5th MCPFE

FORESTS FOR QUALITY OF LIFE

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STATE OF EUROPE'S FORESTS 2007

The MCPFE Report on Sustainable Forest Management in Europe

MINISTERIAL CONFERENCE ON THE PROTECTION OF FORESTS IN EUROPE

FAO FIAT PANIS

Jointly prepared by
the MCPFE Liaison Unit Warsaw,
UNECE and FAO

WARSAW, 2007

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PREFACE

The Ministerial Conference on the Protection of Forests in Europe (MCPFE) has been working towards sustainable forest management from the early 1990s, through a series of political declarations and concrete actions. However, good intentions are not enough: policies should be based on excellent information on the status and trends, and the success or failure of the actions taken should be monitored.

MCPFE has defined the main concepts underlying the idea of sustainable forest management, notably through the resolutions of the Helsinki Conference in 1993. Nevertheless, a more precise and quantitative structure for information was needed to guide action and monitor trends. To meet this need, the MCPFE Criteria and Indicators for Sustainable Forest Management were agreed by 1995, and specified what should be measured, at the national level, to monitor progress towards sustainable forest management in European forests. Based on this framework, two reports on the situation were compiled and presented to the Ministerial Conferences in Lisbon (1998) and Vienna (2003). The indicators were themselves revised by the Vienna Conference in the light of experience. During this period, the expert community made significant progress in harmonizing and refining concepts and methods, and collecting the basic data.

This major commitment by experts of many different disciplines in a politically defined context and for the use of policy-makers has now produced the most comprehensive and balanced report ever on sustainable forest management in Europe. The study shows that much more information than in the past is available on "difficult-to-measure indicators", and, above all, on trends over time. Despite several acknowledged shortcomings in data quality and coverage, this report sets new standards. MCPFE, UNECE and FAO are all committed to working together also in the future to continue the steady improvement in quality of regional monitoring.

Work on the study has been led and coordinated by the MCPFE Liaison Unit Warsaw and the UNECE/FAO Timber Section Geneva, but is the result of a massive, multi-year cooperative effort between hundreds of individuals and tens of agencies, whose contributions are described in the Acknowledgements section. We take this opportunity to thank warmly all those who contributed time, expertise or resources for the report.

This report, aspiring to high scientific standards, is intended as a source of accurate, recent, comprehensive and unbiased information on all dimensions of sustainable forest management in Europe. We hope that it will be put to good use by policy-makers, the private sector and civil society in the forest sector and outside it.

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This report is the fruit of many years of work by hundreds of people, whose contribution is briefly described and acknowledged below.

The preparation of the report was overseen by an Advisory Group to the MCPFE Liaison Unit Warsaw, consisting of Michael Köhl (Chairman), Alex Korotkov, Mette Løyche Wilkie, Kit Prins, Ewald Rametsteiner, Tor-Björn Larsson, Jesus San-Miguel Ayanz, Joost van der Velde, Ernst Schulte, Erkki Olavi Tomppo, Claude Vidal, Yves Zanatta, Marilise Wolf-Crowther and Risto Paivinen.

The UNECE/FAO team of specialists on "Monitoring forest resources for SFM in the UNECE Region" led by Ewald Rametsteiner, guided the work, advising on methods, notably the Enquiry on quantitative indicators, and generating consensus on many important technical points.

Data in response to the enquiry on quantitative indicators were supplied by the national correspondents listed in the Annex, who also participated in the intense data validation process.

The national representatives to MCPFE supplied the information on qualitative indicators. They are also listed in the Annex.

This report is in fact the visible part of a much larger effort at the national level to collect and validate forest resource information. Both national correspondents and MCPFE representatives mobilized information and resources from numerous national experts and institutions, which are referred to in the notes to the data set. They also reviewed the information supplied by international data providers. The national correspondents are therefore ultimately responsible for the figures used in this report.

For certain indicators, information was also supplied by international data providers: International Cooperative Programme on Forests under the ECE Convention on Long-Range Transboundary Air Pollution (ICP Forests), the Statistical Office of the European Union (EUROSTAT), the European Commission Joint Research Centre at Ispra, and European Forest Genetic Resources Programme (EUFORGEN). The process of communication and verification for data gathered from international providers was led by the team of the MCPFE Liaison Unit Warsaw (LUW), together with Krzysztof Kaczmarek. The cooperation between specialist communities, through their respective international organizations and agencies, is a key feature in the data quality improvement.

The UNECE/FAO Timber Section, Geneva, and the Global Forest Resources Assessment Team in FAO, Rome worked closely together to collect and validate the data on the quantitative indicators: they conducted a dialogue with national correspondents, searched for or estimated missing data (in consultation with national correspondents), stored information in the global FAO FRA database, and produced tables, graphs, maps and other outputs. The Geneva team, led by Kit Prins and Alex Korotkov, comprised Stein Tomter, Helena Guarin Corredor and Richard Slabý, with administrative support from Cynthia de Castro. On behalf of coordinators, authors and all collaborators, we would like to direct our special thanks to Alex Korotkov for his invaluable and helpful energy and spirit, which allowed to overcome obstacles and to achieve the goal, and for his continuous and dedicated work on European forest reporting, which provided a basis for elaboration of this report. The Rome team, led by Mette Løyche Wilkie, comprised Lars Gunnar Marklund, Örjan Jonsson, Daniel Wiell and Arvydas Lebedys. Roman Michalak of the LUW also made a major contribution to the validation process.

The responses on the qualitative indicators were collected and organized by Olga Zyrina of the LUW and Franziska Hirsch of UNECE/FAO.

A review team consisted of Kit Prins, Piotr Borkowski, Sten Nilsson, Peter Csoka, Piotr Paschalis Jakubowicz, Risto Paivinen, Mette Løyche Wilkie and Kazimierz Rykowski. A near-final text was reviewed by the General Coordinating Committee of MCPFE and the bureaux of the UNECE Timber Committee and the FAO European Forestry Commission.

Each chapter was assigned to a coordinating lead author, who was assisted by lead authors. The coordinating lead authors were Zoltán Somogyi, Michael Köhl, Marco Marchetti, Jari Parviainen, Pier Carlo Zingari, Arvydas Lebedys and Ewald Rametsteiner. The coordinating lead authors, lead authors and contributing authors are listed in the Annex and made a vital contribution to the work.

The whole report was coordinated and edited by Michael Köhl and Ewald Rametsteiner, who worked with the authors to transform a data base into a coherent and meaningful analytical report in record time. A large number of further experts provided advice on specific issues and details in the process.

Barbara Hall provided a major contribution to the report as language editor, under short deadlines and difficult conditions. The Forest Communicators Network, led by Ingwald Gschwandtl, advised on communicating the results of the study, and the wording of the Executive Summary. Matt Fonseca finalised the text, after checking by Douglas Clark and Franziska Hirsch.

The text was laid out and printed by Meander, Warsaw.

The Government of Norway contributed the services of Stein Tomter for more than a year and the Government of the Czech Republic made available the services of Richard Slabý. Financial resources were supplied by the European Commission, Directorate General for Environment (Grant agreement number 07.030101/2006/452817/SUB/B1) and the Governments of Switzerland and the United Kingdom. Without these contributions, whether financial or through loan of experts, this report would have been impossible.

Kit Prins and Piotr Borkowski

ACRONYMS AND ABBREVIATIONS

0	Data nil or not significant
AESZ	Hungarian State Forest Service
BSc	Bachelor of Science
C	Carbon
CBD	Convention on Biological Diversity
CEC	Cation Exchange Capacity
CEEC	Central and Eastern European countries
CEPF	Confederation of European Forest Owners *(Confédération Européenne des Propriétaires Forestiers)*
CEPI	European Confederation of Paper Industries
CIS	Commonwealth of Independent States
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLC	CORINE Land Cover
CO_2	Carbon dioxide
COP	Conference of Parties
CORINE	Coordinated Information on the European Environment
EC	European Commission
EEA	European Environmental Agency
EFI	European Forest Institute
EFFIS	European Forest Fire Information System
EFSOS	European Forest Sector Outlook Study
EHS	*Ecologische Hoofdstructuur* (National Ecological Network)
EMEP	International Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe
EQ	Wood equivalents
EU	European Union
EUFORGEN	European Forest Genetic Resources Programme
EUROSTAT	Statistical Office of the European Communities
EUSTAFOR	European State Forest Association
FAO	Food and Agriculture Organization of the United Nations

FAOSTAT	Food and Agriculture Organization of the United Nations, Statistical database
FAWS	Forest available for wood supply
FMU	Forest management unit
FOWL	Forest and other wooded land
FRA	Forest Resource Assessment
FTE	Full-time equivalent
GCC	General Coordinating Committee of the MCPFE
GDP	Gross Domestic Product
GIS	Geographic Information System
ha	Hectare
ICP Forests	International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests
IDP	International data provider
IEA	International Energy Agency
IFF	Intergovernmental Forum on Forests
ILO	International Labour Organization
INBO	*Instituut voor Natuur- en Bosonderzoek* (Research Institute for Nature and Forest)
IPCC	Intergovernmental Panel on Climate Change
IPF	Intergovernmental Panel on Forests
IPGRI	International Plant Genetic Resources Institute
INIBAP	International Network for Improvement of Banana and Plantain
ISIC	International Standard Industrial Classification of all Economic Activities
ITTA	International Tropical Timber Agreement
IUCN	The World Conservation Union
JRC	European Commission – Joint Research Centre
JWEE	Joint Wood Energy Enquiry
LUW	MCPFE Liaison Unit Warsaw
MCPFE	Ministerial Conference on the Protection of Forests in Europe
METLA	Finnish Forest Research Institute
METSO	Forest Biodiversity Programme for Southern Finland
MSc	Master of Science

