West Europe (89.9%) have a strong focus on processing activities, whereas Central East Europe (70.2%) places greater emphasis on production and primary conversion. These two activities together account for 70.2% of GVA. Northern Europe displays a more balanced contribution across subsectors, as does South-East Europe, although the latter leans more towards production and primary conversion (69.6%).

The forest sector plays a particularly important role in the economies of Latvia, Estonia, Finland, Bosnia and Herzegovina and Lithuania, accounting for between 2.2% and 5.2% of GDP. It also plays a relatively significant role in Sweden, Slovenia, Austria, Poland, Portugal, Romania and Slovakia, contributing around 1.6% to 2% of GDP. In all other European countries, the forest sector contributes 1.5% or less to GDP *(Figure 6.2-1)*.

The data presented for this indicator capture only the reported, direct contribution of activities in the formal forest sector to GDP; that is, the value added by all respective subsectors, recorded as such. However, as forestry provides a wide range of public ecosystem goods and services that are not fully reported or monetised, the actual economic contribution of the forest sector is likely to be underestimated.

Trends

Figure 6.2-2 illustrates trends in gross value added by the forestry subsector and its contribution to GDP in Europe. To ensure compatibility and consistency over time, countries reporting only partial data were excluded. The countries included in the figure accounted for around 90% of Europe's GDP and the forest sector's value added. This means that the observed trends provide a reliable picture of overall developments across Europe. Tables 6.2-2–6.2-4 present the forest sector's GVA by subsector and region for 2000, 2010, 2015, and 2020.

Annual forest sector GVA in Europe remained stable at around EUR 100 billion between 2000 and 2010, before increasing to EUR 113.3 billion by 2020 *(Table 6.2-2)*. However, despite this absolute growth, the sector's contribution to GDP declined from 1.13% in

Table 6.2-2: *Trends in forestry (ISIC/NACE 02) gross value added and contribution to gross domestic product, by region, 2000–2020*

Region	Gross value added (EUR million)				Contribution to GDP (%)			
	2020	2015	2010	2000	2020	2015	2010	2000
North Europe	7 884	7 507	6 687	5 208	0.55	0.55	0.53	0.62
Central-West Europe	4 926	9 981	6 163	5 824	0.06	0.11	0.08	0.10
Central-East Europe	5 172	4 755	3 927	1 614	0.48	0.56	0.54	0.49
South-West Europe	4 178	3 572	3 316	3 283	0.53	0.41	0.48	0.89
South-East Europe	1 024	905	837	510	0.04	0.03	0.03	0.03
EU 27	**22 294**	**24 424**	**19 319**	**14 986**	**0.18**	**0.22**	**0.20**	**0.21**
Europe	**23 184**	**26 721**	**20 930**	**16 437**	**0.17**	**0.18**	**0.16**	**0.17**

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 85%, C-EE 51%, S-WE 99%, S-EE 40%, EU-27 98%, Europe 77%

2000 to 0.83% in 2020, reflecting slower growth than that of the overall European economy.

Trends in GVA varied considerably across different sectors. For example, GVA in the forestry subsector increased by an average of 2.7% per year between 2000 and 2010, accelerating to 5.5% per year between 2010 and 2015. However, it declined by an average of 2.6% per year between 2015 and 2020. Despite this downturn, positive developments were observed in 2022 compared with 2020 in all reporting countries except Sweden and Romania. This reflects market developments, as well as the growing influence of disturbance-related costs and salvage operations on primary-sector performance in certain countries.

GVA in the wood industry grew modestly by an average of 0.2% between 2000 and 2010, recovered to an annual growth rate of 1.4% between 2010 and 2015, and then slowed again to a yearly growth rate of just 0.4% between 2015 and 2020. The paper industry experienced a 1.3% annual decline in GVA between 2000 and 2010. Following the global economic downturn, it recovered with an average yearly growth rate of 2.1% between 2010 and 2015. However, it subsequently contracted slightly, by around 1% per year, between 2015 and 2020.

The regional distribution of forest sector value added in Europe shifted moderately over the period 2000–2020. Northern Europe maintained a relatively stable share of total value added, while Central-West Europe saw its share decline. In contrast, Central and Eastern Europe experienced a substantial increase, with its share rising from 5.5% to 14.8%. This was largely driven by significant growth in value added across all forest sector subsectors.

At a country level, most European countries recorded increases in forest sector value added between 2000 and 2020. The largest increases were observed in Germany (EUR 11.8 billion) and France (EUR 7.4 billion).

Table 6.2-3: *Trends in wood industry (ISIC/NACE 16) gross value added and contribution to gross domestic product, by region, 2000–2020*

Region	Gross value added (EUR million)				Contribution to GDP (%)			
	2020	2015	2010	2000	2020	2015	2010	2000
North Europe	7 137	6 834	6 325	5 579	0.49	0.50	0.50	0.66
Central-West Europe	21 392	21 802	18 183	19 800	0.28	0.23	0.24	0.33
Central-East Europe	6 605	5 505	5 692	2 303	0.62	0.65	0.79	0.70
South-West Europe	7 172	7 373	8 811	10 186	0.90	0.84	1.28	2.77
South-East Europe	999	922	730	952	0.04	0.04	0.03	0.05
EU 27	***38 441***	***33 753***	***33 452***	***32 291***	***0.32***	***0.31***	***0.34***	***0.46***
Europe	***43 305***	***42 436***	***39 742***	***38 820***	***0.32***	***0.28***	***0.31***	***0.41***

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 91%, C-EE 51%, S-WE 99%, S-EE 41%, EU-27 100%, Europe 78%.

Table 6.2-4: *Trends in paper industry (ISIC/NACE 17) gross value added and contribution to gross domestic product, by region, 2000–2020*

Region	Gross value added (EUR million)				Contribution to GDP (%)			
	2020	2015	2010	2000	2020	2015	2010	2000
North Europe	7 998	8 427	8 089	13 103	0.55	0.61	0.65	1.55
Central-West Europe	22 574	26 950	23 992	27 171	0.29	0.29	0.32	0.45
Central-East Europe	4 993	4 084	2 907	1 949	0.47	0.48	0.40	0.59
South-West Europe	10 395	9 267	9 174	8 741	1.31	1.06	1.33	2.37
South-East Europe	886	672	548	653	0.03	0.03	0.02	0.04
EU 27	**45 372**	**42 829**	**38 628**	**43 912**	**0.37**	**0.39**	**0.39**	**0.62**
Europe	**46 846**	**49 400**	**44 709**	**51 617**	**0.34**	**0.33**	**0.35**	**0.55**

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 91%, C-EE 51%, S-WE 99%, S-EE 41%, EU-27 100%, Europe 78%.

Indicator 6.3 Net revenue

Why it is important

Net revenue from forests is the income remaining after covering all forest-related operating costs, such as harvesting, regeneration, protection, and administration. It is a key indicator of the economic viability of sustainable forest management. Positive and steady net revenue indicates that forests can be managed in the long term without depleting natural capital or requiring unrealistic financial support, such as subsidies.

High net revenue enables reinvestment in forest infrastructure, biodiversity protection, and the development of new methods to help forests adapt to climate change, including climate-smart forestry. Conversely, persistently low or negative revenue may signal inefficiencies, ecological degradation, insufficient adaptation to climate change-related threats or market failures that undermine long-term sustainability.

The goal of sustainable forest management is to balance ecological objectives with financial returns by promoting the multifunctional use of forests and optimising operations through good practices, innovation, and modern technology. Net revenue is therefore essential for maintaining the engagement of both public and private forest owners in the long term. Net revenue dynamics are also closely linked to investment patterns (Indicator 6.4), because operating surplus affects reinvestment capacity.

How it is defined

Net revenue of forest enterprises.

Key findings

- The average net operating surplus of forest enterprises in Europe was around EUR 79 per hectare of forest in 2020.
- Factor income, defined as the sum of labour costs and profit, amounted to around EUR 121 per hectare in 2020, with significant variations observed across European regions.

- Per-hectare factor income in forestry increased at an average annual rate of around 1.4% between 2000 and 2020, though there was significant variation between European regions.
- Interpretation requires caution, however, as values are reported in nominal terms (not adjusted for inflation) and apparent regional differences may be influenced by uneven country coverage and variations in how subsidies and taxes are reflected in national accounts.

Status

Information on the factor income of forest enterprises and their net operating surplus was extracted from the EUROSTAT database (economic aggregates of forestry) for the years 2000, 2005, 2010, 2015 and 2020.

In the reporting countries, the factor income of forest enterprises totalled almost EUR 20 billion in 2020. The largest share of this income was generated in Northern Europe. A similar pattern was observed for net operating surplus, which totalled almost EUR 13 billion, again with the highest contribution coming from Northern Europe.

Table 6.3-1 shows that factor income and net operating surplus per hectare varied considerably across regions in 2020. Central and Eastern Europe recorded the highest factor income (EUR 202/ha) and net operating surplus (EUR 118/ha), with Central and Western Europe and South and Eastern Europe following in terms of factor income. Northern Europe recorded the lowest factor income per hectare (EUR 91/ha), while Central-West Europe recorded the lowest net operating surplus per hectare (EUR 47/ha).

While factor income in the underlying accounts is calculated as net value added at factor cost (including the effects of production taxes and subsidies), the aggregated reporting used here does not allow consistent separation of subsidy effects across countries and regions. On average, factor income across Europe amounted to €121/ha, while the net operating surplus was €79/ha. As highlighted in earlier SoEF reports, these figures are presented in nominal terms, so inflation and changes in input costs are not captured. This limits the ability to make direct comparisons over time without additional deflation/price adjustments.

Table 6.3-1: *Status of the factor income and net operating surplus of the forest enterprises, by region, 2020*

Region	Factor income		Net operating surplus	
	EUR million	*EUR/ha*	*EUR million*	*EUR/ha*
North Europe	5 690	91	5 170	83
Central-West Europe	4 554	127	1 691	47
Central-East Europe	4 697	202	2 746	118
South-West Europe	3 584	113	2 461	78
South-East Europe	1 315	126	912	87
EU-27	***18 567***	***126***	***12 362***	***84***
Europe	***19 841***	***121***	***12 981***	***79***

Note: Data coverage as % of total regional forest area: NE 87%, C-WE 92%, C-EE 51%, S-WE 99%, S-EE 24%, EU-27 91%, Europe 71%.

Trends

Regional trends are difficult to interpret because the number of countries reporting within each region varies over time. Consequently, the statistics include only countries that continuously provided the required data for the examined time periods.

Across Europe, forestry factor income per hectare shows varying dynamics over time: it increased between 2000 and 2015 but then declined from EUR 168/ha to EUR 121/ha between 2015 and 2020 In Central-West Europe, an annual decrease of 4% occurred between 2000 and 2010. Central and Eastern Europe experienced a yearly decline in factor income of 6.2% during 2010–2015, followed by an annual increase of 0.6% during 2015–2020. The highest volatility was observed in South-West Europe, where factor income fell by an average of 2% per year between 2010 and 2020. A similar pattern is evident in the net operating surplus of forest enterprises *(Table 6.3-3)*, reflecting comparable regional and temporal fluctuations.

According to Eurostat data, the trend in factor income showed a moderate reversal in 2022 for several countries. For instance, factor income increased in Austria, Germany, France and Poland compared to 2020, contrasting with the negative trend observed between 2015 and 2020.

Table 6.3-2: *Trends in the factor income of forestry, by region, 2010–2020*

Region	Factor income			Annual change rate of factor income		
	2020	*2015*	*2010*	*2010–2020*	*2015–2020*	*2010–2015*
	EUR/ha			*%*		
North Europe	90.9	86.3	93.6	-0.3	1.1	-1.5
Central-West Europe	127.0	202.1	147.5	-1.4	-7.4	7.4
Central-East Europe	201.6	195.4	128.6	5.7	0.6	10.4
South-West Europe	113.1	193.4	215.7	-4.8	-8.3	-2.1
South-East Europe	125.8	99.1	58.8	11.4	5.4	13.7
EU-27	***126.0***	***135.2***	***133.1***	***-0.5***	***-1.4***	***0.3***
Europe	***121.1***	***139.5***	***117.1***	***0.3***	***-2.7***	***3.8***

Note: Data coverage as % of total regional forest area: NE 87%, C-WE 92%, C-EE 51%, S-WE 99%, S-EE 24%, EU-27 91%, Europe 71%.

Table 6.3-3: *Trends in the net operating surplus of forest enterprises, by region, 2000–2020*

Region	Net operating surplus				Annual change rate of net operating surplus			
	2020	2015	2010	2000	2000–2020	2015–2020	2010–2015	2000–2010
	EUR/ha				%			
North Europe	82.6	62.6	68.6	65.7	1.3	6.4	-1.7	0.4
Central-West Europe	47.2	120.3	77.9	48.6	-0.1	-12.2	10.9	6.0
Central-East Europe	117.8	114.4	55.7	16.5	30.7	0.6	21.1	23.7
South-West Europe	77.7	74.7	62.1	103.8	-1.3	0.8	4.1	-4.0
South-East Europe	87.3	59.6	30.8	7.2	56.0	9.3	18.8	33.0
EU-27	**83.9**	**89.1**	**71.1**	**60.7**	**1.9**	**-1.2**	**5.0**	**1.7**
Europe	**79.2**	**83.7**	**65.5**	**58.7**	**1.8**	**-1.1**	**5.6**	**1.2**

Note: Data coverage as % of total regional forest area: NE 87%, C-WE 92%, C-EE 51%, S-WE 99%, S-EE 24%, EU-27 91%, Europe 71%.

Indicator 6. 4 *Investment in forests and forestry*

Why it is important

Investing in forests and forestry is crucial for ensuring the long-term health, productivity and resilience of forests and their ecosystems. Such investment underpins sustainable forest management, supporting activities such as afforestation and reforestation to plant new trees, forest restoration, infrastructure development and maintenance, biodiversity protection, and innovation in forest-based industries. Targeted investment ensures forestry remains economically viable while protecting environmental and social values.

Public and private funding are both crucial for enabling climate-smart forestry, adaptive management, and the delivery of ecosystem services. Insufficient investment often limits the capacity to address growing challenges, including those associated with climate change, pests and post-fire land degradation. Sustainable investment considers not only short-term profits, but also ecological impact and social benefit. This aligns with broader objectives, such as national and pan-European climate and biodiversity strategies, the Paris Agreement, and the UN Sustainable Development Goals, and others. Transparent, long-term investment in forestry helps secure the future supply of wood, supports jobs in rural areas, and strengthens forests' role in storing carbon, protecting biodiversity, and adapting to climate change.

How it is defined

Total public and private investments in forest and forestry.

Key findings

- In 2020, the value of gross fixed capital investment in European forests was approximately EUR 26.5 per hectare, totalling over EUR 4.3 billion across the reporting countries.
- Reported forestry investment in Europe shows mixed dynamics across countries and time periods. Forestry investment in Europe declined from 2015 to 2020, reflecting lower revenues. However, it showed a moderate recovery in 2021–2022 across most countries, despite limitations in the available data and price data.
- Interpretation requires caution. The results are not adjusted for inflation, and the reporting coverage is uneven across the FOREST EUROPE area, as comparable investment series are not available for all members. This can affect regional comparisons and trend interpretation.

Status

A total of 30 countries reported a gross fixed capital formation figure of EUR 4 328 million in 2020 *(Table 6.4-1)*. The majority of this total (92%) comes from countries for which harmonised forestry economic accounts are regularly compiled (primarily EU/EFTA countries), which helps to explain the incomplete coverage of the wider FOREST EUROPE region. The highest investments were recorded in Northern Europe (EUR 1 791 million) and Central-West Europe (EUR 968 million).

Disaggregated analysis reveals significant differences in investment composition across regions. Investment levels in South-East Europe were much lower, both in absolute terms (EUR 91 million) and relative terms. Notable regional variation was observed: in Central-East Europe, investment per hectare reached EUR 34.2, nearly four times higher than in South-East Europe (EUR 8.7/ha), with the European average at EUR 26.5/ha *(Table 6.4-1)*.

The country's policy context is important for interpretation. The balance between public and private investment varies considerably among FOREST EUROPE members, depending on forest ownership structures and national policy choices. Cross-country comparisons of 'public vs private' investment levels can therefore be misleading unless the type of instrument (e.g., grant, tax incentive, compensation or advisory support) is specified.