NACE	*Nomenclature générale des activités économiques dans les communautés Européennes* (General industrial classification of economic activities within the European communities)
NAI	Net annual increment
NFC	National Forest Centre
NFI	National forest inventory
NFP	National forest programme
NGO	Non-governmental organization
NWFP	Non-wood forest product
NWGS	Non-wood goods and services
NUTS	Nomenclature des unités territoriales statistiques (The Nomenclature of Territorial Units for Statistics)
OWL	Other wooded land
Pcs	Pieces
pH	Logarithmic measure of hydrogen ion concentration
REFORGEN	FAO Global Information System on Forest Genetic Resources
SFM	Sustainable forest management
SME	Small and medium-sized enterprise
TBFRA	Temperate and Boreal Forest Resources Assessment
Tg	Tera gram (Tg = 10^{12} g)
UNCBD	UN Convention on Biological Diversity
UNCED	United Nations Conference on Environment and Development
UNECE	United Nations Economic Commission for Europe
UNFF	United Nations Forum on Forests
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
VILMAT	Programme for Developing Recreation and Nature Travel
yr	Year
ZUL	Private Forest Services Organizations in Poland

EXECUTIVE SUMMARY

The MCPFE report *State of Europe's Forests 2007* is a comprehensive and up-to-date description of the situation and the management of European forests as well as the related policies and institutions. It shows the status and trends related to forests and sustainable forest management in Europe, structured according to the Pan-European Criteria and Indicators for Sustainable Forest Management, including, for the first time, qualitative indicators on policies and institutions.

In this report "Europe" comprises the 46 countries of the MCPFE listed in the Annex, and includes the Russian Federation.

Forest resources and their contribution to global carbon cycles

Forests cover 44 percent of the land area of Europe.

At just over 1 billion ha, or 1.26 ha per capita, 25 percent of the world's forests are in Europe. About 80 percent of these forests are in the Russian Federation. Some 80 to 90 percent of forests are available for wood supply in most regions, but only around 40 percent in East Europe.

Europe's forest area continues to increase.

The area of forest in Europe has increased by almost 13 million ha (an area roughly the size of Greece) in the past 15 years mainly due to planting of new forests and natural expansion of forests onto former agricultural land.

74 percent of Europe's forests have been influenced by humans.

About 70 percent of the European forests are classified as semi-natural and about 4 percent as plantations, while the remaining 26 percent, located mainly in Eastern and Northern European countries, are considered undisturbed. Excluding the Russian Federation, only 5 percent of forests in Europe are undisturbed, while 8 percent are plantations.

Wood volume in forests has reached record heights and is increasing.

The total growing stock of forests in Europe amounts to 112 billion m^3. In the last 15 years, an average of 358 million m^3 – equivalent to the total growing stock of Slovenia – has been added each year.

Forest biomass carbon reserves are huge, and increasing.

In forest biomass 53 gigatonnes of carbons are stored, which is an increase of 2 billion tonnes since 1990. Further substantial amounts of carbon are stored in forest litter and soils, but knowledge on these components remains limited.

Forest ecosystem health and vitality

Although air quality in Europe has improved, trees are still under stress. Further reductions in emissions are needed to improve ecosystem health and vitality.

Air pollution and depositions, especially of sulphur, have been reduced in recent years; however, past depositions accumulated in soils may lead to higher levels of nitrogen, sulphate and soil acidity, which make forests more vulnerable to environmental stress and changing climatic conditions.

Tree crown condition has stabilized but defoliation levels are still high in most regions, indicating that trees have a reduced potential to withstand adverse environmental impacts. Further reduction of related emissions is needed to bring depositions below critical loads.

Forests in Europe have suffered severe storm damages, and forest fires continue to be a major challenge.

Since 1999, large storm damages have occurred in Europe almost annually. Hundreds of thousands of ha of forest are burnt annually. While the number of forest fires increased, the area burnt did not increase in the period 2000–2005, mainly due to more effective fire suppression in many countries.

Productive functions of forests

Volumes of wood harvested in Europe's forests are increasing, but remain considerably below increment.

Harvesting of wood has steadily increased over the last ten years. The forests are growing at an unprecedentedly high and increasing rate that is well above the volume harvested, so the amount of wood in forests continues to increase.

Forests provide a wide variety of goods and services other than wood.

The economic value of non-wood goods and services (NWGS) provided by forests is increasing, but often they are not marketed. In some European regions, NWGS provide more revenue than wood sales.

98 percent of all European forests are covered by a forest management plan or equivalent.

European forest areas are almost completely covered by plans for their long-term management.

Biological diversity in forest ecosystems

Forest management practices increasingly promote biodiversity.

Forest management practices have changed in ways that promote the conservation and enhancement of biological diversity, notably through the increased use of natural regeneration and more mixed species stands. Measures are also being taken to encourage deadwood accumulation.

Less than 1 percent of Europe's forests are dominated by introduced tree species.

In Europe excluding the Russian Federation, the area dominated by introduced tree species is around 4 percent. In many countries, introduced tree species are closely related to the establishment of plantations. Very few introduced tree species are invasive, and while significant in some countries, the total area of introduced tree species is not increasing.

The area of protected forests has expanded by about 2 million ha in the last five years to reach almost 5 percent of Europe's forests.

About 3 percent of Europe's forests are protected with the main objective of conservation of biodiversity and another 1.7 percent with the main objective of conserving landscapes and specific natural elements. For the MCPFE region excluding the Russian Federation, the figures are 8 percent and 10 percent, respectively. In the MCPFE region, these areas have increased by around 455 000 ha annually over the last five years.

Protective functions in forest management

More than one-fifth of European forests are managed primarily to protect water, soil and infrastructure.

Ten percent of European forests are designated primarily for the protection of soil and water, and 11 percent for the protection of infrastructure or managed natural resources. In some areas, notably mountains, the protective functions are particularly important and override the others.

Socio-economic functions and conditions

Forests are mainly public in about half of European countries, and mainly privately owned in the other half.

Due to the vast areas of public forests in the Russian Federation, in Europe as a whole, 90 percent of forest area is public and 10 percent is privately owned, but ownership patterns and trends vary widely across regions and countries. Without the Russian Federation, almost half of Europe's forest area is owned by private forest owners. The number of private forest holdings, currently more than 11 million, continues to grow, mainly due to the ongoing restitution process in some European countries as well as fragmentation due to inheritance laws.

European production and consumption of wood is increasing, as are exports of wood products.

Since the mid-1990s, wood consumption per capita has been rising, reaching 1.1 m^3 in 2005. At the same time, Europe has become a major net exporter of wood products to other regions (100 million m^3 per year). Large volumes of wood are used for energy, with a significant increase in recent years. Forestry activities, wood industries, and the pulp and paper industry combined contribute about 1 percent to the gross domestic product in Europe and substantially more in a few countries. The total added value and the net revenue of forestry activities remain stable.

Around 4.3 million people work in the European forest sector

Employment in forestry continues to decrease in Europe, but the loss of jobs is slowing down. In 2005, employment in forestry activities, wood industries and pulp and paper industries accounted for 1.1 percent of total employment in Europe. Occupational safety is improving, but forestry remains one of the most hazardous sectors.

More than 90 percent of European forests are open to public access.

More than 90 percent of the forests in Europe are open to public access, and the area of forest available for recreation is increasing. A very large number of archaeological sites, nature monuments, and other sites of cultural and spiritual value are found in forests.

Forest policies and institutions

Public participation in decision-making related to forests is increasing, but challenges remain.

National forest programmes (NFPs) are increasingly widely acknowledged and used across Europe to govern the diversity of forest-related issues in a more open and adaptive manner, but challenges remain. These include better ways and means for cross-sectoral coordination and continued political commitment to further develop NFPs into an effective policy tool.

Forest-related institutions are changing.

Changes in institutional frameworks in Europe indicate an emphasis on further improving the efficiency and effectiveness of state forestry organizations as well as on reorganizing forest research. In addition, organizational structures for private forest owners are further developed. However, it seems that well-functioning coordination mechanisms between different levels of government and stakeholder groups (which are increasingly diverse) are still rare.

Sustainability is given prominence in forest laws and other policy instruments.

MCPFE countries are pursuing sustainable forest management (SFM) through creating new policy instruments and adjusting existing ones. This is done through integrating SFM more systematically into legal and regulatory frameworks when they are revised, through financial support measures addressing the different dimensions of SFM, through efforts to strengthen the forest-related information base, and by improving communication with the public.

Forest policies are becoming more target-oriented, but further improvements are needed.

Several European countries pursue active and often target-oriented policies in a number of areas. In particular, some countries aim to enlarge forest area, increase the use of wood (material and energy use), improve biodiversity conservation and strengthen the economic viability of forestry. However, in other policy areas, including climate change, forest health and vitality, employment, and cultural and spiritual values, the policies at present seem to be less focused or less pro-actively pursued (and are often more dependent on decisions in other policy areas).

Conclusions

It is evident that the MCPFE has played a major role in promoting sustainable forest management and in coordinating and promoting cooperation on forest-related matters across Europe. A number of important and new policy means and instruments have been developed through the MCPFE to address new challenges. These, together with generally well-developed forest-related national organizations, should safeguard the sustainability of European forests and the multiple benefits that they provide.