Table 6.4-1: *Gross fixed capital formation in forest and forestry, by region, 2020*

Region	Gross fixed capital formation	
	EUR million	*EUR/ha*
North Europe	1791.2	28.6
Central-West Europe	968.3	27.6
Central-East Europe	796.9	34.2
South-West Europe	680.7	21.5
Sout- East Europe	91.4	8.7
EU 27	***3 997.4***	***27.3***
Europe	***4 328.5***	***26.5***

Note: Data coverage as % of total regional forest area: NE 87%, C-WE 89%, C-EE 51%, S-WE 99%, S-EE 24%, EU-27 91%, Europe 71%.

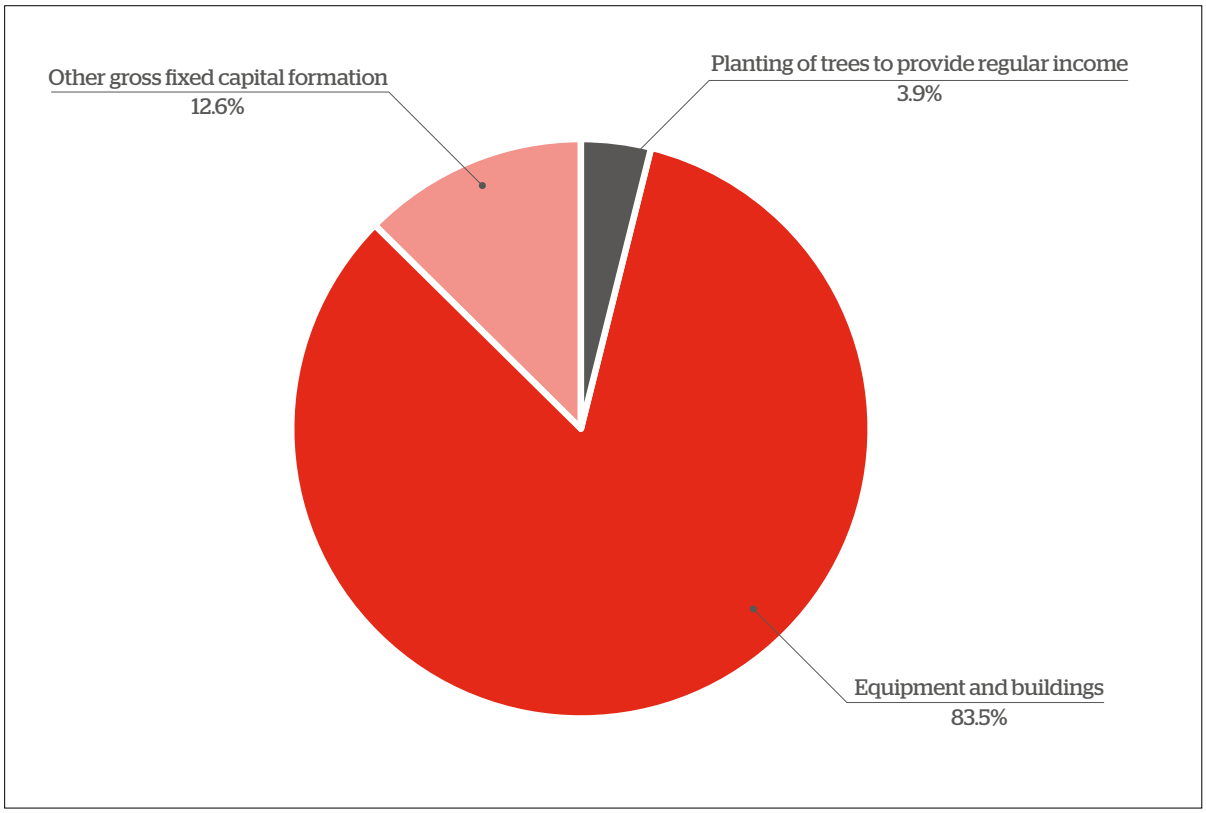


Figure 6.4-1: *Distribution of gross fixed capital formation, 2020*

Note: Data coverage as % of total regional forest area: 71%.

The allocation of investment among categories, such as planting, infrastructure, and equipment, varies depending on ecological conditions and national forestry structures. For instance, regional variations in planting investment are influenced by climatic, soil, land-use and policy contexts that affect forest establishment. *(Figure 6.4-2)*.

Reported investments in fixed capital vary between 2015 and 2020, reflecting the downward trend in net revenue (see Indicator 6.3). However, interpretation should account for the following: (i) incomplete and uneven country coverage in the forestry economic accounts used for this indicator; and (ii) nominal reporting (no inflation adjustment), which can distort comparisons across years, particularly around 2020–2022.

Eurostat data suggest a moderate recovery in 2021–2022, with positive trends evident across most countries. Exceptions include Portugal, Finland, Sweden and Switzerland, which experienced slight decreases compared to 2020.

Despite temporary setbacks, ongoing investment in forestry remains essential to maintaining ecosystem resilience, fostering innovation in the bioeconomy, and ensuring the long-term productivity of Europe's forests.

Table 6.4-2: *Trends in distribution of gross fixed capital formation, by region, 2010–2020*

Region	Planting			Equipment & building			Other			Total		
	EUR million											
	2020	2015	2010	2020	2015	2010	2020	2015	2010	2020	2015	2010
North Europe						822	26	84	78	1791	1094	1368
Central-West Europe					658	448	20	11	13	968	864	673
Central-East Europe					391	140	64	18	8	797	818	194
South-West Europe	56	77	72		139	42	72	5	2	681	274	116
South-East Europe					28	40	2	8	4	91	51	44
EU 27	**57**	**77**	**72**		**1 060**	**1 313**	**182**	**116**	**92**	**3 997**	**2 936**	**2 205**
Europe	**57**	**77**	**72**		**1 215**	**1 492**	**184**	**127**	**105**	**4 328**	**3 102**	**2 396**

Note: Data coverage as % of total regional forest area: NE 49%, C-WE 47%, C-EE 47%, S-WE 99%, S-EE 22%, EU-27 88%, Europe 65%.

Indicator 6.5 *Forest sector workforce*

Why it is important

A skilled and diverse workforce is central to sustainable forest management. This includes foresters, loggers, processors, conservation specialists and related service providers. A skilled and diverse workforce ensures that activities such as planning, harvesting, regeneration, protection and restoration are carried out responsibly and effectively. A stable and well-trained workforce is essential for maintaining long-term forest productivity, protecting biodiversity and enhancing forest resilience in the face of emerging and increasing threats and disturbances.

Training and education focused on sustainability encourages innovative approaches, climate-smart practices, and the adoption of modern digital forestry tools. Employment trends in the sector can also reflect broader developments, such as the growth of green jobs, stable rural economies and social inclusion, particularly in remote areas.

Investing in education, vocational training, and safe working conditions enables workers to balance economic gains with ecological health, community needs, and overall well-being. As forests face increasing pressure from climate change, biotic and abiotic hazards, and land-use changes, a competent, professional workforce is essential for adaptive management and rapid response. Previous SoEF reports have also highlighted long-term structural changes in the sector, such as mechanisation, contractorisation and restructuring in the wood and paper industries. These changes affect both employment levels and the required skill set across the value chain.

How it is defined

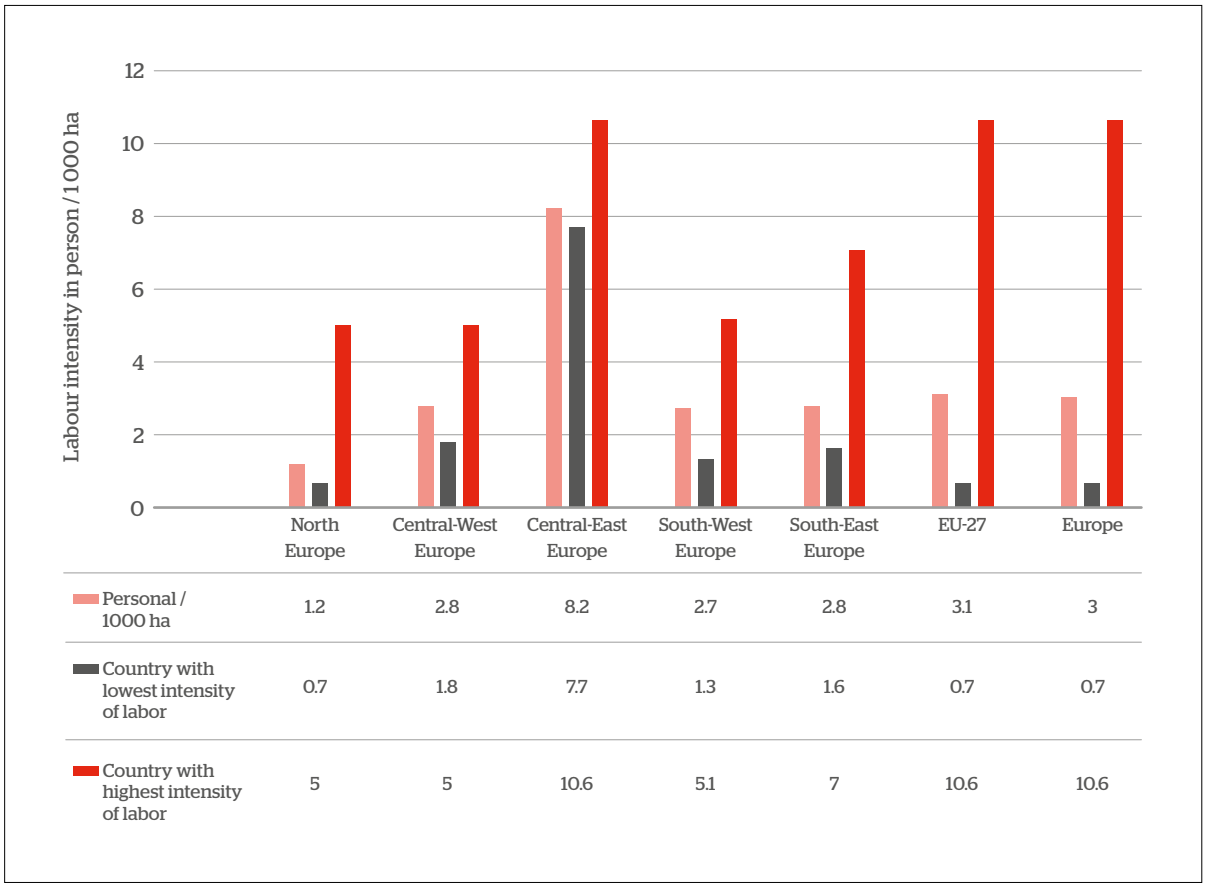
Number of persons employed and labour input in the forest sector, classified by gender and age group, education and job characteristics.

Key findings

- In 2020, around 2.4 million people were employed in the European forest sector (i.e. forestry, wood manufacturing and the paper industry). For context, the SoEF 2020 report stated that more than 2.6 million people were employed in the forest sector based on the previous reporting cycle.
- In forestry, there are approximately three employees per 1 000 hectares of forest.
- Employment in the forest sector declined by around 25% in the long term between 2000 and 2020, particularly in processing subsectors where automation and market restructuring were significant.
- Work is ongoing in FOREST EUROPE to refine Indicator 6.5 to better capture changes in employment structures (including contractors and new green job profiles) and to improve comparability between countries.

Status

Employment in the forest sector includes the forestry workforce (ISIC/NACE 02), the wood manufacturing workforce (ISIC/NACE 16), and the paper industry workforce (ISIC/NACE 17). In 2020, these sub-sectors together employed over 2.4 million people across 29 reporting countries. While employment has declined overall since 2000, the forest sector still accounts for 1.1% of Europe's total workforce. It remains a key employer in rural regions, making a significant contribution to local economies.



	North Europe	Central-West Europe	Central-East Europe	South-West Europe	South-East Europe	EU-27	Europe
Personal / 1000 ha	1.2	2.8	8.2	2.7	2.8	3.1	3
Country with lowest intensity of labor	0.7	1.8	7.7	1.3	1.6	0.7	0.7
Country with highest intensity of labor	5	5	10.6	5.1	7	10.6	10.6

Figure 6.5-1: *Labour intensity in forestry (ISIC/NACE 02), by region, 2020*

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 87%, C-EE 51%, S-WE 99%, S-EE 80%, EU-27 96%, Europe 79%.

In 2020, approximately 27% of forest sector employment in Europe was in forestry, 44% in wood manufacturing, and 28% in the paper industry. Regional patterns vary: in Central-West and South-West Europe, for example, over 80% of employment in the forest sector is in manufacturing and paper processing, reflecting strong industrial development.

Labour intensity in forestry ranges from around one person per 1 000 hectares (ha) in highly mechanised Northern Europe to more than eight people per 1 000 ha in parts of Central and Eastern Europe *(Figure 6.5-1)*, depending on levels of mechanisation, site accessibility, and management intensity. Productivity, as measured by gross value added (GVA) per worker, also varies widely among regions.

The sector remains male-dominated, with men comprising over 80% of the workforce in forestry and wood manufacturing and around 70% in the paper industry. Despite technological advancements, little has changed in terms of the gender imbalance.

Small and medium-sized enterprises characterise the forestry and wood manufacturing sectors. Self-employed workers represent 24% of the forestry workforce, 14% of the wood manufacturing workforce and 3% of the paper industry workforce. The highest proportions of self-employed workers are found in the Czech Republic and Sweden, and the lowest in Croatia and Cyprus.

Trends

Between 2000 and 2020, employment in the European forestry sector fell by around 25% (Figure 6.5-2). The largest declines were seen in South-East Europe (-40%) and Central-West Europe (-43%), primarily due to restructuring and increased automation in the processing industry. Employment in Central-East Europe decreased gradually from the early 2000s. At the same time, in Northern Europe, the pulp and paper subsector experienced significant reductions (-47%) due to declining demand for printing paper and increased efficiency.

However, since 2010, employment in primary forestry operations has stabilised or even risen slightly in some countries, supported by growing demand for renewable materials and energy wood. This reflects forestry's expanding role in the circular bioeconomy and climate mitigation efforts.

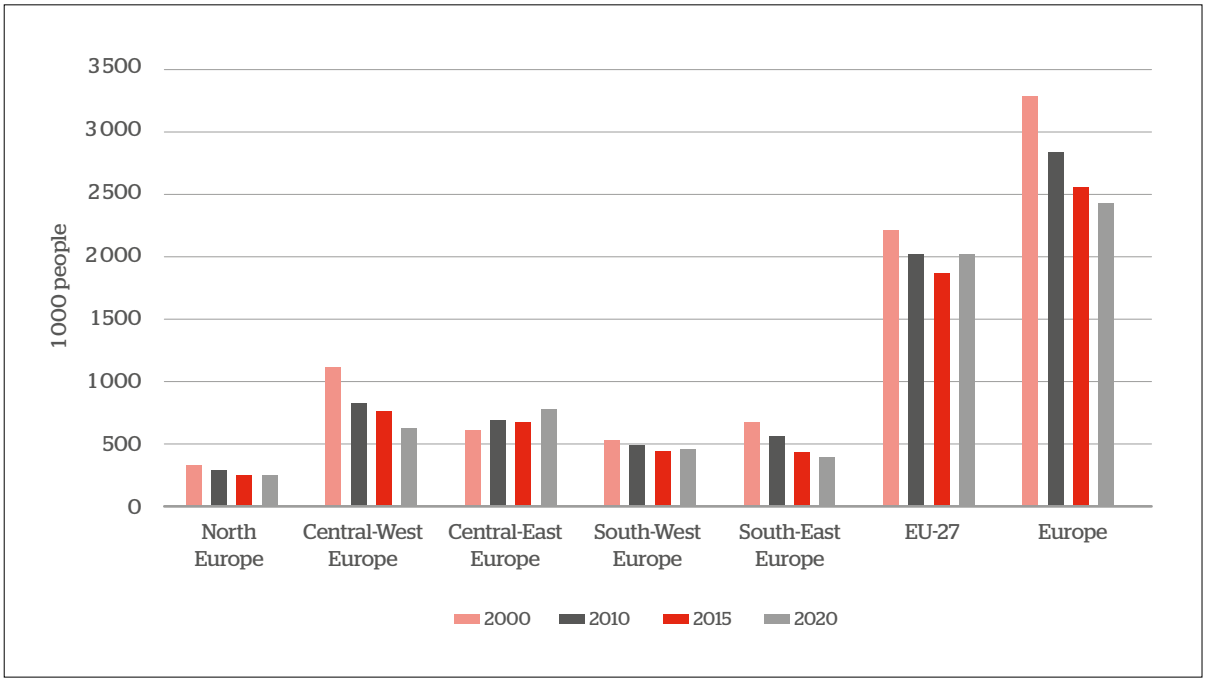


Figure 6.5-2: *Trends in total forest sector employment, by region, 2000–2020*

Note: Data coverage as % of total regional forest area: NE 83%, C-WE 87%, C-EE 100%, S-WE 99%, S-EE 80%, EU-27 96%, Europe 85%.

Recent updates in official statistics indicate mixed dynamics post-2020 across countries and subsectors. For instance, between 2020 and 2023, several countries reported employment growth, including the Netherlands (+9%), Greece (+8%), the Czech Republic (+7.7%), and Finland (+7.5%). These short-term changes should be interpreted with caution and considered alongside longer-term structural drivers, as well as the growing importance of evolving skills and occupational safety needs within the workforce.

Indicator 6.6 *Occupational safety and health*

Why it is important

Ensuring occupational safety and health in the forestry industry is essential to protecting workers who perform physically demanding, sometimes dangerous tasks during harvesting and silviculture operations.

Sustainable forest management focuses not only on protecting and managing ecosystems, but also on safeguarding the people who work in them. High rates of accidents and injuries undermine the sector's social sustainability and make it harder to recruit and retain skilled workers.

Implementing safe work practices, providing appropriate training, using personal protective equipment, and modern risk-reducing technologies are all key to ensuring occupational safety and health. Legal frameworks, certification standards, and responsible employers all play a key role in enforcing safety regulations and promoting continuous improvement. Particular attention should be given to vulnerable groups, including seasonal, migrant and young workers, as well as contractors and self-employed individuals, who may be subject to different reporting and prevention arrangements.

A safe and healthy working environment is fundamental to social sustainability and reflects the forest sector's commitment to human dignity, social justice, and decent work in rural areas. As noted in earlier SoEF editions, comparability across countries can be affected by differences in reporting systems, contractor coverage, and definitions of reportable incidents.

How it is defined

Frequency of occupational accidents and occupational diseases in forestry.

Key findings

- Working in forestry remains dangerous: 169 fatal and 14 500 non-fatal accidents were reported in Europe in 2020, equivalent to around 17 non-fatal accidents per 1 000 employees.
- Between 2000 and 2020, the number of fatal accidents decreased in all regions except South-West and South-East Europe, where the trend is more mixed and influenced by national outliers and reporting coverage.
- When measured per 1 000 m^3 of harvested timber, accident rates are lowest in Northern Europe, while the highest rates of non-fatal and fatal accidents are reported in South-West Europe.

Status

Data on fatal and non-fatal occupational accidents were provided by 23 countries, accounting for around 78% of total forestry employment in Europe.

In 2020, the European forestry sector experienced around 14 500 non-fatal accidents and 169 fatalities *(Table 6.6-1)*. Central-West Europe reported the highest number of fatal incidents, while Central-East Europe recorded the lowest overall accident rate normalised by the number of workers.

At a national level, the highest rates were recorded in Italy and Germany, at up to 133 non-fatal incidents per 1 000 m^3 of timber harvested. However, these figures may reflect differences in definitions and recording practices, such as what constitutes a reportable accident, severity thresholds and how lost working time is recorded. Therefore, the data should be interpreted with caution, as differences may partly reflect variations in national reporting systems rather than actual risk levels.

Table 6.6-1: *Fatal and non-fatal accidents in forestry, by region, 2020*

Region	Fatal occupational accidents - Number	Non-fatal occupational accidents - Number	Non-fatal accidents per 1 000 workers	Non-fatal accidents per 1 000 m³ fellings
North Europe	8	758	6.8	0.00
Central-West Europe	59	8 259	84.3	0.06
Central-East Europe	54	848	4.4	0.01
South-West Europe	24	4 324	10.3	0.14
South-East Europe	24	287	20.2	0.01
EU 27	***146***	***14 330***	***20.5***	***0.03***
Europe	***169***	***14 476***	***17.4***	***0.02***

Notes: Data coverage as % of total number of reports: NE 88%, C-WE 70%, C-EE 67%, S-WE 89%, S-EE 36%, EU-27 92%, Europe 78%.

Overall, although forestry safety has improved over time, the sector remains highly accident-prone. Although mechanisation and improved work organisation have reduced exposure in many settings, they have also shifted risk profiles (e.g., machinery-related hazards), thereby reinforcing the need for continuous training and preventive measures.

Trends

Fatal accident rates declined across most European regions between 2000 and 2020. However, trends in South-West and South-East Europe are more variable and can be influenced by a small number of countries and changing data coverage over time. The largest reductions occurred in Northern Europe.

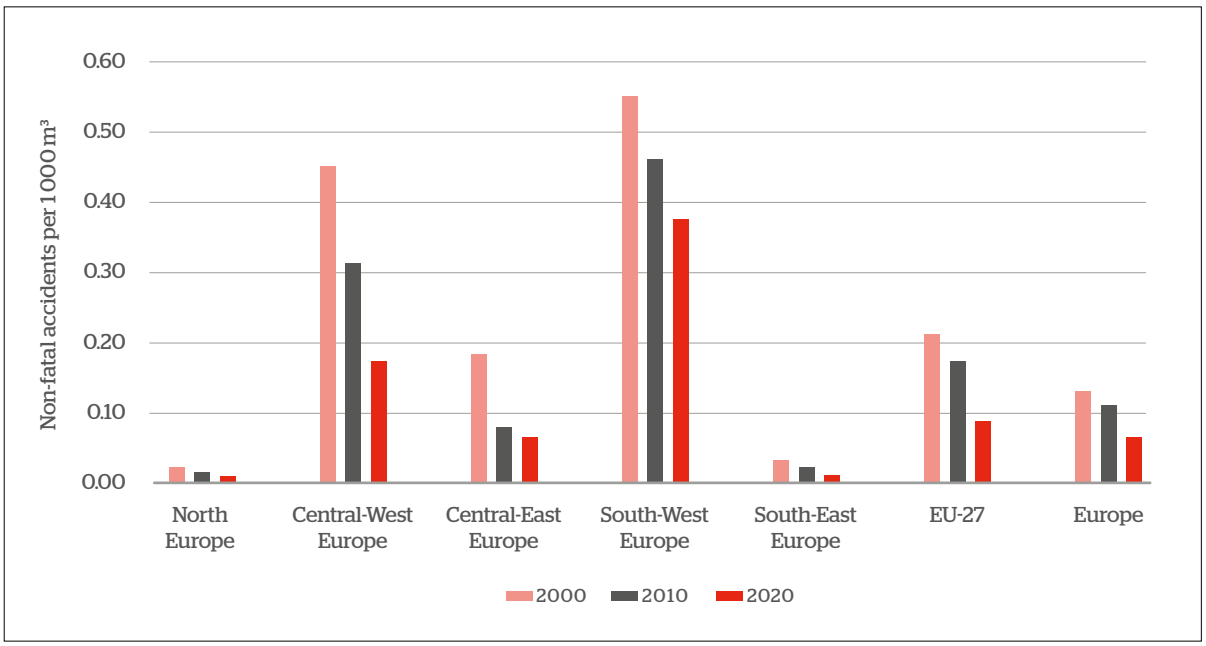


Figure 6.6-1: *Trends in non-fatal accidents per 1 000 m³ fellings, by region, 2000–2020*

Notes: Data coverage as % of regional forest area: NE 88%, C-WE 70%, C-EE 67%, S-WE 40%, S-EE 36%, EU-27 89%, Europe 58%.

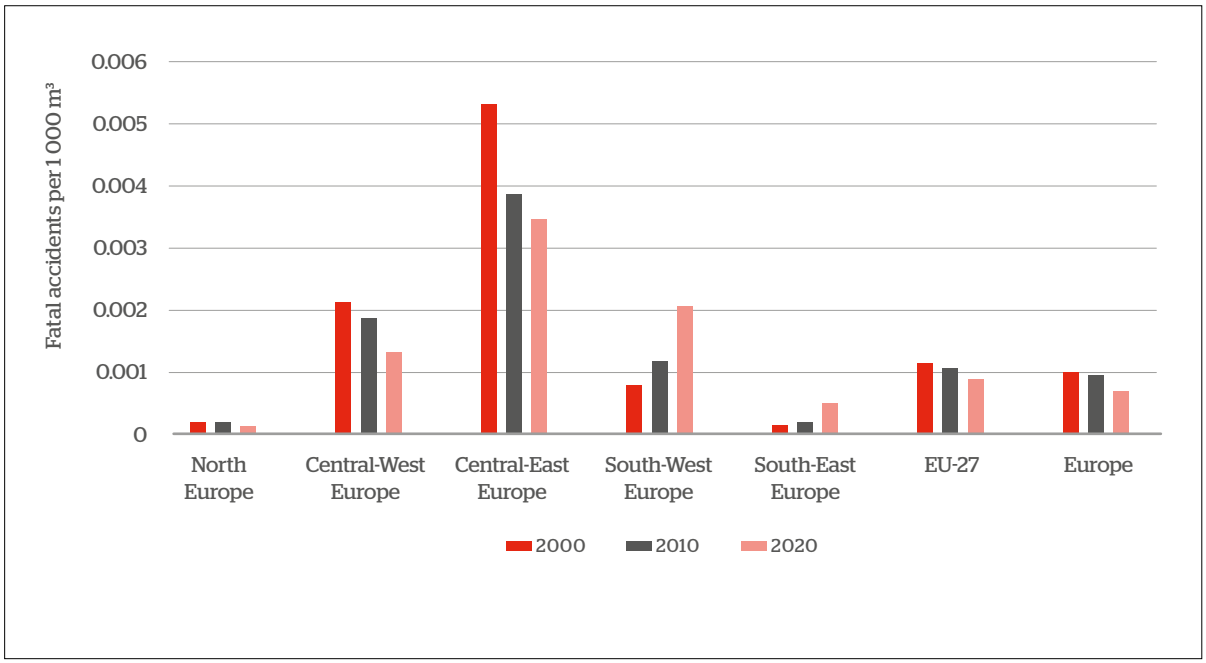


Figure 6.6-2: *Trends in fatal accidents per 1 000 m³ fellings, by region, 2000–2020*

Notes: Data coverage as % of regional forest area: NE 88%, C-WE 70%, C-EE 67%, S-WE 40%, S-EE 36%, EU-27 89%, Europe 58%.

Comparing accident frequency relative to the number of workers and the volume of timber harvested provides additional insights. Northern Europe consistently records the lowest rates of fatal and non-fatal accidents per 1 000 m³ harvested, whereas South-West Europe exhibits the highest rates *(Figures 6.6-1 and 6.6-2)*. However, these comparisons should be considered alongside differences in harvesting systems, contractor structures, and reporting practices.

Despite regional variations, the number of non-fatal accidents has decreased steadily across Europe over the last two decades. However, fatal accident trends remain more variable, highlighting the continued need for stronger occupational safety measures, comprehensive training, and the adoption of modern risk-reducing technologies. This should include measures tailored to contractors and small operators, where safety support and compliance capacity may be weaker.

Indicator 6.7 *Wood consumption*

Why it is important

Wood consumption refers to the use of wood and wood-based materials for construction, furniture, paper, packaging, and bioenergy. When responsibly practised alongside sustainable forest management, wood consumption can contribute to a circular bioeconomy by replacing fossil-based materials with renewable alternatives that emit fewer greenhouse gases.

Long-lasting wood products are particularly valuable as they store carbon over extended periods. Responsible wood consumption ensures that forests are not harvested faster than they can naturally regenerate, thereby protecting biodiversity, soil, and essential ecosystem services. However, higher consumption does not necessarily imply higher domestic harvesting, as consumption can be met through trade. Therefore, an accurate interpretation benefits from considering production, imports and exports alongside per capita consumption.

Tracking wood consumption reveals trends in the efficiency of resource use, the extent to which non-renewable materials are being replaced and the sustainability of supply chains. As demand for wood in renewable products, climate-smart construction, and energy grows, this must be carefully balanced with the need to maintain forest resources and their role in mitigating climate change (as well as in other ecosystem services), including through the principle of cascading use (prioritising long-lived products and reuse/recycling over energy use where feasible). Interpretation benefits from reading this indicator alongside wood trade (Indicator 6.8) and wood energy (Indicator 6.9), as consumption can be met through imports and may be driven by energy policy as well as material use.

How it is defined

Per-capita consumption of wood and products derived from wood.

Key findings

- In 2020, the average wood consumption in Europe was around 1 m^3 roundwood equivalent per person per year, ranging from 0.6 m^3 in South-East Europe to 1.9 m^3 in Northern Europe.
- Between 2010 and 2020, per capita wood consumption in Central and Eastern Europe increased by 3.45%. In contrast, there was an annual decline of 0.18% in Northern Europe and 0.84% in Central-West Europe. These trends reflect regional differences in economic growth, industrial restructuring, and the mix of energy and renewable material policies.

Status

Wood consumption includes sawn wood, wood-based panels, paper and paperboard, and energy wood. Estimates are calculated by comparing production levels and net trade (exports minus imports) within each region.

Considerable regional variation exists: in 2020, consumption ranged from 593 m^3 of roundwood equivalent (RWE) per 1 000 inhabitants in South-East Europe to 1 914 m^3 of RWE in Northern Europe *(Figure 6.7-1)*. Several factors influence these differences in forest resources, industrial capacity, income levels, cultural preferences, and patterns of wood utilisation, including the relative importance of wood-based bioenergy in national energy mixes.

Countries with well-developed processing industries and abundant domestic timber, such as Finland, Sweden and Austria, where wood is widely used for construction and energy, report the highest per capita consumption. In contrast, regions with limited processing capacity or smaller forest areas show lower levels. In some countries, high per capita consumption also reflects export-oriented processing industries and associated internal material flows, which can affect how roundwood equivalents map onto end-use consumption.

Table 6.7-1: *Trends in wood consumption, by region, 2010–2020*

Region	Annual change rate		
	2010–2020	*2010–2015*	*2015–2020*
	%		
North Europe	-0.18	-0.90	0.57
Central-West Europe	-0.84	-1.10	-0.61
Central-East Europe	3.45	2.94	3.46
South-West Europe	0.12	-0.98	1.27
South-East Europe	0.86	2.09	-0.34
EU-27	***0.05***	***-0.18***	***0.29***
Europe	***0.07***	***-0.21***	***0.35***

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

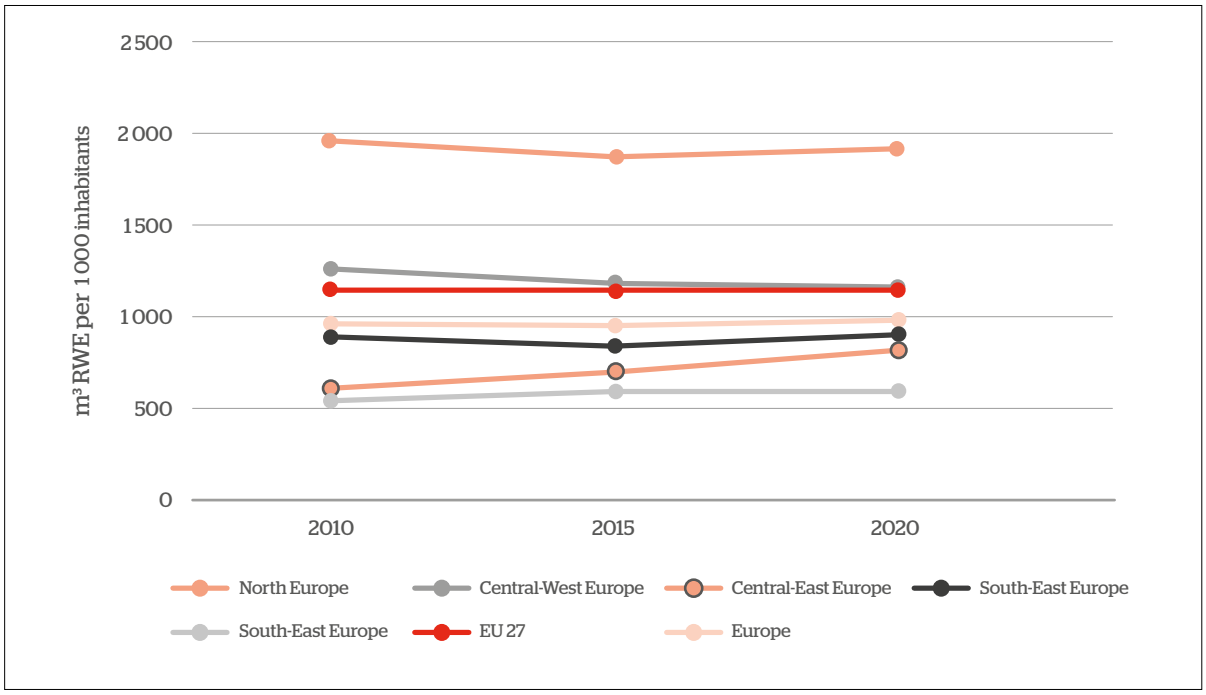


Figure 6.7-1: *Trends in wood consumption, by region, 2010–2020*

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

Trends

Trends in wood consumption generally reflect the performance of the wider economy, particularly in sectors such as construction, packaging, paper production and energy. Between 2005 and 2015, European wood consumption declined, primarily due to the global financial crisis of 2008–2009 and contractions in the housing and paper industries. The collapse of the graphic paper market, particularly the newsprint sector, further reduced demand.