The MCPFE report *State of Europe's Forests 2007* does not judge whether forest management in a country or region is sustainable or not, since this judgment is dependent on the relative importance given to the different criteria and indicators in countries. However, the report does provide most of the relevant information on which governments and other stakeholders can carry out this assessment. This represents a significant advance in the monitoring of sustainable forest management, although there are still many gaps and weaknesses that should be addressed at the technical and policy level.

The report provides relevant information on a range of major issues, including options for the use of the accumulated growing stock, the need to address threats to forest health by air pollution, storm, fire and other damaging factors, and on the role of forests and wood in the interlinked policy debates on energy and climate change. It provides information that should facilitate decisions related to the role of forests in sustainable development within a globalizing world and with changing demands from society. Further, it points to potentially unsustainable situations in some indicators in a few countries. Overall, are European forests sustainably managed? The answer is a qualified "yes", with caveats in all three areas of sustainable development: economic, social and environmental.

INTRODUCTION

State of Europe's Forests 2007 was prepared for the fifth Ministerial Conference on the Protection of Forests in Europe (MCPFE), held in Warsaw, Poland and provides an overview of the status and development of sustainable forest management (SFM) in Europe. It is a continuation of reporting on European forests provided for the previous Conferences, in particular *The State of Europe's Forests 2003*, which was presented at the Fourth Ministerial Conference, as well as a report to the Third Ministerial Conference in 1998, all of which are based on the MCPFE criteria and indicators for sustainable forest management. The current report was jointly prepared by the MCPFE Liaison Unit Warsaw, United Nations Economic Commission for Europe (UNECE) and Food and Agriculture Organization of the United Nations (FAO).

BOX: 1. The definition of Sustainable Forest Management as adopted by the MCPFE

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

Since the first set of pan-European indicators for sustainable forest management were developed in the early 1990s, experience has shown that criteria and indicators are a very important tool for European forest policy. The purpose of this report is to provide an updated information source for decision-makers and other stakeholders.

BOX: 2. Definitions

Criterion: A general goal on which a judgment or decision can be based.

Indicator: A quantitative or qualitative parameter which can be assessed in relation to a criterion. It describes objectively and ambiguously the content of the criterion and provides an indication of the condition or direction over time.

The report presents the most recent, objective, quantified and comparable data on sustainable forest management in Europe. The data presented were made available by individual countries through a joint UNECE/FAO and MCPFE questionnaire and by international data providers, namely the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests), EC-Joint Research Centre, Statistical Office of the European Communities (EUROSTAT) and UNECE/FAO. Efforts have been made to provide data for every indicator, although data quality and the comprehensiveness of the information vary significantly, depending on the specific indicator and the country conditions. In this report, Europe comprises 45 MCPFE countries, including the Russian Federation. No data were requested from the Holy See. Forest statistics in Europe are dominated by the Russian Federation, where about 80 percent of the total forest area in Europe is found (Figure 1). It was therefore decided to present results for both the entire MCPFE region and the MCPFE region excluding the Russian Federation. In order to display regional differences, the MCPFE countries were grouped into six regional groups (Figure 2). Overall, the data coverage of the MCPFE region can be regarded as outstanding, permitting a sound analysis of the current state and development of forests and sustainable forest management in Europe.

A special focus of this report is on the current status and trends in forests and in sustainable forest management in Europe in the 1990–2005 period. It aims to show the situation in the MCPFE region as well as in individual regions. The report is structured according to the improved Pan-European Criteria and Indicators for Sustainable Forest Management as endorsed at the Fourth Ministerial

Conference in 2003, held in Vienna, Austria. The quantitative pan-European indicators show changes over time for each of the six criteria, i.e. forest resources and their contribution to global carbon cycles; forest ecosystem health and vitality; productive functions of forests; biological diversity in forest ecosystems; protective functions in forest management; and other socio-economic functions and conditions. The qualitative indicators give an overview of the policies, institutions and instruments for sustainable forest management.

Figure 1. MCPFE region

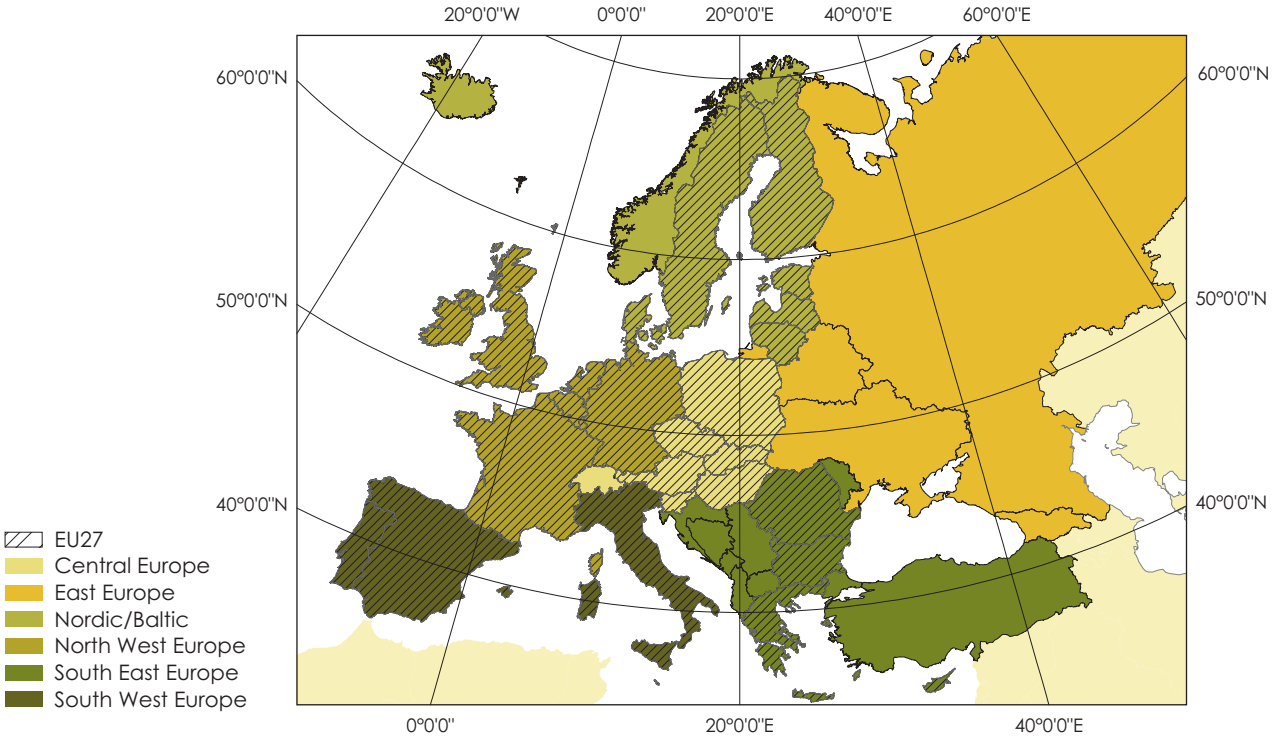


Figure 2. Country groups

State of Europe's Forests 2007 also contains the most comprehensive reporting on policies, institutions and instruments governing sustainable forest management in the context of the MCPFE. Qualitative indicators have been devised in order to build a consistent bridge between sustainable forest management on the ground, and related policies and institutions that govern the management and use of forests. This set of qualitative indicators was endorsed by the European governments, together with the quantitative indicators, at the Fourth Ministerial Conference. These qualitative indicators for sustainable forest management should enable monitoring of the status and changes in policies, institutions and instruments, enhance accountability and transparency of policy-making, and allow a better understanding of the interplay between the state of forests and policy-making. They should also support the strategic orientation of policies, and over time, help create more efficient and effective policies and institutional arrangements to govern sustainable forest management.

REPORT ON THE MCPFE QUANTITATIVE INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT

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

Forests cover 44 percent of the land area of Europe.

At just over 1 billion ha, or 1.26 ha per capita, 25 percent of the world's forests are in Europe. About 80 percent of these forests are in the Russian Federation. Some 80 to 90 percent of forests are available for wood supply in most regions, but only around 40 percent in East Europe.

Europe's forest area continues to increase.

The area of forest in Europe has increased by almost 13 million ha (an area roughly the size of Greece) in the past 15 years mainly due to planting of new forests and natural expansion of forests onto former agricultural land.

74 percent of Europe's forests have been influenced by humans.

About 70 percent of the European forests are classified as semi-natural and about 4 percent as plantations, while the remaining 26 percent, located mainly in Eastern and Northern European countries, are considered undisturbed. Excluding the Russian Federation, only 5 percent of forests in Europe are undisturbed, while 8 percent are plantations.

Wood volume in forests has reached record heights and is increasing.

The total growing stock of forests in Europe amounts to 112 billion m^3. In the last 15 years, an average of 358 million m^3 – equivalent to the total growing stock of Slovenia – has been added each year.

Forest biomass carbon reserves are huge, and increasing

In forest biomass 53 gigatonnes of carbons are stored, which grew by 2 billion tonnes since 1990. Further substantial amounts of carbon are stored in forest litter and soils, but knowledge on these components remains limited.

Key findings by Indicator

1.1. Forest area

Forests cover 44 percent (1 015 million ha) of the land area of Europe and continue to increase. With just over 1 billion ha, or 1.26 ha per capita, Europe has 25 percent of the world's forests. About 80 percent of the total forest area in Europe is found in the Russian Federation, which affects most forest statistics in the MCPFE region as a whole. Half of all European forests are predominantly coniferous, a quarter of them are predominantly broadleaved and a quarter of them are mixed. From 1990 to 2005, the area of forest in Europe has increased by almost 13 million ha (an area roughly the size of Greece) due to planting of new forests and natural expansion of forests onto abandoned agricultural land.

1.2. Growing stock

The total growing stock of forests in Europe amounts to 112 billion m^3, of which 57 percent is available for wood supply. In the last 15 years, an average of 358 million m^3 – equivalent to the

total growing stock of Slovenia – has been added each year due to expansion of the forest area and an increase in stocking levels.

1.3. Age structure and/or diameter distribution

Around 87 percent of all forests in Europe excluding the Russian Federation were reported as even-aged. The Russian Federation reported all its forests as even-aged. Concerning age structure, data were generally only available for the Nordic/Baltic countries and Central Europe. In the Nordic and Baltic countries, the area of young forests increased, whereas that of forests older than 60 years decreased. In Central Europe, the area of all age classes increased. Information on diameter distribution was too limited to generate trends.

1.4. Carbon stock

The forests of Europe are a large reserve of carbon with 53 gigatonnes of carbon sequestered in forest biomass and deadwood. They continue to be a significant carbon sink, as evidenced by the increase in these carbon stocks of 2 billion tonnes since 1990. Knowledge on the status and trends of carbon stocks in forest litter and soil remains limited.

Indicator 1.1. Forest area

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

Forest area is the traditionally most obvious indicator of changes in forests. Forests, however, are very different in their composition and structure, as well as in their economic and social functions and services. Therefore, only a detailed analysis of changes in area by many aspects, can provide a true picture.

Situation

With their total forest area of just over 1 billion ha (10.15 million km^2), MCPFE countries own 25 percent of all forests of the world.

Other wooded lands cover an additional area of 111 million ha (1.11 million km^2) (Table 1). While they are usually not as important as forests in economic terms and are often in need of protection, they can be very important locally, for example, for their economic or social services or for conservation of biodiversity.

Table 1. Extent of forest and other wooded land, 2005

Region	Forest		Other wooded land	
	1 000 ha	% of land area	1 000 ha	% of land area
Central Europe	22 080	33.2	229	0.6
East Europe	829 571	48.1	74 961	4.3
Nordic/Baltic	67 351	50.7	7 381	5.6
North West Europe	31 268	24.5	1 796	1.9
South East Europe	32 836	21.5	15 580	10.2
South West Europe	31 693	35.8	11 430	12.9
MCPFE	1 014 798	44.3	111 377	5.0
MCPFE excl. the Russian Federation	206 008	31.5	37 192	5.7

Overall, forests and other wooded lands cover half of all the terrestrial land of the MCPFE countries. However, the importance of the forests of the individual countries varies significantly. Four-fifths (79.7 percent) of the area of forest are located in the Russian Federation.

On average, forests occupy 44.3 percent of the land area in the MCPFE region (31.5 percent in MCPFE excluding the Russian Federation), whereas the share of other wooded lands is 5.0 percent (5.7 percent in MCPFE excluding the Russian Federation).

The distribution of this area varies substantially by country in terms of the amount of forest area (Figure 3), the percentage of land area and the area of forest per capita.

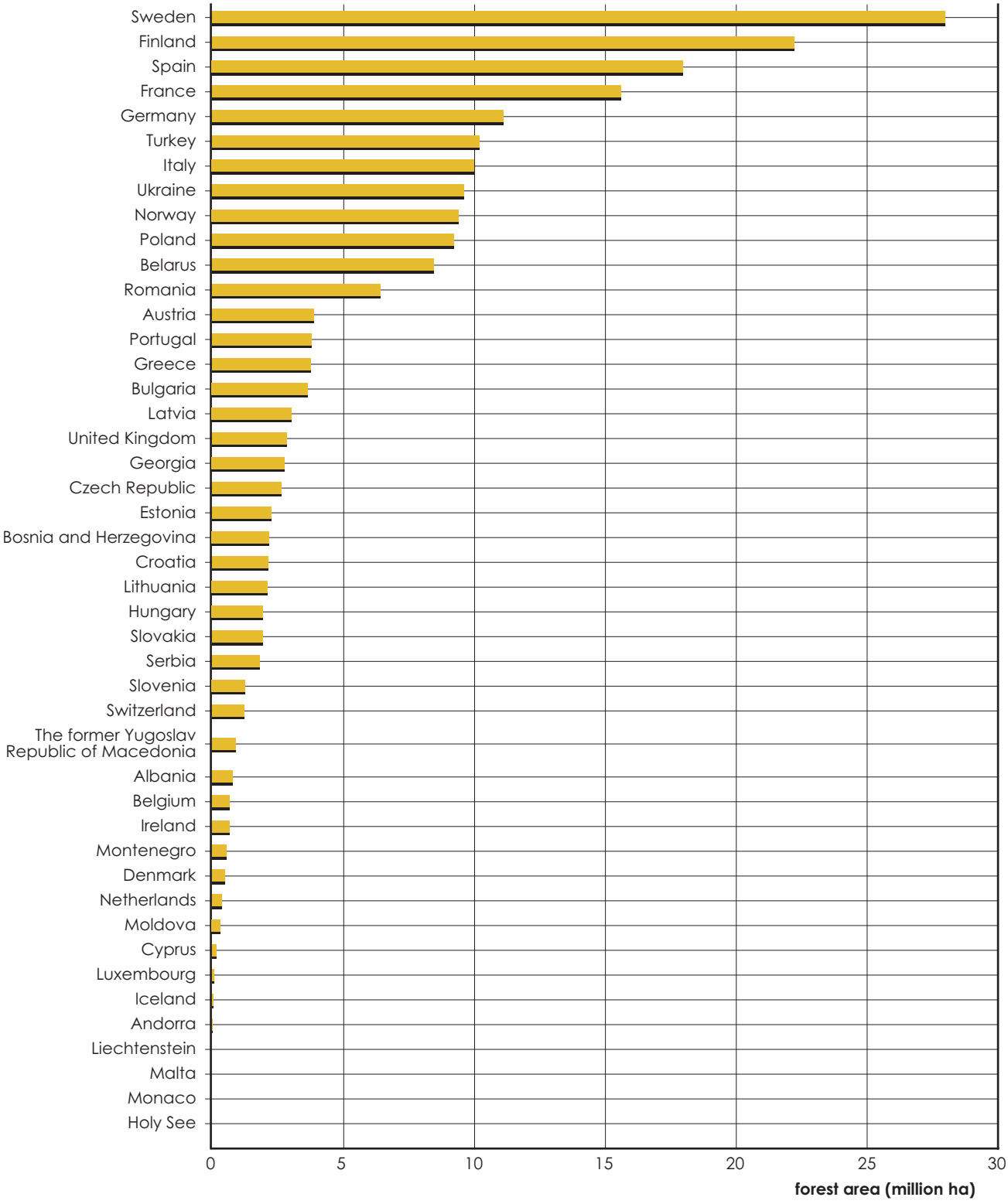


Figure 3. Forest area by country (excluding the Russian Federation), 2005

Note: Forest area of the Russian Federation is 809 million ha

Forest area in percentage of land area is highest in the Russian Federation and in the Nordic countries, having twice as much forest per unit land area than the North Western and South Eastern European countries (Table 1 and Figure 4). The share of forest area in total area does not seem to depend on the reported economic development of a country measured as either GDP or GDP per capita.

Forest area per capita is highest in the Russian Federation (5.7 ha/capita), followed by Finland and Sweden (4.2 and 3.1 ha/capita, respectively). However, there are only 0.5 ha or less of forest per capita in most other countries (Figure 5). The area of other wooded land per capita is less than 0.6 ha/capita in all countries, ranging from 0.28 to 0.57 ha/capita, with the highest rates in Norway, the Russian Federation, Iceland, Sweden and Cyprus.