Between 2010 and 2020, consumption increased across most regions, except in Northern and Central-West Europe. Regional annual growth rates ranged from 0.12% in South-West Europe to 3.45% in Central-East Europe. These increases were supported by public policies that promoted the use of wood in construction and renovation, as well as by EU renewable energy targets that encouraged the use of sustainably sourced wood-based bioenergy. Earlier SoEF editions also highlighted the sensitivity of wood consumption to macroeconomic cycles and structural changes in the paper industry.

The partial recovery in recent years has been driven by the increased use of engineered wood products, such as laminated veneer lumber and cross-laminated timber, and higher demand for packaging materials linked to e-commerce. These trends illustrate the adaptability of, and ongoing structural transformation in, the forest-based sector. However, it should be noted that the indicator does not distinguish between end uses (e.g., long-lived products versus short-lived uses and energy), so it should be interpreted alongside complementary indicators on wood energy, trade, and harvested wood products, where available.

Indicator 6.8 *Trade in wood*

Why it is important

The trade of wood connects regions with abundant forests to global markets, promotes the economic utilisation of renewable forest resources, fosters rural development, generates income, and encourages investment in sustainable forest management. Sustainable forest management ensures that traded wood products originate from legally harvested, responsibly managed forests. Trade indicators also help to track exposure to external market shocks and policy changes that can affect harvesting pressure, processing activity, and prices.

Monitoring trade flows provides insights into the environmental impact of wood consumption. Promoting trade in sustainably produced wood supports a green, circular bioeconomy by replacing fossil fuel-dependent materials with renewable alternatives. Furthermore, trade data provide a clear overview of the volumes of wood and wood products imported into and exported from Europe, illustrating the main wood streams across the continent. It is helpful to distinguish between product categories (roundwood, sawnwood, panels and pulp/paper) and between intra-European and non-European trade.

How it is defined

Imports and exports of wood and products derived from wood.

Key findings

- Europe is a net exporter of primary wood and paper products.
- In 2020, the European trade surplus was 64.2 million m³ of roundwood equivalent, worth EUR 11.1 billion.
- During the last reporting period, exports of primary wood and paper products increased slightly again. In value terms, however, trends were more mixed, reflecting price movements and changes in product composition.

Status

The trade of wood products reflects the spatial and economic distribution of production and consumption. It encompasses the export and import of roundwood, energy wood, sawn wood, wood-based panels, pulp, paper, and paperboard.

In 2020, Europe's net export position was 64.2 million cubic metres of roundwood equivalent (RWE), worth EUR 11.1 billion – a significant change from the trade deficits seen before 2000. This also represents a substantial increase compared to the previous reporting cycle. The change reflects both structural developments and cyclical effects in consumption, imports, and export-oriented processing. However, considerable regional imbalances remain.

The trade surplus is largely driven by Northern Europe, where forest-rich countries export substantial volumes of sawn wood and paper products within Europe and globally (notably to China). Most other regions are net importers of wood and paper products. The exception is Central and Eastern Europe, which recorded a net export of 23 million m³ in 2020.

Central and Eastern European countries primarily drive roundwood exports, whereas pulpwood and sawnwood exports are concentrated in Northern, Central and Western Europe. The main importers of wood and paper products are located in Central-West Europe, reflecting high industrial and consumer demand.

By 2020, only Northern and Central-East Europe had a positive trade balance. Overall, Europe's trade surplus of 64.2 million m³ RWE (EUR 11.1 billion) highlights the region's status as a major global exporter of forest-based materials and the ongoing importance of sustainable production and stable international markets. As with previous SoEF editions, it is important to note that 'roundwood equivalent' aggregates heterogeneous products into a common unit and can mask shifts towards higher-value, more processed exports.

Trends

Trade volumes have fluctuated in line with economic cycles. Unless stated otherwise, trade values and volumes shown for reference years

Table 6.8-1: *Trends in exports of primary wood and paper products in volume, by region, 2000–2020*

Region	Exports (million m³)					Annual change (%)			
	2020	2015	2010	2005	2000	2015–2020	2010–2015	2005–2010	2005–2000
North Europe	177.6	171.8	163.5	179.4	165.1	0.67	1.01	-1.77	1.73
Central-West Europe	204.1	193.9	198.2	203.9	158.2	1.05	-0.43	-0.56	5.77
Central-East Europe	93.8	75.9	57.4	51.8	35.9	4.71	6.47	2.14	8.90
South-West Europe	48.9	48.6	44.8	39.2	30.0	0.10	1.70	2.88	6.08
South-East Europe	27.4	24.0	17.9	15.1	8.9	2.76	6.82	3.76	13.95
EU-27	**496.0**	**465.7**	**442.5**	**445.6**	**363.2**	**1.30**	**1.05**	**-0.14**	**4.54**
Europe	**551.7**	**514.3**	**481.8**	**489.4**	**398.1**	**1.45**	**1.35**	**-0.31**	**4.58**

Notes: Data coverage as % of total regional forest area: for all regions 100%. Data used for reference years are averages over five years

Table 6.8-2: *Trends in exports of primary wood and paper products in value, by region, 2000–2020*

Region	Exports (EUR million)					Annual change (%)			
	2020	2015	2010	2005	2000	2015–2020	2010–2015	2005–2010	2005–2000
North Europe	22 723	28 554	25 107	26 536	25 157	-4.08	2.75	-1.08	1.10
Central-West Europe	38 176	39 833	36 039	37 150	31 800	-0.83	2.10	-0.60	3.36
Central-East Europe	12 234	10 602	7 656	6 315	3 816	3.08	7.69	4.25	13.09
South-West Europe	9 984	10 256	8 510	7 782	6 074	-0.53	4.10	1.87	5.62
South-East Europe	4 587	3 679	2 406	1 958	1 101	4.94	10.58	4.57	15.56
EU-27	**85 027**	**85 650**	**73 783**	**73 206**	**61 705**	**-0.15**	**3.22**	**0.16**	**3.73**
Europe	**92 865**	**92 924**	**79 718**	**79 742**	**67 949**	**-0.01**	**3.31**	**-0.01**	**3.47**

Notes: Data coverage as % of total regional forest area: for all regions 100%. Data used for reference years are averages over five years.

are five-year averages, which smooth short-term volatility and should not be interpreted as single-year values. For example, between 1990 and 2005, exports of roundwood and wood products doubled, only to decline during the economic downturn of 2008-2009 and recover moderately thereafter.

The economic slowdown had a lesser impact on South-East, South-West and Central-East Europe, which maintained export growth at lower rates than before 2008. Export values across the EU-27 and Europe increased slightly between 2005 and 2015, then declined moderately during 2015–2020, except in Central-East Europe, where exports continued to improve *(Tables 6.8.1 and 6.8.2)*. The divergence between volume and value trends indicates that price and product-mix effects must be considered when interpreting data, particularly during periods of market volatility.

Imports followed a similar pattern: decreasing during the financial crisis; recovering until 2015; and then declining moderately between 2015 and 2020. Again, there was an exception in Central-East Europe, where growth persisted *(Tables 6.8-3 and 6.8-4)*.

By 2020, only Northern Europe and Central-East Europe had a positive trade balance. Overall, Europe's trade surplus of 64.2 million m^3 of roundwood equivalent (RWE) (EUR 11.1 billion) highlights the region's status as a major global exporter of forest-based materials and the ongoing importance of sustainable production and stable international markets. Given the role of trade in shifting harvesting and processing pressures across regions, the results should be considered alongside indicators of wood consumption (Indicator 6.7), fellings/harvest levels (where available) and policy developments affecting requirements for legality and sustainability.

Table 6.8-3: *Trends in imports of primary wood and paper products in volume, by region, 2000–2020*

Region	Import (million m³)					Annual change (%)			
	2020	2015	2010	2005	2000	2015–2020	2010–2015	2005–2010	2005–2000
North Europe	57	50	47	63	53	2.83	1.19	-4.86	3.69
Central-West Europe	241	248	251	266	243	-0.59	-0.23	-1.13	1.95
Central-East Europe	71	59	48	40	25	3.92	4.51	4.14	12.66
South-West Europe	80	76	78	91	84	1.00	-0.52	-2.98	1.87
South-East Europe	39	37	34	33	19	0.92	1.74	0.97	15.02
EU-27	**407**	**387**	**374**	**397**	**343**	**1.05**	**0.67**	**-1.13**	**3.13**
Europe	**488**	**471**	**459**	**493**	**422**	**0.72**	**0.51**	**-1.38**	**3.35**

Notes: Data coverage as % of total regional forest area: for all regions 100%. Data used for reference years are averages over five years.

Table 6.8-4: *Trends in imports of primary wood and paper products in value, by region, 2000–2020*

Region	Import (EUR million)					Annual change (%)			
	2020	2015	2010	2005	2000	2015–2020	2010–2015	2005–2010	2005–2000
North Europe	7 336	7 012	6 328	7 223	5 781	0.92	2.16	-2.48	4.99
Central-West Europe	42 897	47 288	43 063	45 492	43 589	-1.86	1.96	-1.07	0.87
Central-East Europe	11 482	10 331	8 143	6 531	3 958	2.23	5.37	4.93	13.00
South-West Europe	13 160	13 282	12 134	14 123	13 072	-0.18	1.89	-2.82	1.61
South-East Europe	6 871	6 991	5 591	5 054	2 975	-0.34	5.01	2.12	13.98
EU-27	**66 457**	**67 668**	**60 384**	**62 175**	**55 086**	**-0.36**	**2.41**	**-0.58**	**2.57**
Europe	**81 746**	**84 903**	**75 259**	**78 424**	**69 376**	**-0.74**	**2.56**	**-0.81**	**2.61**

Notes: Data coverage as % of total regional forest area: for all regions 100%. Data used for reference years are averages over five years.

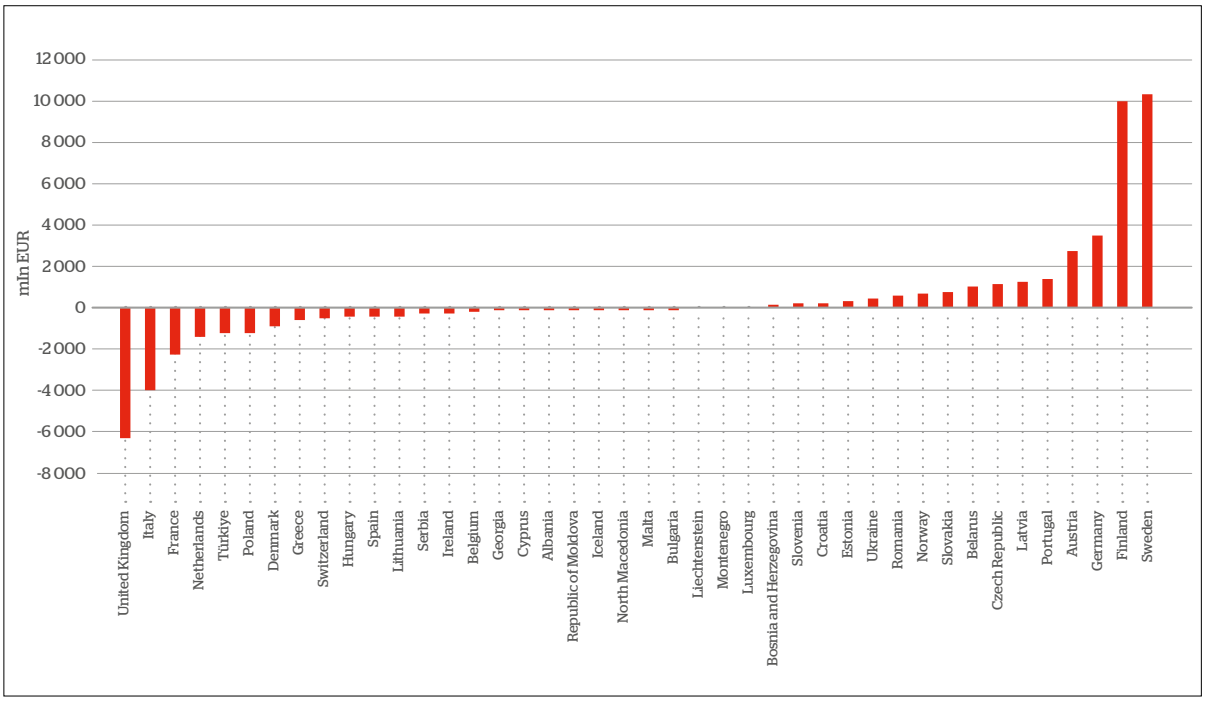


Figure 6.8-1: *Net trade of primary wood and paper products, by country, 2020.*

Indicator 6.9 *Wood energy*

Why it is important

Wood energy refers to the use of wood and wood residues for heating, electricity generation, and as a fuel source. As a major renewable energy source, wood energy can reduce dependency on fossil fuels, enhance energy security, and mitigate climate change.

When sourced from sustainably managed forests, wood energy supports the circular bioeconomy by utilising by-products such as branches, thinnings, and harvest residues that would otherwise be wasted. It also provides an important source of income for forest owners and rural communities. However, achieving sustainability requires careful balancing: overharvesting wood for energy can reduce forest carbon stocks, causing degradation and affecting biodiversity and long-term productivity.

Sustainable forest management helps maintain this balance by matching energy use to forest growth, protecting ecological and social functions and monitoring carbon impacts. Wood energy can play a valuable role in renewable energy strategies, but only when integrated into a broader commitment to long-term forest stewardship and ecological integrity. It is also important to distinguish between the use of residues and by-products, and the direct use of roundwood ("stemwood" or "wood fibre") for energy, as these have different implications for material substitution and carbon outcomes.

How it is defined

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

Key findings

- In Europe, the average annual per capita consumption of wood for energy is 0.3 tonnes of dry matter.
- Northern Europe has the highest per capita consumption, with nearly 1.5 metric tonnes of dry wood used for energy per person per year. However, direct wood fibres account for only 10%, compared with an average of 22% across Europe.

Status

In 2020, total wood energy consumption (in dry matter) was estimated at around 49.3 million tonnes in Northern Europe, 84 million tonnes in Central-West Europe, 8 million tonnes in Central-East Europe, 13 million tonnes in South-West Europe, and 5 million tonnes in South-East Europe. In Central-West Europe, this equates to around 2.2 tonnes of dry matter per hectare of forest. Despite having a population roughly 7.6 times larger than Northern Europe, Central-West Europe consumed only around 70% more wood-based energy in total, indicating substantially lower per-capita consumption and/or a different feedstock mix.

Northern Europe stands out for its high per capita wood energy consumption of 1.9 metric tonnes of dry matter per person, driven by both resource availability and a well-developed wood processing industry that generates substantial volumes of residues for energy use. National-level data *(Figure 6.9-1)* show that consumption per capita is highest in the Nordic countries and lowest in southern and eastern regions.

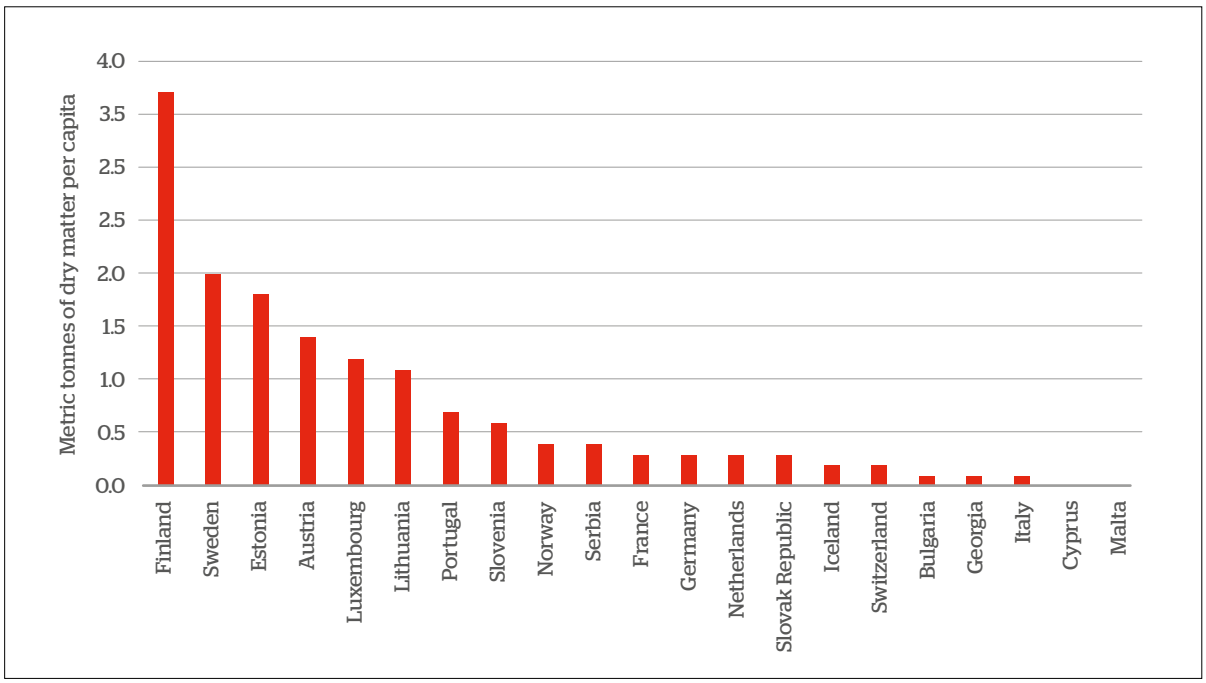


Figure 6.9-1: *Annual wood energy consumption, by country, 2021*

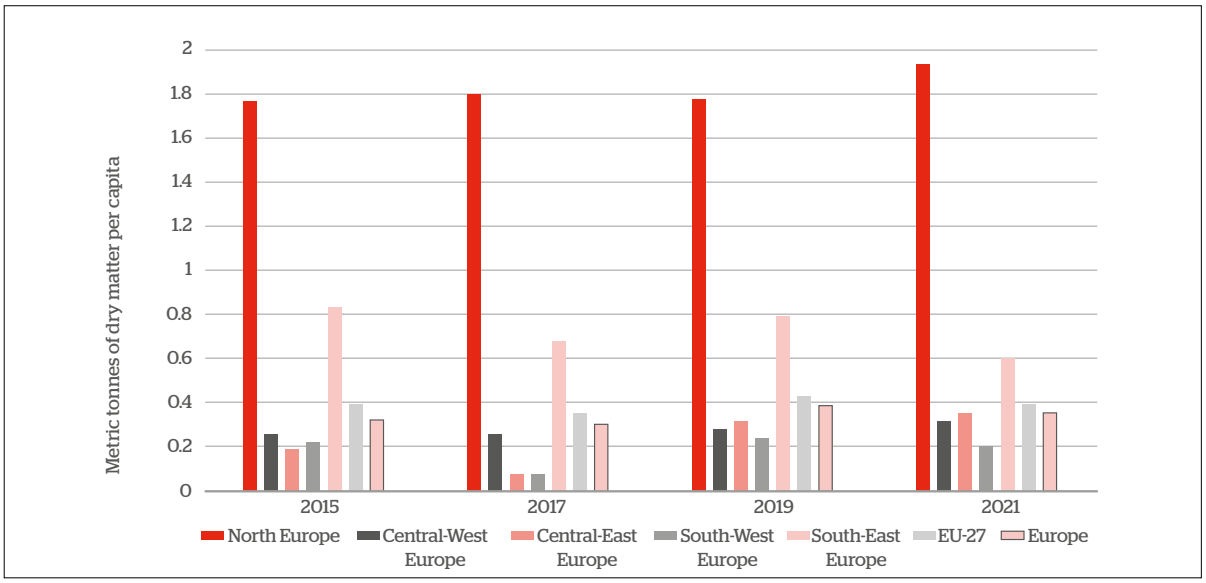


Figure 6.9-2: *Trend in annual wood energy consumption, by region, 2013–2021*

Note: Data coverage as % of number of reports: NE 75%, C-WE 70%, C-EE 66%, S-WE 60%, S-EE 73%, EU-27 80%, Europe 75%.

Trends

Data show that wood consumption in Europe peaked between 2015 and 2019, after which it declined by 2021. Overall, consumption fell from 0.31 tonnes of dry matter per person in 2015 to 0.21 in 2021 (-32%), while in the EU-27 it decreased from 0.36 to 0.25 (-31%) over the same period. Consumption remained high and relatively stable in Northern Europe (falling from 1.47 in 2013 to 1.39 in 2021, a 5% decline), whereas in Central-Western Europe it declined steadily (from 0.41 to 0.35, a 15% decline). Central-Eastern and South-Western Europe exhibited pronounced fluctuations, while consumption remained low in South-Eastern Europe, with minor changes around 0.04–0.06.

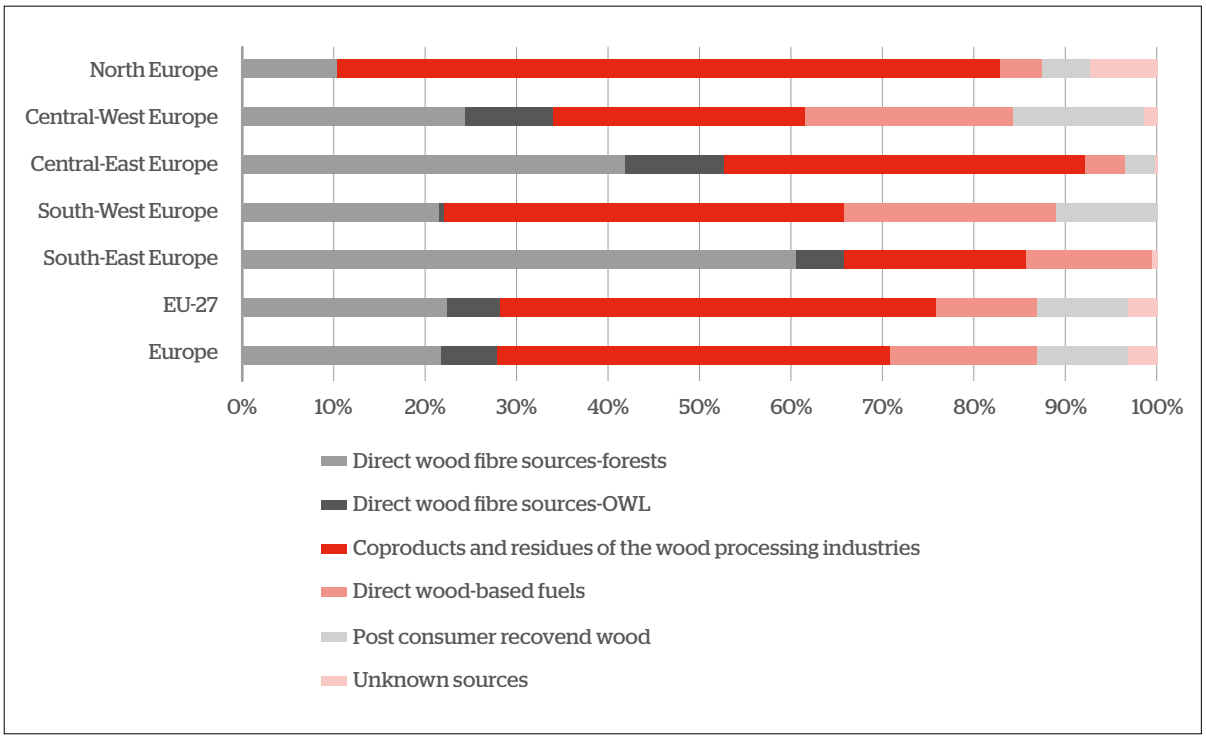


Figure 6.9-3: *Shares of wood fibre sources used for energy production, by region, 2021*

Note: Data coverage as % of number of reports: NE 75%, C-WE 70%, C-EE66%, S-WE 60%, S-EE 73%, EU-27 80%, Europe 75%.

These regional patterns reflect differences in national energy policies, forest resource availability, and the development of bioenergy infrastructure. While the overall European trend indicates a decline in per capita wood energy use, ensuring sustainability requires careful monitoring of feedstock origin, carbon accounting, and balancing the energy and material uses of wood. As emphasised in previous SoEF cycles, a significant interpretive issue is determining whether the increase in energy use is primarily sourced from residues/by-products or stemwood, and how this interacts with material use pathways (e.g. construction, panels, pulp/paper) and substitution effects.

Indicator 6.10 Recreation in forests

Why it is important

Forest recreation offers many social and cultural benefits, improving people's well-being and mental health, strengthening their sense of cultural identity, and enhancing their overall quality of life. Forests provide spaces for activities such as walking, cycling, wildlife observation, and relaxation, helping people feel more connected to nature.

To manage forests for recreation, it is necessary to maintain accessible, safe, and ecologically sensitive infrastructure while also protecting scenic beauty and biodiversity and minimising disturbance to wildlife and forest ecosystems.

However, forest recreation must be balanced with nature conservation and the needs of other forest users, such as hunters, forest workers and local communities. At the same time, forest recreation contributes to local economies through tourism and nature-based businesses, thereby strengthening broader support for conservation and sustainable forest management.

How it is defined

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

Key findings

- Approximately 65% of Europe's forests and other wooded land (FOWL) are open to the public for recreation, and in most countries, over 90% of forests are accessible to the public.
- Around 3.9% of FOWL are primarily designated or managed for public recreation.
- Changes in the availability of FOWLs for public recreation have been minimal, although interpretation is constrained by uneven coverage and diferences in national definitions of "public access".

Status

Data on recreational forest areas were provided by 27 countries, accounting for around 57% of Europe's FOWL area *(Table 6.10-1)*. Public access exceeds 90% in 20 of these countries. In Northern Europe, almost all forests (99%) are open to the public, reflecting robust legal access rights. In Central and Western Europe, around half of forest areas are publicly accessible, compared to 66% in South-Western Europe and around 40% in South-Eastern Europe.

Forests that are primarily designated or managed for recreation account for 3.9% of the total forest area. Only six countries reported the intensity of recreational use, expressed as the number of visits (covering 26% of the forest area). These countries estimated a total of 3.78 billion visits in 2020. However, given the limited reporting coverage of visit data, these figures should be interpreted as indicative only and not extrapolated to cover all of Europe.

Table 6.10-1: *Forest area available for public recreation and area managed for recreational use, by region, 2020*

Region	Percentage of FOWL area available for the public for recreational purposes	Percentage of the FOWL area primarily designated or managed for public recreation
	%	
North Europe	99.1	5.1
Central-West Europe	58.3	2.0
Central-East Europe	90.1	5.9
South-West Europe	66.0	-
South-East Europe	39.6	8.1
EU 27	***81.7***	***4.8***
Europe	***65.0***	***3.9***

Note: coverage as a % of regional forest area: NE 68%, C-WE 88%, C-EE 51%, S-WE 0.1%; S-EE 17%, EU-27 74%, Europe 57%.

Trends

Across Europe, the proportion of forest land designated for recreational use has remained largely unchanged since 1990, reflecting stable legal frameworks that guarantee public access. However, the area designated primarily for recreation has steadily increased in South-East and Central-East Europe *(Figure 6.10-1)*. This pattern is consistent with earlier SoEF reports: access tends to be stable where "right of access" traditions are established, while growth is more evident where recreation areas are formally designated and managed, and where policy attention and facility development have expanded.

Public demand for recreation continues to evolve, with a growing interest in outdoor activities and nature-based tourism and forest-induced health activities (e.g., forest therapy). Forest managers are increasingly integrating recreational infrastructure with ecosystem protection to ensure that visitor use remains compatible with conservation and other forest functions. In practice, this often involves zoning, visitor management and investment in trails, signage and popular sites, rather than uniform changes across all forests.

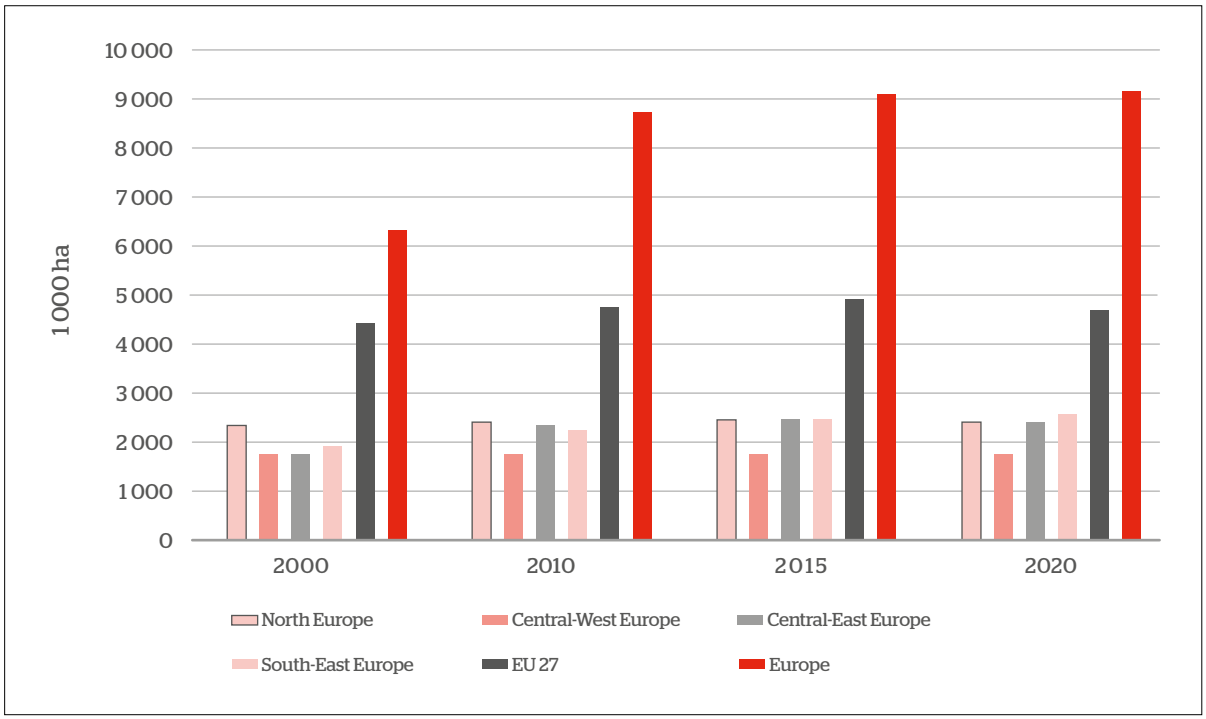


Figure 6.10-1: *Trends in area primarily designated or managed for public recreation, by region, 1990–2020.*

Note: coverage as a % of regional forest area: NE 29%, C-WE 88%, C-EE 51%, S-WE 0.1%; S-EE 17%, EU-27 63%, Europe 37%

Indicator C.6: *Policies, institutions and instruments to maintain other socio-economic functions and conditions*

Key findings

Most European countries have set policy objectives that address the socio-economic functions of forests, with a primary focus on ecosystem services, recreation, rural development and employment. Although no quantitative targets were reported for Criterion 6, 23 countries described institutional measures and policy tools, particularly emphasising:

- public access to forests and recreation opportunities.
- financial support through rural development programmes.
- initiatives to raise awareness of the social value of forests.