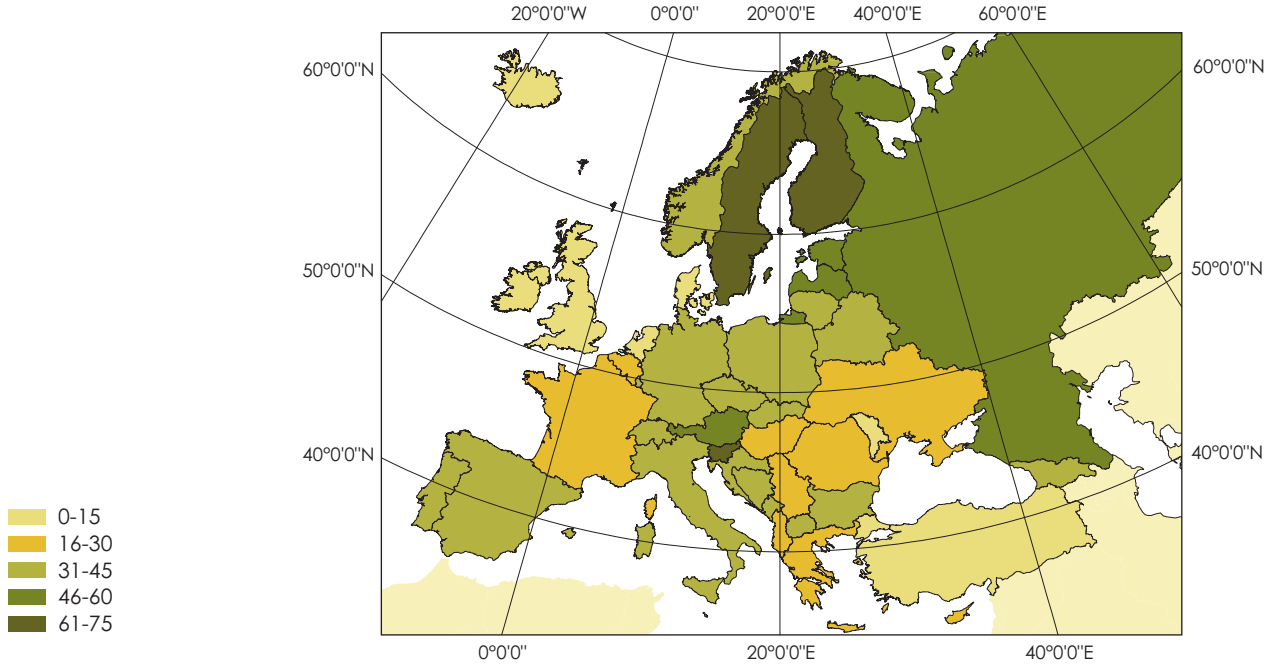


Figure 4. Forest area in percent of land area by country, 2005

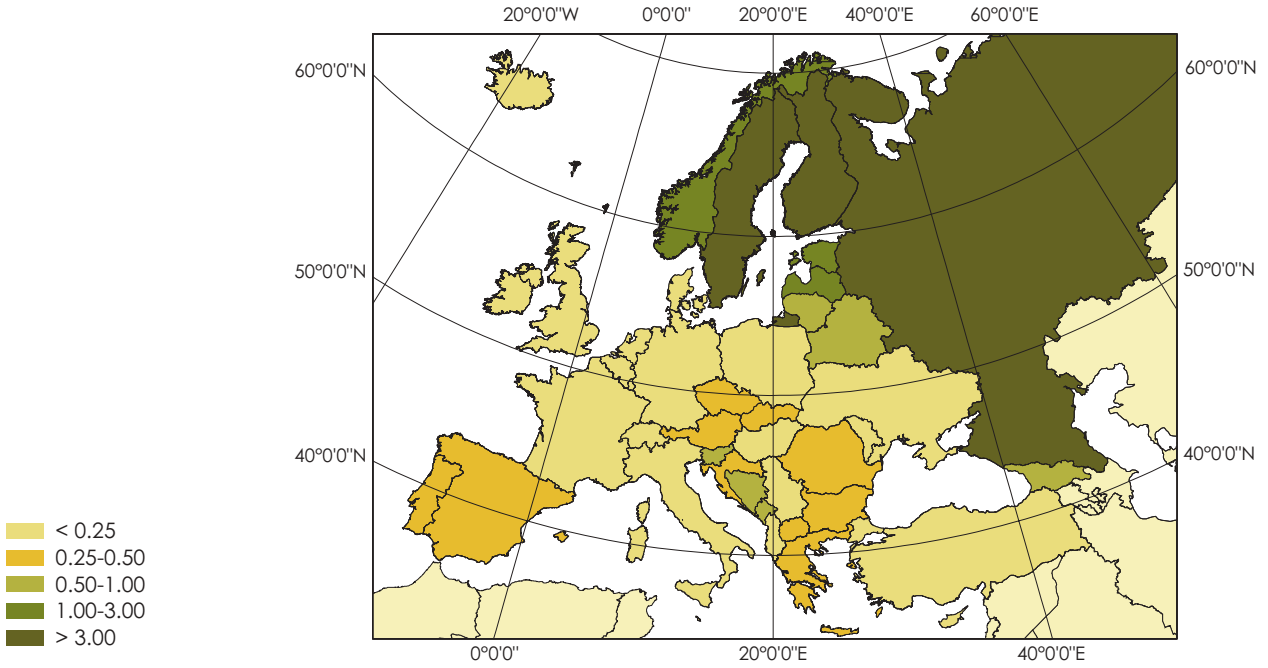


Figure 5. Area of forest per capita by country (ha), 2005

The total area available for wood supply is 468 million ha (138 million ha when excluding the Russian Federation), or 48 percent of the forest area of the 40 countries which provided information on this variable (Table 2). In the Russian Federation, only 41 percent of all forests are available for wood supply. Excluding the Russian Federation, 83 percent of the forest area in the MCPFE region is available for wood supply. However, there are large differences between countries with values ranging from 24 percent in Cyprus to more than 95 percent in seven countries (Belgium, Croatia, Czech Republic, Iceland, Ireland, Luxembourg and Switzerland). Eight- to nine-tenths of all forests are available for wood supply in most regions, but only 41 percent in East Europe (Table 2).

Table 2. The proportion of forests available for wood supply (FAWS) by region, 2005

Region	Forest area available for wood supply
	(% of forest area)
Central Europe	91
East Europe	41
Nordic/Baltic	82
North West Europe	93
South East Europe	82
South West Europe	89
MCPFE	48
MCPFE excluding the Russian Federation	83

About half of all forests of the Russian Federation are predominantly coniferous, 22 percent are broadleaved and 28 percent are mixed. In the MCPFE region excluding the Russian Federation half of the forests are predominantly coniferous, one-quarter are broadleaved and one-quarter mixed. Conifers predominate in the Nordic and Baltic countries, whereas three-quarters of all forests are broadleaved in South West Europe. On the other hand, more than half of the other wooded land is broadleaved.

Trends: 1990–2000 and 2000–05

The total area of forest and other wooded land in the MCPFE region continues to increase, although at a slower rate than between 1990 to 2000. In the last five years, the area of forest increased by 3.6 million ha – an area larger than the total land area of the Netherlands (Table 3).

Table 3. Trends in forest area by region, 1990–2000 and 2000–05

Region (1 000 ha/yr)	Forest area (1 000 ha)			Annual change rate (%)		Annual change	
	1990	2000	2005	1990–2000	2000–05	1990–2000	2000–05
Central Europe	21 235	21 766	22 080	53	63	0.25	0.29
East Europe	828 653	829 824	829 571	117	-51	0.01	-0.01
Nordic/Baltic	65 957	66 953	67 351	100	80	0.15	0.12
North West Europe	29 439	30 943	31 268	150	65	0.5	0.21
South East Europe	31 604	32 247	32 836	64	118	0.2	0.36
South West Europe	24 977	29 482	31 693	451	442	1.67	1.46
MCPFE	1 001 866	1 011 215	1 014 798	935	717	0.09	0.07
MCPFE excluding the Russian Federation	192 916	201 947	206 008	903	812	0.46	0.40

From 1990 to 2005, the area of forest in the Russian Federation declined by 160 000 ha[1]. While this is a large area, it is less than a 0.02 percent reduction of the forest area in this huge country over a period of 15 years and is well within the error of the difference of the results of inventories over this

[1] Note that for the Russian Federation, the reported figures may include substantial areas of poorly stocked and temporarily un-stocked forests. Indications are that the area of stocked forests slightly increased from 1990 to 2005 (Russian Forests, 2005).

period of time. The forest area also decreased in six other countries from 1990 to 2000, but only in Finland and Serbia from 2000 to 2005 (Figure 6).