Achievements over the last five years differ across countries but include expanded forest management planning, increased income from forest products and progress in forest infrastructure and certification. Reported challenges include limited financial capacity, administrative burdens and difficulties reconciling differing societal expectations regarding forest use. Several countries also note that reporting and monitoring remain uneven across themes, and that some socio-economic benefits (in particular non-market services) are difficult to capture consistently in comparable statistics. This aligns with the wider reporting challenge identified for Criterion 6: socio-economic benefits are increasingly delivered through hybrid public-private arrangements that are not consistently recorded in national statistics.

Policy objectives

Of the 31 countries that reported, 25 identified explicit policy objectives under Criterion 6, which covers most of the associated indicators. The most frequently reported objectives include:

- Maintaining and enhancing ecosystem services, especially recreational and cultural values (eight countries).
- Strengthening the economic viability of forest ownership and the forest sector as part of the green economy (seven countries).
- Promoting employment and rural development opportunities (seven countries).
- Advancing urban forestry for social and environmental benefits (two countries).
- Increasing investment in the forestry sector (one country).
- Creating incentives to boost national wood consumption (one country).

These objectives are embedded in national forest legislation, strategies and programmes. They are often aligned with broader policy frameworks, such as the EU's Common Agricultural Policy (CAP), Natura 2000 and rural development schemes. Countries frequently present these objectives as a balance between production, social access and ecosystem service delivery, reflecting the multi-functional role of forests in national policy narratives.

Institutional measures and policy tools

The institutional measures reported by the 23 countries include legal, financial and communication instruments designed to strengthen the socio-economic functions of forests. Most countries use national forest laws and acts as the primary legal framework, which is supplemented by forest action plans and sectoral strategies.

Frequently mentioned instruments include:

- Public funding and compensation schemes for private and communal forests.
- Subsidies based on rural development programmes.
- Investments in forest infrastructure.
- Communication campaigns promoting social, cultural and economic benefits of forests.

Cross-sectoral cooperation, particularly with the agricultural and tourism sectors, was identified as crucial for achieving the objectives of Criterion 6. Several countries also reported instruments aimed at supporting small forest owners, such as advisory services and cooperation structures, which are relevant for delivering socio-economic functions where ownership is fragmented.

Achievements

Fifteen countries reported specific achievements relating to the socio-economic functions of forests. The most frequent of these were:

- Expansion of areas covered by forest management plans and improved access to free planning services.
- Upgrades to forest road networks and recreational facilities.
- Increased forest certification and sustainable management practices.
- Higher income from wood and non-wood products, and greater contribution of forestry to national GDP.
- Improvements in communication and transparency, particularly through digitalisation.
- New investments in wood processing and forest-based industries.

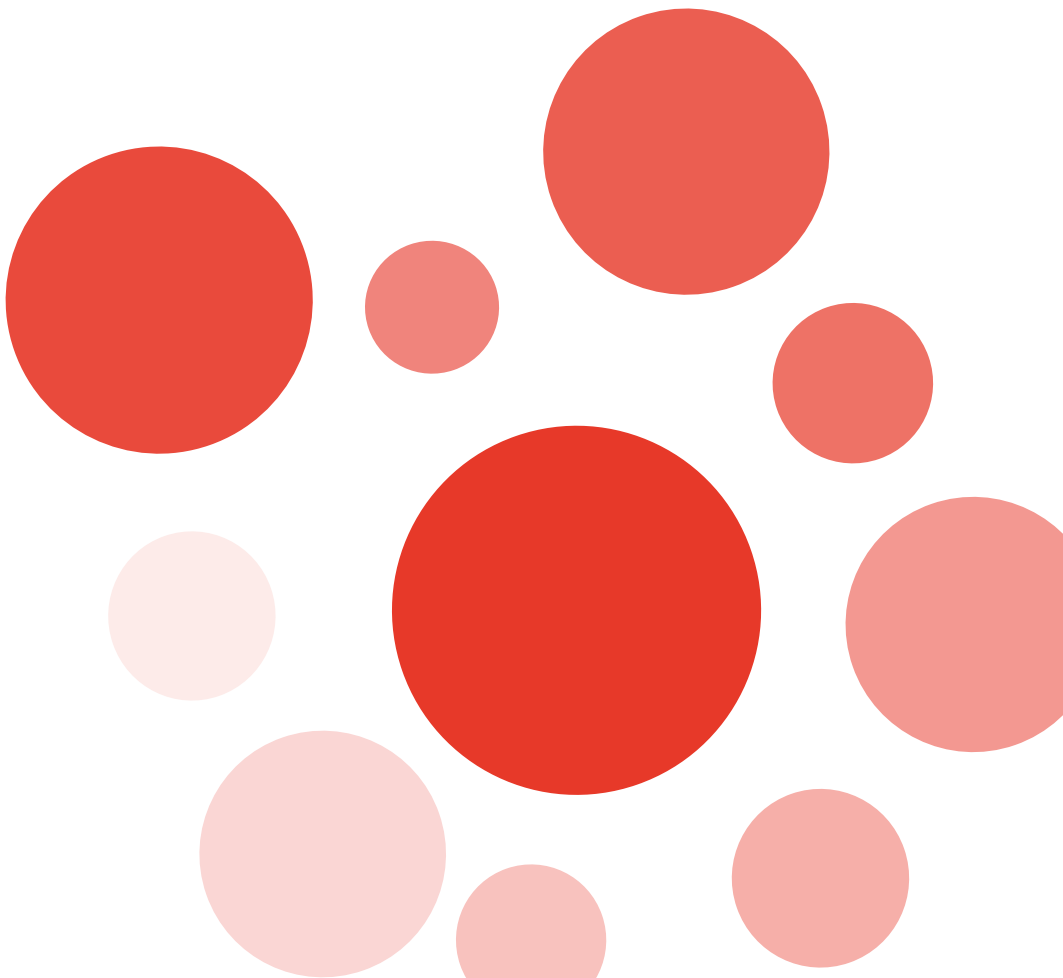
Additional examples include initiatives that promote forest tourism and youth engagement, as well as national studies on the role of wood in the bioeconomy. Several countries also report improvements in recreation-related infrastructure and access arrangements as practical achievements linked to well-being and rural development.

Challenges

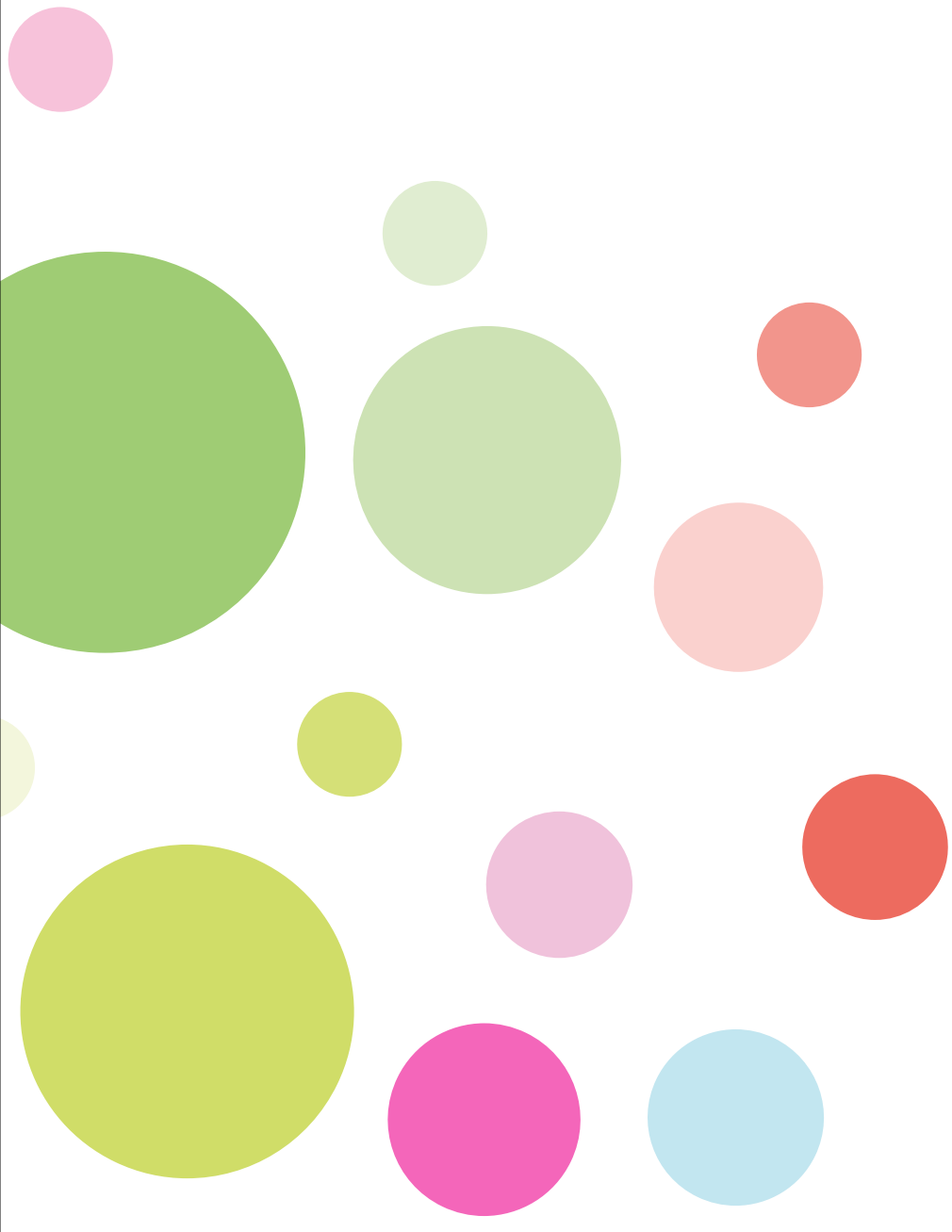
Eighteen countries reported significant challenges in maintaining and improving the socio-economic functions of forests. The most common issues include:

- Fragmented forest ownership and management structures, particularly among small forest owners.
- Administrative complexity and rapidly evolving market conditions.
- Insufficient financial resources and investment capacity.
- Differing stakeholder expectations and increasing polarisation of public debate (for example, between conservation and utilisation interests).
- Challenges in quantifying the benefits of ecosystem services, such as bioenergy potential or recreational value.

Several countries also emphasised the need for better coordination between national and EU legislation, improved monitoring capabilities, and greater long-term financial stability. Balancing ecological, social and economic objectives remains a key challenge in achieving sustainable forest management under Criterion 6. Countries also emphasise that improvements in data availability and methods (including clearer definitions and more consistent reporting) would strengthen the evidence base for policy choices and improve comparability across reports.



Forest Policy and Governance



Forest Policy and Governance

Forest policy defines the legislative, administrative, institutional, and economic framework required for forest management, including conditions related to information and communication. It also interacts with wider land-use and sectoral policies. As the core component of sustainable forest management, it reflects environmental and socio-economic circumstances at international, national and sub-national levels, shaping how trade-offs among forest functions are governed.

Key messages

- National Forest Programmes provide a framework for adapting forest legislation, creating cross-sectoral dialogue platforms, and enabling exchange mechanisms.
- Research, inventory work and forest management planning are usually organised within dedicated structures under the authority of the relevant ministry.
- Budgetary and staffing constraints can reduce institutions' capacity to adapt and further develop policy instruments that stimulate sustainable forest management.
- National forest laws are in force in all 31 reporting countries.
- Measures related to climate change and biodiversity dominate the implementation of international forest-related commitments.
- Almost all countries use grants and subsidies to support specific forestry initiatives, and more than half also apply tax-based instruments.
- The current national forest inventory, monitoring and assessment systems are considered sufficient to meet information and communication needs in 30 of the 31 reporting countries, with response coverage varying by sub-question.
- While participatory approaches are widely reported, inter-sectoral coordination and integrating forest objectives into broader development goals can remain challenging.

Global context (FRA 2025): An essential condition for sustainable forest management is that national policies identify sustainable development as an overall priority across sectors; to be effective, policy development should be accompanied by legally binding instruments (laws and regulations) that are consistent with policies. National policies and legislation supporting sustainable forest management are in place in 192 countries and areas, representing more than 95% of the global forest area. Of the 236 countries and areas reporting to FRA 2025, 64% (152 countries and areas representing almost 95% of the world's forests) reported national platforms for stakeholder participation in forest policy development.

Indicator 1: *National Forest Programmes or equivalent*

Key findings

National Forest Programmes (NFPs) are a well-established means of implementing sustainable forest management among FOREST EUROPE signatories. They provide a framework for adapting forest legislation and establishing cross-sectoral platforms, coordination mechanisms, and opportunities for exchange. Alongside operational tools such as Criteria and Indicators (C&I), NFPs help to structure sustainable forest management initiatives at national and sub-national levels.

FOREST EUROPE's definitions and guidelines are often cited as valuable contributions to NFP activities. NFPs are primarily used to develop strategic, forest-related documents that provide advisory—or, in some cases, compulsory—guidance and direction for forest policy-making. Funding arrangements vary, ranging from dedicated allocations within forest funds to external financing sources. However, securing long-term funding remains a key challenge. Overall, NFPs are dynamic processes that require regular review to respond to emerging needs and challenges. Country reporting also suggests that, despite broad participation, the effectiveness of NFPs in inter-sectoral coordination may vary.

Twenty-three countries reported making adjustments, mainly to strengthen stakeholder involvement and integrate newly introduced instruments into national forest governance.

Introduction

Since the adoption of FOREST EUROPE's Vienna Resolution 1 in 2003, National Forest Programmes (NFPs) have served as key instruments in supporting forest policy-making and governance. Consistent with the NFP principles, they are intended as participatory, holistic, intersectoral, and iterative processes for policy planning, implementation, monitoring, and evaluation at national and/or subnational levels. They facilitate coordination and guidance for policy planning, implementation, monitoring, and evaluation at national and subnational levels, while also providing participatory forums for forest-related stakeholders. The information presented here is based on responses from 31 countries to the enquiry into qualitative indicators.

Status

NFPs are widely recognised as an important policy instrument in 31 countries. Currently, 28 of 31 countries have an NFP in place, 2 are preparing one, and 1 has yet to develop an NFP. In most cases (25 countries), the forestry ministry serves as the primary decision-making authority for NFPs. In some instances, however, this role is assumed by other ministries (in four countries) or by multi-member bodies (in six countries), and in four countries multiple governance arrangements coexist.

Funding arrangements vary considerably:

- Fourteen countries provide goal-specific funding.
- Six countries finance NFPs through general forest fund allocations.
- Six countries allocate funding directly to measures linked to NFP implementation, sometimes outside the NFP framework.
- Six countries reported no dedicated funding specified or planned.

While most countries did not report significant funding constraints, the lack of clearly defined or planned allocations could present challenges to the long-term continuity of NFP processes in certain instances.

NFPs are generally linked to national or sub-national strategic instruments (most commonly a national forest strategy). They have an advisory role in 21 countries, are compulsory in 10, and one country reported a mixed status.

References to FOREST EUROPE instruments vary by country: while the definition of SFM is widely adopted, the C&I for sustainable forest management and the NFP guidelines are referenced less frequently. Other tools, such as the classification of

protected and protective forests, the Pan-European Operational Level Guidelines (PEOLGs) and the Pan-European Guidelines for Afforestation and Reforestation, are rarely referenced.

Additionally, 24 countries reported the existence of other overarching policy instruments that support sustainable forest management or address forest-related issues. NFPs are often coordinated with strategies in policy areas such as agriculture, biodiversity, climate change, energy, the bioeconomy, and forest sector reform.

Regarding evaluation, 24 countries conduct regular, predefined assessments of NFP implementation. Three countries conduct reviews on an irregular basis, while four have not yet established formal procedures, often pending legislative revisions. Evaluation approaches include scientific analysis, stakeholder surveys, expert assessments, and reviews by advisory bodies on implementation progress and follow-up actions.

Trends

Many countries have adapted their NFPs in response to emerging developments.

Since 2019, 23 countries have reported significant changes, including:

- Revisions to national forestry goals and NFP objectives;
- Adoption or updating of forest legislation and strategic programmes;
- Integration of objectives beyond the forest sector, e.g. biodiversity and climate change;
- Modifications based on evaluations of previous initiatives;
- Establishment of new administrative structures and regional processes;
- Broadening the scope of NFPs to encompass wider environmental or cross-sectoral issues;
- Preparatory work for the introduction of new NFPs.