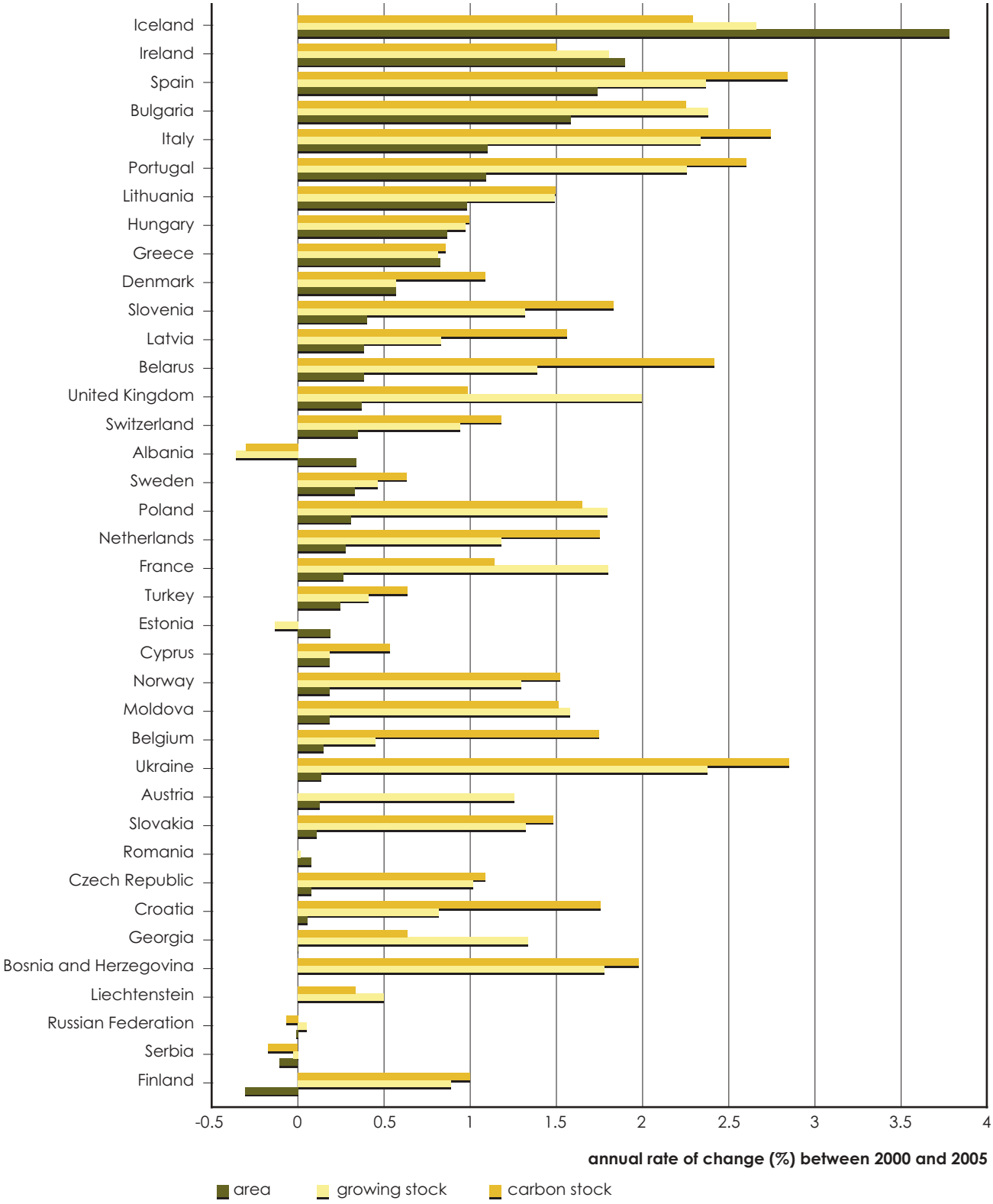


Figure 6. Changes in the area, growing stock and carbon stock, 2000–05

However, the total forest area of the whole MCPFE region increased by 935 000 ha a year between 1990 and 2000, and by 717 000 ha from 2000 to 2005 (i.e., at an annual rate of 0.07 percent). Thus, the net forest loss was more than offset by the establishment of new forests in the MCPFE region. Although Spain and Italy alone accounted for almost half of the increase, the forest area grew in

all but two countries in the last 15 years. Figure 6 shows that sustainability was overwhelmingly achieved between 2000 and 2005, not only with regard to forest area, but also to growing stock and carbon stocks.

Twenty-nine countries reported the area of other wooded land data for both 1990 and 2005. The area of other wooded lands decreased by 956 000 ha in the Russian Federation, and by 2.99 million ha elsewhere in the MCPFE region from 1990 to 2005. The largest decrease in absolute terms was reported by Spain (a loss of 2.1 million ha since 1990), and the largest increase was reported by Belarus (a gain of 0.5 million ha). In relative terms, the largest decrease occurred in Bulgaria and Portugal (-79 and -64 percent, respectively), while the largest increase occurred in Ukraine (46 percent).

The area of predominantly broadleaved forests increased across four out of six regions from 1990 to 2005, although at a slower rate after 2000. The area of predominantly coniferous forests has been continuously decreasing, with the loss rate increasing in the Russian Federation and Central Europe, and decreasing in the Nordic/Baltic countries. In North Western Europe, former losses were partly offset by increases after 2000. In South Europe, the area of predominantly coniferous forests is increasing, but at a slower rate than before. After a substantial loss before 2000, the total area of mixed forests started to increase after 2000, mainly in the Russian Federation and in the Nordic/Baltic countries. The area of mixed forests continues to decrease in South East Europe.

The area of forests available for wood supply has decreased in the Russian Federation (by 58.6 million ha) and in the Nordic/Baltic countries. In the MCPFE regions excluding the Russian Federation this area has increased by 1.6 million ha since 1990 (Table 4).

Table 4. Trends in forest available for wood supply by region, 1990–2005

Region	Forest area available for wood supply (1 000 ha)			Annual change (ha/yr)		Annual change rate (%)	
	1990	2000	2005	1990–2000	2000–05	1990–2000	2000–05
Central Europe	19 770	19 932	20 069	16	27	0.08	0.14
East Europe	400 769	343 610	341 472	-5 716	-428	-1.53	-0.12
Nordic/Baltic	53 416	52 367	52 090	-105	-56	-0.2	-0.11
North West Europe	17 524	18 605	18 822	108	43	0.6	0.23
South East Europe	20 598	20 661	21 116	6	91	0.03	0.44
South West Europe	7 495	8 446	8 922	95	95	1.2	1.1
MCPFE	519 572	463 622	462 491	-5 595	-226	-1.13	-0.05
MCPFE excl. the Russian Federation	131 119	132 161	132 702	104	108	0.08	0.08

Note: Only includes those countries which provided data for all 3 reporting years

Indicator 1.2. Growing stock

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

This indicator is one of the basic figures of any forest inventory and is useful for various purposes. The growing stock is closely related to the above ground woody biomass and provides data also for calculating carbon budgets.

Information on growing stock for 2005 was available from all but four countries. For these latter countries, an estimate of the growing stock was made. This provided an estimate of the total growing stock for 2005 for all countries in the region.

Situation

The total growing stock of all forests in the MCPFE amounts to 112 billion m^3 (31 billion m^3 in MCPFE without the Russian Federation) or an average of 110 m^3/ha (151 m^3/ha in MCPFE without the Russian Federation, Table 5).

Table 5. Total growing stock and growing stock density by region, 2005

Country/region	Total growing stock (1 000 m^3)	Growing stock density (m^3/ha)
Central Europe	5 448 592	247
East Europe	84 510 850	102
Nordic/Baltic	7 633 565	113
North West Europe	6 486 997	207
South East Europe	4 760 088	145
South West Europe	2 686 556	85
MCPFE	111 526 648	110
MCPFE excl. the Russian Federation	31 047 598	151

Around 57 percent of the total growing stock is available for wood supply. Three-quarters of all growing stock is found in the Russian Federation alone. However, since large areas of forest are not available for wood supply in the Russian Federation, only 64 percent of all growing stock in forests available for wood supply is found in the Russian Federation, and 36 percent elsewhere. Other wooded lands only contain some 0.4 percent of the total growing stock on all land available for wood supply, although this proportion is considerably higher in Iceland (30 percent), Albania (11 percent) and Italy (4 percent).

Due to the heterogeneous ecological conditions and history of forest management, the stocking density, i.e. the average growing stock per unit area, of the forests is rather uneven across the MCPFE countries. It is largest in Central Europe, and much lower in areas of less favourable growing conditions and different silvacultural traditions. Differences are less expressed, but still considerable, if the stocking density of the forests available for wood supply is considered (Figure 7).

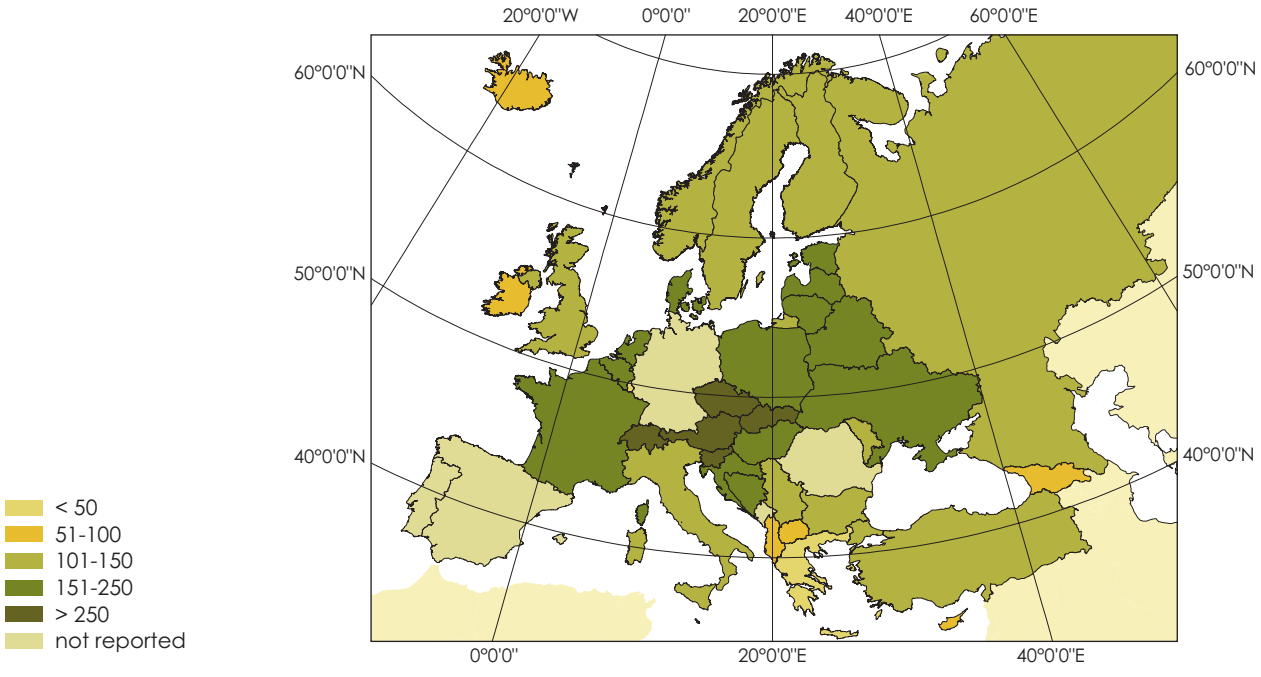


Figure 7. Stocking density of forests available for wood supply across the MCPFE region (m^3/ha), 2005

Trends: 1990–2000 and 2000–05

Just like the area, the growing stock of forests also continues to increase. Each year, 358 million m^3 – a volume equivalent to the total current standing volume of all forests in Slovenia – is added to the growing stock of the MCPFE countries. The rate of increase, on average 0.34 percent annually for those countries which reported on all three years, has not changed much in the last 15 years (Table 6).

Table 6. Trends in total growing stock in forests, 1990–2005

Region	Total Growing Stock in Forest (1000 m^3)			Annual change (1000 m^3)		Annual change rate (%)	
	1990	2000	2005	1990–2000	2000–05	1990–2000	2000–05
Central Europe	4 070 025	4 648 149	4 98 6327	57 812	67 636	1.34	1.41
East Europe	82 875 940	83 940 890	84 510 850	106 495	113 992	0.13	0.14
Nordic/Baltic	6 609 682	7 364 815	7 633 565	75 513	53 750	1.09	0.72
North West Europe	2 598 359	2 851 291	3 106 395	25 293	51 021	0.93	1.73
South East Europe	4 209 692	4 537 334	4 688 088	32 764	30 151	0.75	0.66
South West Europe	1 881 400	2 392 400	2 68 5200	51 100	58 560	2.43	2.34
MCPFE	102 245 098	105 734 879	107 610 425	348 978	375 109	0.34	0.35
MCPFE excll. the Russian Federation	22 205 458	25 464 489	27 131 375	325 903	333 377	1.38	1.28

The growing stock increased in all but a very few countries (Figure 8). Only Estonia, Albania and Serbia reported losses between 2000 and 2005. In Central and North West Europe, growing stocks increased at a faster rate from 2000 to 2005 than from 1990 to 2000. The growing stocks of the broadleaved forests increased most, while those of the mixed forests decreased.

On the other hand, the growing stock of forests available from wood supply, just like their area, decreased in the MCPFE region as a whole at an annual rate of 0.51 percent from 1990 to 2005. This was mainly due to a decrease in the Russian Federation and, to a lesser extent, in Albania, Estonia and Serbia. In the MCPFE region excluding the Russian Federation the growing stock available for wood supply increased by an average 215 million m^3 per year from 1990 to 2005.

The stocking density of forests available for wood supply has generally increased since 1990 (in many countries quite substantially), and only decreased in Albania, Estonia, the Russian Federation and Serbia from 2000 to 2005 (Figure 8).

In the forests available for wood supply, the growing stock of the predominantly broadleaved forests increased, but that of the predominantly coniferous and the mixed forests decreased.

The growing stocks of other wooded land generally increased with the largest increases in absolute values in the Russian Federation, Italy and Finland during the last five years. Spain, Norway, Albania, Georgia, Latvia and Lithuania reported reductions between 2000 and 2005, mainly in broadleaved stands.

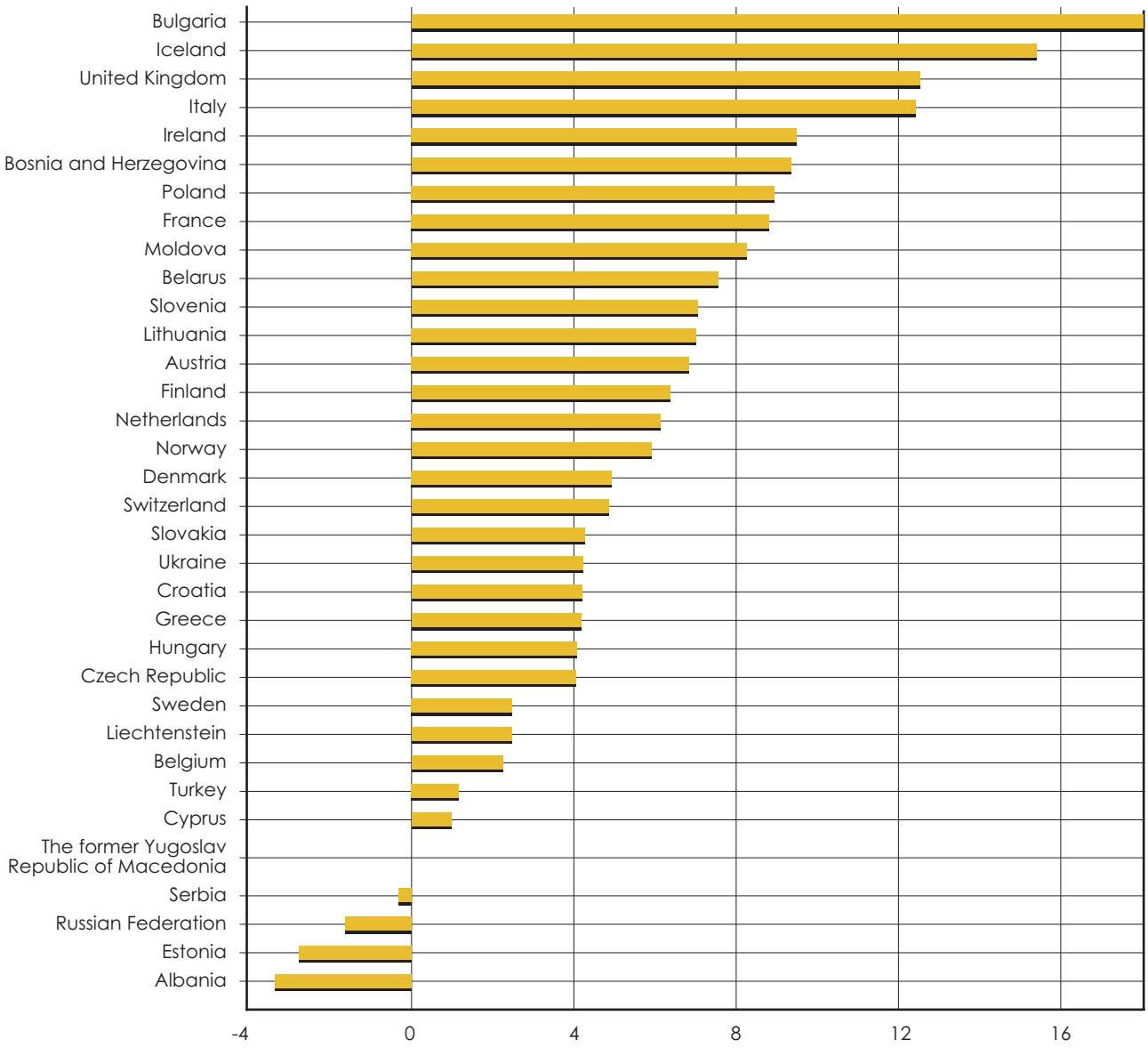


Figure 8. The rate of change of stocking density (m^3/ha) of forests available for wood supply by country (%), 2000–05

Indicator 1.3. Age structure and/or diameter distribution

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

Diameter and age class distributions provide insight into both the history and the future development of forests, and their analysis is a prerequisite for assessing the long-term sustainability of forest management interventions. On a national level, the age class distribution should be assessed for even-aged stands, while the diameter distribution is more appropriate for uneven-aged stands. As forest management is changing towards more uneven-aged stands, the data on diameter distribution might gain importance in the future.

Situation

In general, much less information was provided on the age structure and diameter distribution than on other indicators. The age distribution data are mainly available for East Europe, the Nordic/Baltic countries, and Central Europe. Only a few countries have reported statistics on the diameter distribution, mainly those that have relatively large areas of uneven-aged stands.

The Russian Federation reported all of its forests as even-aged, although a large proportion is classified as undisturbed by man. Elsewhere in the MCPFE region, on average 87 percent of all forest was reported as even-aged. The following countries reported more than 20 percent of their forest area as uneven-aged: Austria (51 percent), Norway (29 percent), Belgium (24 percent), Latvia (23 percent) and Albania (22 percent).

Stand age shows a fairly even distribution in the Russian Federation. Although harvests also affect age structure, it is primarily shaped by the natural disturbances, such as forest fires from previous decades in the vast natural forests. In the MCPFE region excluding the Russian Federation, age distribution is much more affected by harvests, regenerations and the establishment of new forests. This can be clearly seen in Central Europe, where forests are generally young, i.e. almost two-thirds of the forest area is comprised of trees younger than 60 years old. Forests are even younger in the Nordic countries where, although there are still old forests on large areas, the share of older forests steeply decreases with age, and there are twice as many 1–20 year-old forests as 81–100 year-old ones (Figure 9). It must be noted that the age-class distribution may also be affected by the species composition, as rotation length is species-dependent.