NFPs are well established in most FOREST EUROPE signatory countries. They deliver a range of benefits by:

- Organising forest policy processes and supporting effective implementation;
- Providing a shared framework informed by FOREST EUROPE tools such as C&I for SFM;
- Creating participatory platforms for dialogue and decision-making;
- Introducing new topics into the policy agenda and setting priorities for action and implementation;
- Encouraging partnerships beyond the traditional forest sector;
- Promoting systematic approaches to forest information, inventories and monitoring to support evidence-based decision-making;
- Strengthening the links between scientific knowledge and political processes.

Maintaining an ongoing NFP process requires adequate financial and human resources, sustained long-term political commitment, and active engagement from public authorities and stakeholders alike. NFPs are currently recognised as key forest policy instruments and have demonstrated their value in addressing cross-sectoral challenges. Effective communication with audiences beyond the forestry community will remain important for their future development.

Indicator 2: *Institutional frameworks*

Key findings

Thirty-one reporting countries confirmed the existence of an institutional framework for forestry, although the organisational and administrative arrangements differ. Responsibilities for forest policy administration, legislation, enforcement, forest management planning, and private forestry support are usually assigned to national or sub-national ministries, depending on the political system. State-owned forest enterprises or companies often manage public forests.

Forest inventories are managed roughly equally by national ministries and independent organisations, while universities and independent institutions primarily carry out forest research.

Twenty-two countries reported that approximately 125 000 public-sector staff are employed in forestry roles, most of whom manage public forests. Over the past five years, 18 countries reported no significant institutional changes, while 12 indicated reforms focused on administrative reorganisations and realignments, the establishment of new funding mechanisms, and reductions in staffing levels.

Introduction

The core institutional framework of forestry within a country comprises the roles and responsibilities of public and private bodies at different levels. This includes the administrative organisation of forest policy and its implementation, the management of public forests, as well as forest-related research and education. The information presented in this section is based exclusively on national responses to the enquiry into qualitative indicators, outlining the existing framework and highlighting major changes over the past five years.

Status

National and sub-national ministries play a central role in shaping and implementing forest policy. In most countries, these responsibilities lie with national ministries. In federal or decentralised systems, however, they may also be assigned to sub-national ministries, regional authorities, or specialised agencies. Legislative oversight and enforcement are usually managed at a central level, although responsibilities are sometimes shared with regional or local authorities.

Support for private forest management and planning is distributed fairly evenly among national and subnational ministries, state forest enterprises, forest services, and private companies, often through cooperative arrangements. Management of public forests is generally carried out by publicly owned enterprises operating at the national, regional or municipal level.

Forest inventories are usually carried out by specialised institutions, public forest services or enterprises, as well as research organisations, often under the supervision of national or regional authorities. Forest-related research is primarily conducted by universities, national research institutes, academies of science, and private organisations, rather than ministries.

Public forest-related staff

Most public forestry workers are employed by agencies that manage publicly owned forests. A total of 125 000 full-time equivalent (FTE) public forest employees were recorded across 22 reporting countries, indicating a decline in public-sector employment. Of these:

- 73 500 are engaged in public forest management
- 11 500 work in forest administration
- 7 500 are employed in public forest research, education, and training
- 32 500 hold other forest-related public positions.

The ratio of staff to forest area varies considerably depending on national policies, administrative arrangements, forest area, and ownership structures. On average, approximately 60% of public forestry personnel are employed in forest management agencies, 9% in administration and 6% in research, education and training.

Forest-related research, education and capacity building

Interest in forest-related research has increased in several countries, with a growing focus on climate change adaptation, the environmental and social dimensions, and the bioeconomy. Of the 17 countries that provided detailed information, many reported higher funding levels through dedicated research strategies and programmes conducted by forest research agencies and universities. Common research areas include climate change adaptation, risk prevention, biodiversity protection and enhancement, the socio-economics aspects of forests, and bioeconomy-related topics such as the supply of wood for renewable energy and materials. In contrast, some countries reported reductions in forest research staff due to austerity measures.

Education and training are widely recognised as essential for maintaining sustainable forest management and supporting forests' multifunctional roles. National forest programmes and strategies often emphasise the importance of forest-related education. Academic degrees and postgraduate training for forest managers are widely available, as are technical or professional on-the-job training programmes for forest owners, workers, rangers, and administrative staff, with occupational safety and health commonly included. Forest-related topics are also integrated into school and university curricula, and many countries implement public awareness campaigns on forestry issues.

Cross-sectoral exchange

The exchange of information between forest owners, experts, stakeholders, industry representatives, scientists, as well as other interest groups is widely recognised as essential for building capacity within the forestry sector. Collaborative platforms and data-sharing initiatives enhance coordination and foster innovation.

Trends

Of the 30 countries that reported on trends, 18 indicated that there had been no significant changes to public or private institutional frameworks over the past five years. The remaining 12 countries reported developments primarily related to administrative restructuring, the introduction of new funding mechanisms, and reductions in staffing levels. In line with previous reports, several reforms reflect ongoing administrative consolidation, including the merging of forestry units with bodies responsible for natural resources, rural development and/or nature conservation, or closer alignment with these bodies.

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 and are usually adopted by national parliaments. Twenty-three countries enacted their current forest laws more than a decade ago, and 16 of these have introduced amendments within the past five years.

Many policy instruments refer, either fully or partially, to the principles of FOREST EUROPE, particularly the definition of sustainable forest management. Countries that have incorporated this definition into national legislation also frequently refer to the Criteria and Indicators (C&I) for sustainable forest management.

All reporting countries are signatories to major international forest-related agreements, and climate change and biodiversity commitments play a key role in integrating international measures and obligations into national forest legislation.

Introduction

Legal and regulatory forest-related policy instruments provide the legal framework for sustainable forest management. Related policy areas, such as nature conservation, wildlife management, and hunting, benefit from alignment with forestry instruments to ensure coherence and consistency.

The fifth reporting period confirms the widespread adoption of the definition of sustainable forest management and the pan-European C&I into national legislation. This highlights FOREST EUROPE's pivotal role in developing significant policy concepts and tools.

While national legislation is important for forestry governance, international conventions, agreements, and EU legislation set additional policy objectives for forests that inform both policy-making and practice.

Status

Forest legislation is in force in all reporting countries and is usually enacted by national parliaments. In 29 countries, forest acts have been approved at a parliamentary level and are often complemented by administrative decrees or regulations. In seven countries, forest-related provisions have been incorporated into their constitutions. This represents a slight increase since 2020, with two additional countries passing a forest act. Although constitutional recognition does not fundamentally alter the implementation of forest laws, it underscores the sector's importance in national governance systems. In federal systems, legislative authority is often shared between the national and subnational levels.

Twenty-three countries reported that their main forest laws were adopted more than 10 years ago. In comparison, sixteen countries have made major amendments in the past five years, often reflecting evolving policy priorities or compliance with international commitments.

References to FOREST EUROPE instruments

Many national legal and regulatory frameworks explicitly reference FOREST EUROPE commitments. Approximately two-thirds of the reporting countries have incorporated the definition of sustainable forest management – either fully or partially – into their national law. At the same time, half of

them reference the criteria and indicators (C&I) for sustainable forest management. When C&I are included, they are generally accompanied by a definition of sustainable forest management. References to the Pan-European Operational Level Guidelines (PEOLGs) are less common in national legislation, but more common in PEFC certification schemes.

International and regional commitments

All reporting countries are parties to the major international forest-related agreements developed under the United Nations framework. These in clude:

- The Convention on Biological Diversity (CBD) and its Kunming-Montreal Global Biodiversity Framework;
- The United Nations Convention to Combat Desertification (UNCCD);
- The United Nations Framework Convention on Climate Change (UNFCCC), including the Kyoto Protocol, the Paris Agreement, and REDD+ initiatives (Reducing Emissions from Deforestation and Forest Degradation).

Several regional agreements have been signed. These include the 1990s Alpine Convention and the 2003 Framework Convention on the Protection and Sustainable Development of the Carpathians (Carpathian Convention), which was ratified by all seven Carpathian countries in 2006.

FOREST EUROPE signatories have also signed and ratified other relevant agreements, including the UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (the Aarhus Convention), the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention), the International Tropical Timber Agreement (ITTA), participation in the International Tropical Timber Organization (ITTO) and the Convention on the European Forest Institute (EFI).

In addition, non-legally binding instruments are supported, including the United Nations Forum on Forests (UNFF) and the United Nations Strategic Plan for Forests 2030 (UNSPF).

Trends

Between 2020 and 2025, approximately half of the reporting countries introduced significant amendments to their forest legislation. These changes affect all European regions and are primarily motivated by the need to modernise legislation, integrate new policy priorities, and implement international and EU-level commitments.

For EU Member States (and, in some cases, trading partners seeking access to EU markets), EU legal frameworks can serve as important drivers of contextual national implementation and compliance-oriented amendments. Key policy instruments include the EU Deforestation Regulation (EUDR), the Habitats and Birds Directives, and the Natura 2000 network.

Legislative measures that promote forest resilience, planting of native species and fire prevention as integral elements of sustainable forest management have emerged as central themes in the context of climate change mitigation and adaptation.

Indicator 4: *Financial and economic instruments*

Key findings

Governments dedicate substantial financial and human resources to promoting sustainable forest management. Publicly owned forests are central to achieving these objectives: over two-thirds of reporting countries indicated that state forest management is financially self-sufficient or profitable, despite carrying out non-commercial activities. In other countries, however, public forest management depends on supplementary funding from the state budget.

A variety of economic instruments are employed to encourage sustainable forest management in privately owned forests. Nearly all countries provide grants and subsidies, and more than half also implement tax-based incentives. Transfer payments are most commonly directed towards biodiversity conservation, improving forest stands, adapting to climate change, creating protected areas and afforestation. Payments for Ecosystem Services (PES) are in place in around half of the reporting countries and are administered either publicly or privately. Some countries also report compensation measures for restrictions or ecosystem service provision, which can overlap with PES, but are not necessarily equivalent.

Over the past five years, 15 countries have reported increased funding, primarily for ecosystem services, climate-related measures, and support for forest owners, while one country has experienced a notable decrease in funding due to economic challenges.

Introduction

Financial and economic instruments are important policy tools governments can use to support sustainable forest management objectives. Countries were asked to outline their main financial mechanisms, the level of resources allocated and any recent changes to forest-related economic policies. All 31 countries responded to this enquiry.

Status

Public forest management

In approximately two-thirds of reporting countries, the management of state-owned forests is financially self-sufficient or generates a surplus. Nevertheless, many public forest enterprises also carry out non-commercial activities, such as biodiversity protection, recreation and landscape management, which may not be economically viable without government support.

Of the 30 countries providing more detailed information:

- twenty-one reported that state-owned forest management is self-sufficient or profitable.
- ten reported providing additional financial support to state-owned forest management from public budgets.
- four described other or combined funding arrangements.

Public financial assistance for sustainable forest management can cover operational management and support for the provision of ecosystem services.

Privately owned forests

To encourage sustainable forest management in privately owned forests, governments employ regulatory instruments, such as forest laws and compulsory management plans, as well as economic incentives.

Of the 29 countries that provided details on uch tools:

- twenty-four reported using grants or subsidies, including those sourced from Regional Development Policy Funds (RDPFs).
- fourteen indicated the use of tax measures to support forest owners.

Transfer payments are commonly directed toward biodiversity conservation, improving forest stands, adapting to climate change, creating and maintaining protected areas, afforestation and reforestation, conducting inventories and developing plans, protecting soil and water, as well as encouraging recreational use. Some countries also highlighted funding for protective forests, regeneration management, wildfire control, game management, and silvopastoral systems.

Payments for Ecosystem Services (PES)

PES schemes provide financial support to forest owners to help them achieve policy objectives. These measures include support for improved planning of ecosystem services, forest stand enhancement, afforestation, and direct protection measures. PES schemes are implemented in approximately half of the reporting countries.

Among the 31 signatories:

- ten operate PES schemes at the public level;
- six operate at the private level;
- three have both public and private PES schemes.
- seventeen do not currently use PES.

Where applicable, national incentives may be complemented by EU funding streams, notably rural development funding under the CAP, which can inform incentive design alongside domestic budgets.

Trends

Between 2020 and 2025, sixteen countries reported significant changes to forest-related economic policies. Fifteen of these countries indicated increased funding for nature protection, climate adaptation, and resilience measures (e.g., planting native species), which was often supported by national and EU sources. Several countries also introduced support schemes for forest owners affected by pest outbreaks, such as bark beetle infestations. One country reported a substantial decline in funding due to wider economic constraints.

Indicator 5: *Information and communication*

Key findings

National forest inventory, monitoring and assessment systems are generally considered adequate for meeting information and communication requirements. Of the 31 reporting countries, 30 judged their systems to be adequate, while one noted the ongoing development of a web-based reporting tool to address remaining gaps.

All countries provide either full or partial public access to forest inventory data. Around two-thirds have a formal, forest-related outreach and communication strategy, which is often embedded within their National Forest Programmes (NFPs). Twenty-eight countries publish national reports on the status of sustainable forest management, and 25 countries have established platforms for stakeholder participation to support policy development and decision-making. In recent years, many countries have modernised the delivery of information by providing and using expanded online tools, interactive maps, and social media to engage the public.

Introduction

The demand for reliable, accurate and up-to-date forest data has grown significantly across policy-making, research, education and public awareness campaigns. Forest monitoring systems provide vital information on forest conditions and the results of management initiatives. The effective dissemination of this information is essential to ensure transparency, inform stakeholders and encourage discussion on forest-related issues. Recent disturbances, such as droughts, storms and insect outbreaks, have further increased public and policy demand for timely forest information, reinforcing the shift towards digital tools, interactive platforms and social media outreach.

Status

Monitoring and information systems

Among the 31 reporting countries:

- twenty consider their monitoring systems to be fully sufficient;
- ten consider them partly sufficient;
- one considers them insufficient, citing the ongoing development of a web-based data recording system.

Reliable and accurate forest data is essential for evaluating environmental changes, the effectiveness of management measures and investment decisions, as well as for supporting education and research.

Public access to data

All countries provide at least some public access to forest inventory data and information, primarily via national websites offering reports, open databases, online tools, and interactive maps. Although plot-level inventory data is usually restricted at a national level, it is often available upon request. Ecological inventory data is frequently combined with socio-economic statistics to inform integrated analyses, including modelling future forest development, making harvest projections, and assessing the impact of policies.

Communication strategies

Two-thirds (20 out of 31) of reporting countries have a formal government-led forestry outreach or communication strategy, which is usually accessible online and often incorporated into a National Forest Programme (NFP) or national forest strategy.

Reporting on sustainable forest management

Twenty-eight countries publish national reports on sustainable forest management, with five publishing annually and the remainder reporting every 5 to 10 years. These reports usually contain summaries, data tables, graphics, and conclusions and are partly based on the pan-European C&I for sustainable forest management.

Stakeholder participation

Twenty-five countries reported national platforms for stakeholder involvement in forest policy development and decision-making. These platforms engage ministries, forest owner organisations, forest-based industries, NGOs, employer associations, and other interest groups. Participation mechanisms include roundtables, forums, and expert groups.

The public is often invited to give feedback on draft policies or NFPs via online consultations.

Trends

Advances in information systems

Forest information systems in 14 countries have seen significant development over the past five years.

These trends can be grouped into two main categories:

1. Data acquisition: improvements include enhanced forest inventories, new measurement variables, improved GIS tools, and more comprehensive monitoring of forest and environmental changes.

2. Data presentation: advancements include online platforms, social media, and broader outreach channels such as television and radio. Many countries have also launched public awareness campaigns on forest ecosystem services and risks, including forest fires, and have developed educational content for broadcast media.

Modern communication and outreach

Eighteen countries reported a stronger focus on proactive communication regarding forests, forest ecosystem services, and associated risks. This communication is often conducted via online platforms and social media. Public communication efforts have intensified, especially in countries with a high wildfire risk, primarily in Southern Europe. Overall, demand for accurate, reliable and timely forest information continues to increase, driven by climate change, energy policy and the bioeconomy, thereby improving public awareness and drawing greater political attention to forest-related issues.

References

This report is the result of cooperation with numerous specialists from different countries and international organizations. They include forest inventory personnel, data analysts, national correspondents, authors, and persons responsible for the layout and production of the report. It is impossible to list all those involved here, but the report would not have been possible without their dedicated efforts over several years.

Project leader, coordination and guidance

The preparation of the State of Europe's Forests report was coordinated and led by Bernhard Wolfslehner, European Forest Institute under guidance of the General Coordinating Committee (GCC) of FOREST EUROPE.

Liubov Poliakova, external consultant, co-authored sections on quantitative indicators and Evgenia Gordeeva, European Forest Institute, on qualitative indicators.

Filip Aggestam, Orbis - Green Policy and Governance (Orbis) and the Forest Policy Research Network (FPRN) worked on the final revision of the report. 10 anonymous proof readers helped check and improve the quality of the report.

Enquiries

Two reporting forms were prepared on quantitative and on qualitative indicators. The reporting forms on quantative indicators were developed jointly by UNECE and FAO and made available to national correspondents through joint UNECE/FAO pan-European data interface.. The FAO/UNECE/FOREST EUROPE workshop, held on 11-14 September 2023 in Helsinki, Finland, with the support of the Government of Finland, provided national correspondents with both theoretical knowledge and practical skills for global and Pan-European data collection. The reporting form on qualitative indicators was compiled by Bernhard Wolfslehner and Evgenia Gordeeva.

Data provision of International Data Providers (IDP), and co-authorship

Data collection was facilitated by Andrzej Talarczyk, external consultant. Data from IDP was provided for indicator 6.9 by Florian Steierer, UNECE, for indicators 3.2, 6.7, 6.8 by Daniel Griswold, UNECE.

Draft text for Indicator 2.1, was based on data that was collected by partners of the official UNECE ICP Forests Network (http://icp-forests.net/contributors) by

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Draft text for indicator 4.6 was provided by Anna Maria Farsakoglou, James Chaplin and Michele Bozzano, EUFORGEN.

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Data review, compilation, analysis and verification

Data review, compilation, analysis and verification was performed by Liubov Poliakova in exchange with national correspondents under supervision by Bernhard Wolfslehner. In this process desk studies were conducted for Andorra, Albania, Belarus, BiH, Greece, Malta, Montenegro, and Ukraine. The compilation of information on qualitative indicators as well as review of national reports was done by Evgenia Gordeeva. The tables were prepared by Liubov Poliakova and the graphs were created by Bernhard Wolfslehner. Final consistency check of data on quantitative indicators was completed by Liubov Poliakova. Final review of the text was carried out by Bernhard Wolfslehner, after internal and external review.

Finalization and layout

The layout and design of this report were carried out by Formats Gestió Gràfica i Publicitària S.L. The illustrations are from Morad Abselam, under the coordination and art direction of Ideamatic Digital Experiences S.L., and under the supervision of Santiago Alarcón Ceballos from the European Forest Institute. The source of the cover page picture is Jenny Leyman from the Swedish Forest Agency. The source of the remaining pictures is Adobe Stock: Criterion 1 photo #1202639035 by Andreas Vitting/ imageBROKER, Criterion 2 photo #362996413 by Keith Klosterman, Criterion 3 photo #408432888 by Weinkoetz, Criterion 4 photo #212108659 by Robin, Criterion 5 photo #1595977173 by Michael Derrer Fuchs, and Criterion 6 photo #359492198 by sarka. svobodova.

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Acronyms and abbreviations

AOT40	accumulated exposure over a threshold value of 40 ppb	**FTE**	full time equivalent
BC	base cations	**GCU**	genetic conservation unit
BM	basic material	**GDP**	gross domestic product
C&I	criteria and indicators	**GHG**	greenhouse gases
C:N	carbon to nitrogen ratio	**GPS**	global positioning system
CBD	Convention on Biological Diversity	**GVA**	gross value added
CEC	cation exchange capacity	**HWP**	harvested wood products
C-EE	Central-East Europe	**ICP Forests**	International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests
C-WE	Central-West Europe	**ISCED**	International Standard Classification of Education
DBH	diameter at breast height	**IUCN**	International Union for Conservation of Nature
EC JRC	Joint Research Centre of the European Commission	**ISIC**	International Standard Industrial Classification of All Economic Activities
EEA	European Environment Agency	**JWEE**	Joint wood energy enquiry
EU-27	27 countries of the European Union	**LUCAS**	Land Use/Cover Area frame statistical Survey
EUFGIS	documentation platform linking national inventories on forest genetic resources in Europe	**MCPFE**	Ministerial Conference on the Protection Forest in Europe
EFFIS	European Forest Fire Information System	**NACE**	Statistical Classification of Economic Activities in the European Community
EUFORGEN	European Forest Genetic Resources Programme	**NAI**	net annual increment (gross annual increment less natural losses)
EUROSTAT	Statistical Office of the European Union	**NE**	North Europe
EUTR	EU Timber Regulation	**NFAP**	national forest accounting plan
FAO	Food and Agriculture Organization of the United Nations	**NFI**	national forest inventory

FAWS	forests available for wood supply	**NFP**	national forest programme
FOWL	forest and other wooded land	**NGO**	non-governmental organisation
FGR	forest genetic resources	**NWGs**	non-wood goods
FRL	forest reference level	**NWP**	non-wood product
FRM	forest reproductive material	**o.b.**	over-bark
FSC	Forest Stewardship Council	**OC**	organic carbon
OWL	other wooded land	**SDG**	Sustainable Development Goals
pcs	pieces	**S-EE**	South-East Europe
PECBMS	Pan-European Common Bird Monitoring Scheme	**SFM**	Sustainable forest management
PEFC	Programme for the Endorsement of Forest Certification	**SoEF**	State of Europe's Forests report
PEOLG	Pan-European Operational Level Guidelines for SFM	**S-WE**	South-West Europe
PES	payments for ecosystem services	**u.b.**	under-bark
pH	logarithmic measure of hydrogen ion concentration in solution	**UNCCD**	United Nations Convention to Combat Desertification
ppb	parts per billion	**UNECE**	United Nations Economic Commission for Europe
ppm	parts per million	**UNFCCC**	United Nations Framework Convention on Climate Change
RDP	Rural Development Programme	**VOC**	volatile organic compounds
RDPF	Rural Development Programme funds		
RWE	roundwood equivalent		

Annexes

Annex 1: Materials and methods

The pan-European Criteria and Indicators for Sustainable Forest Management that were 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) 2025 report.

The coincidence of the preparation process of SoEF 2025 report and the Global Forest Resources Assessment (FRA) 2025 led to close cooperation with the FAO and UNECE teams. As a result of this cooperation, the data collection for the respective regional and global reports was launched jointly for pan-European countries in a virtual meeting in July 2023. That was followed by an in-person workshop in Helsinki in September 2023. The reporting forms for quantitative data were made available on the joint UNECE/FAO pan-European data interface. To avoid duplication of efforts data once reported to FRA2025 were automatically copied to the reporting tables of the joint UNECE/FAO pan-European data interface, and the definitions of the corresponding terms were harmonized among these two processes..

SoEF 2025 data were collected through two questionnaires - one on quantitative and one on qualitative indicators, and complemented via international processes and initiatives collecting specific data, serving as international data providers (IDPs).

SoEF 2025 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.

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 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

No.	Indicator	1990	2000	2005	2010	2015	2020	2025	Data reference/Last available data	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	x	Estimated data for 2025	National Correspondent
1.2	Growing stock	x	x	x	x	x	x	x	Estimated data for 2025	National Correspondent
1.3	Age structure and/or diameter distribution	x	x	x	x	x	x		Reported data for 2020	National Correspondent
1.4	Forest carbon	x	x	x	x	x	x	x	Estimated data for 2025	National Correspondent
		C 2: Maintenance of Forest Ecosystem Health and Vitality								
2.1	Deposition and concentration of air pollutants	x	x	x	x	x	x		Reported data for 2020	ICP Forests
2.2	Soil condition				x	x	x		Reported data for 2020	EC-JRC – reported through IDP
2.3	Defoliation	x	x	x	x	x	x		Reported data for 2020	ICP Forests
2.4	Forest damage	x	x	x	x	x	x		Reported data for 2020	National Correspondent
2.5	Forest land degradation	x	x	x	x	x	x		Reported data for 2020	National Correspondent
		C 3: Maintenance and Encouragement of Productive Functions of Forests (Wood and Non-Wood)								
3.1	Increment and fellings	x	x	x	x	x	x		Data for a 5-year period	National Correspondent
3.2	Roundwood	x	x	x	x	x	x		Average data for 5-year periods	UNECE–JFSQ
3.3	Non-wood goods						x		Reported data for 2020	National Correspondent
3.4	Services						x		Reported data for 2020	National Correspondent

No.	Indicator	1990	2000	2005	2010	2015	2020	2025	Data reference/Last available data	Data provider
		C 4: Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems								
4.1	Diversity of tree species	x	x	x	x	x	x		Reported data for 2020	National Correspondent
4.2	Regeneration	x	x	x	x	x	x	x	Estimated data for 2025 and for a 5-year period	National Correspondent
4.3	Naturalness	x	x	x	x	x	x	x	Estimated data for 2025	National Correspondent
4.4	Introduced tree species	x	x	x	x	x	x	x	Estimated data for 2025	National Correspondent
4.5	Deadwood	x	x	x	x	x	x		Reported data for 2020	National Correspondent
4.6	Genetic resources	x	x	x	x	x	x	x	Estimated data for 2025	EUFORGEN
4.7	Forest fragmentation						x		a) the Copernicus HRL-FTY forest cover map, b) the CLC+ land cover map, from which the land/sea mask will be derived, and c) the GISCO map of country boundaries, needed for clipping out the individual reporting units	JRC
4.8	Threatened forest species	x	x	x	x	x	x		Reported data for 2020	National Correspondent
4.9	Protected forests	x	x	x	x	x	x	x	Estimated data for 2025	National Correspondent
4.10	Common forest bird species	x	x	x	x	x	x	x	2023	Pan-European Common Bird Monitoring Scheme

No.	Indicator	1990	2000	2005	2010	2015	2020	2025	Data reference/Last available data	Data provider
		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	x	Estimated data for 2025	National - pre-filled
		C 6: Maintenance of other Socioeconomic Functions and Conditions								
6.1	Forest holdings	x	x	x	x	x	x		Reported data for 2020	National Correspondent
6.2	Contribution of forest sector to GDP	x	x	x	x	x	x		Reported data for 2020	EUROSTAT
6.3	Net revenue	x	x	x	x	x	x		Reported data for 2020	EUROSTAT
6.4	Investments in forests and forestry	x	x	x	x	x	x		Reported data for 2020	EUROSTAT
6.5	Forest sector workforce	x	x	x	x	x	x		Reported data for 2020	EUROSTAT
6.6	Occupational safety and health	x	x	x	x	x	x		Reported average data for a 5-year period	National Correspondent
6.7	Wood consumption	x	x	x	x	x	x		Average data for 5-year periods	Average data for 5-year periods
6.8	Trade in wood	x	x	x	x	x	x		Average data for 5-year periods	*UNECE-JFSQ*
6.9	Wood energy			x	x	x	x		Data for 2007, 2009,2011, 2013, 2015, 2017, 2019, 2021 (JWEE reporting years)	*UNECE-JWEE*
6.10	Recreation in forests	x	x	x	x	x	x		Reported data for 2020	*National Correspondent*

Annex 2: FOREST EUROPE signatories by region

FOREST EUROPE signatories assigned to country groups in State of Europe´s Forest 2025

Region	Countries
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 (desk study)
	Czech Republic
	Georgia
	Hungary
	Poland
	Republic of Moldova
	Romania
	Slovakia
	Ukraine (desk study)
South-West Europe	Andorra (desk study)
	Holy See (desk study)
	Italy
	Malta (desk study)
	Monaco (desk study)
	Portugal
	Spain
South-East Europe	Albania (desk study)
	Bosnia and Herzegovina (desk study)
	Bulgaria
	Croatia
	Cyprus
	Greece (desk study)
	Montenegro (desk study)
	North Macedonia
	Serbia
	Slovenia
	Türkiye

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*

Criteria	No.	Indicator	Full text
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 concen- tration of air pollutants*	*Deposition and concentration of air pollut- ants 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 (abiot- ic, 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*

Criteria	No.	Indicator	Full text
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*

Annex 4: National correspondents who supplied data on quantitative indicators for sustainable forest management

Albania

Desk study

Austria

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Croatia

National Correspondent: Goran KOVAC

Other professionals involved in the reporting process:
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Cyprus

National Correspondent: Savvas ANDREA

Other professionals involved in the reporting process:
Antonis SARRIS

Czech Republic

National Correspondent: Jaroslav KUBIŠTA

Other professionals involved in the reporting process: Jan MÁSLO, Michal SYNEK, Emil CIENCIALA, Radim ADOLT, Robert HRUBAN

Denmark

National Correspondent: Pernille KARLOG

Other professionals involved in the reporting process:
Ebbe POULSGAARD NIELSEN

Estonia

National Correspondent: Mati VALGEPEA

Other professionals involved in the reporting process:
Tiit MATSON, Eve SUURSILD

Finland

National Correspondent: Kari T. KORHONEN

Other professionals involved in the reporting process:
Jukka TORVELAINEN, Tarja TUOMAINEN, Helena HAAKANA, Minna RÄTY, Erno JÄRVINEN

France

National Correspondent: Antoine COLIN

Other professionals involved in the reporting process:
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Georgia

National Correspondent: Paata TORCHINAVA

Other professionals involved in the reporting process:
Aleksandre RUKHADZE, Zurabi JANIASHVILI

Germany

National Correspondent: Friedrich SCHMITZ

Other professionals involved in the reporting process:
Jörg SCHWEINLE, Wolfgang STÜMER, Maike FÖLSTER, Christoph NEITZEL, Naomi DAUR, Sebastian RÜTER, Peter ELSASSER

Greece

Desk study

Hungary

National Correspondent: Tamás TOBISCH

Other professionals involved in the reporting process:
Kinga NAGY

Iceland

National Correspondent: Arnór SNORRASON

Ireland

National Correspondent: Richard Walsh

Other professionals involved in the reporting process:
John REDMOND

Italy

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Lithuania

National Correspondent: Darius VIŽLENSKAS

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Malta

Desk study

Montenegro

Desk study

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Annex 5: National correspondents who supplied data on qualitative indicators for sustainable forest management

Albania

National Correspondent: Ylli HOXHA

Other professionals involved in the reporting process: Elmaz Islami

Belgium

National Correspondent: André THIBAUT

Other professionals involved in the reporting process:
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Bulgaria

National Correspondent: Dolores BELORECHKA

Other professionals involved in the reporting process:
Albena BOBEVA

Croatia

National Correspondent: Srećko JURIČIĆ

Other professionals involved in the reporting process:
Goran GREGUROVIĆ, Goran Kovac, Miljenko Dešković

Cyprus

National Correspondent: Andrea SAVVAS

Other professionals involved in the reporting process:
Antonis SARRIS

Czech Republic

National Correspondent: Jaroslav KUBIŠTA

Other professionals involved in the reporting process:
Tomáš KREJZAR

Denmark

National Correspondent: Pernille KARLOG

Other professionals involved in the reporting process:
Ebbe Poulsgaard NIELSEN

Estonia

National Correspondent: Rauno REINBERG

Other professionals involved in the reporting process:
Mati VALGEPEA, Indrek LAAS

Finland

National Correspondent: Tiina RYTILÄ

France

National Correspondent: Isabelle SMEKTALA

Other professionals involved in the reporting process: Marie-Aude STOFER, Marc FOURNIER

Georgia

National Correspondent: Aleksandre RUKHADZE

Germany

National Correspondent: Friedrich SCHMITZ

Greece

National Correspondent: Georgios PANAGIOTOU

Hungary

National Correspondent: Tobisch TAMÁS

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National Correspondent: Adalsteinn SIGURGEIRSSON

Other professionals involved in the reporting process:
Arnór SNORRASON, Björn HELGI BARKARSON

Ireland

National Correspondent: Partick NULTY

Italy

National Correspondent: Silvia FERLAZZO

Other professionals involved in the reporting process:
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Slovakia

National Correspondent: Rastislav RAŠI

Other professionals involved in the reporting process:
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Slovenia

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