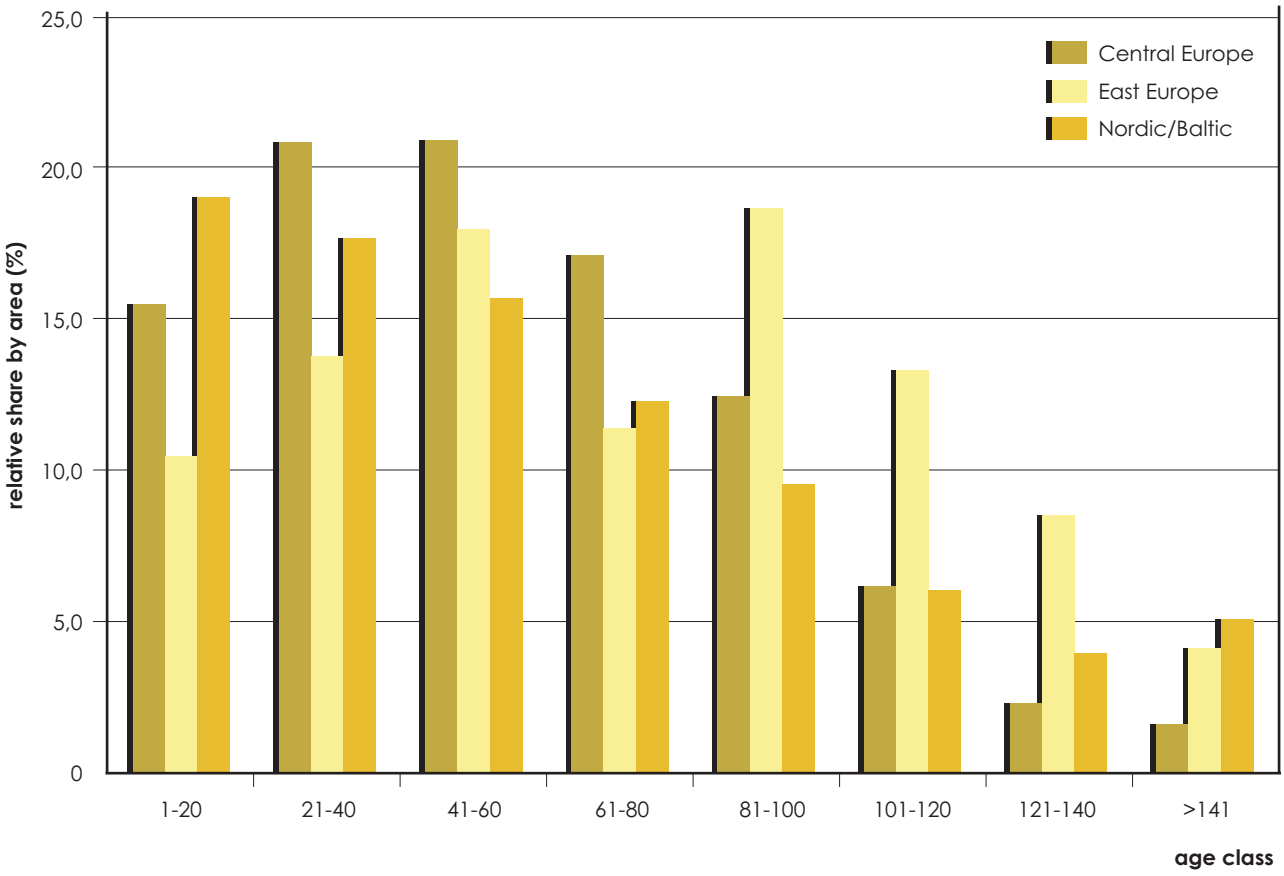


Figure 9. The distribution of forest area by age classes in the three regions for more than 50% of the forest area, 2005 (based on available data)

Trends: 1990–2000 and 2000–05

Compared with the *State of Europe's Forests 2003* report, changes in the age structure can now better be estimated based on the reported data. However, comparable time series data are only available for the Nordic countries (with the exception of Iceland), and for a few other countries in the MCPFE region. This does not allow an evaluation of the sustainability for the whole MCPFE region from this point of view.

For Denmark, Finland, Norway and Sweden, the area of young forests generally increased, whereas the area of old forests increased from 1990 to 2000, but decreased from 2000 to 2005 (Figure 10). For the Nordic/Baltic countries (except Iceland), the area of young age classes (i.e. under 60 years of age) increased by 217 000 ha each year from 2000 to 2005, whereas that of old forests (over 60 years) decreased by 162 000 ha per year. On the other hand, the net increase of the total forest area in these countries was only 60 000 ha per year from 1990 to 2000, and only 42 000 ha per year from 2000 to 2005. Thus, the changes in the area of the age classes mainly demonstrate the effects of the harvesting and disturbance regime.

In contrast, in five Central European countries, i.e. Austria, the Czech Republic, Hungary, Poland and Slovakia, the area of the young age classes decreased by 14 000 ha annually from 2000 to 2005, and that of the older age classes increased by 42 000 ha a year.

Information on diameter distribution was too limited to allow for an analysis of trends.

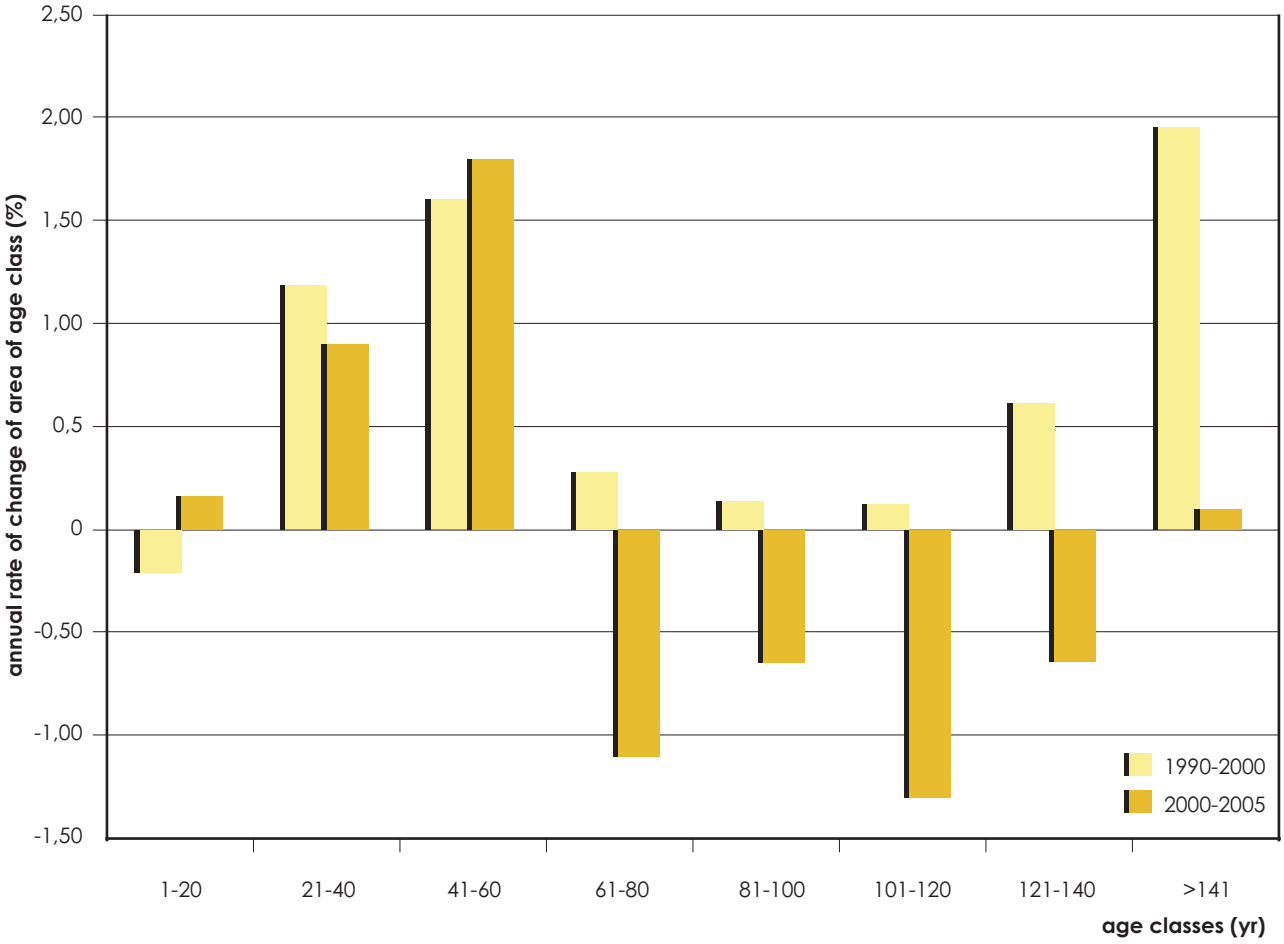


Figure 10. Change in the age structure of even-aged forests in the Nordic/Baltic region (excluding Estonia, Iceland, Latvia and Lithuania), 1990–2005

Indicator 1.4. Carbon stock

Carbon stock of woody biomass and of soils on forest and other wooded land

Carbon accumulates in forest ecosystems through absorption of atmospheric CO_2 by plants, and is retained for periods of different length in the woody biomass, litter and soils, as well as in wood products. However, carbon is also emitted by both natural processes (e.g. due to disturbances) and human activities. The net effect can be an increase in carbon stocks, which is equivalent to the removal of carbon from the air.

Twenty-eight countries provided complete information on carbon stocks. Two countries did not provide any information on carbon stocks and an additional 14 countries did not provide information on carbon stocks in deadwood. For the purpose of this analysis, the average value per ha for the respective variable and subregion was multiplied by the forest area of each of these countries to obtain a valid estimate of the carbon stock for the whole region. Three countries did not provide a full time series and therefore for those the value from 2000 per ha was applied to the forest area in 1990 and/or 2005 in order to calculate trends for the region as a whole.

Situation

The carbon stored in the biomass of forests amounts to an estimated 53 billion tC in the MCPFE region (13.5 billion in the MCPFE without the Russian Federation). Forest biomass carbon of the EU-27 countries is estimated at 9.8 billion tC (Table 7).

Table 7. Carbon stocks in forest biomass and deadwood, 2005; trends in carbon stocks, 1990–2005

Region	Total carbon stock in forest			Carbon stock by component, 2005					
	1990	2000	2005	Above ground		Below ground		Deadwood	
	1 000 tonnes			1 000 tonnes	%	1 000 tonnes	%	1 000 tonnes	%
Central Europe	1 752 614	2 012 600	2 145 693	1 620 340	76	414 150	19	111 203	5
East Europe	40 794 504	40 598 018	40 763 810	26 987 688	66	6 741 293	17	7 034 829	17
Nordic/Baltic	2 651 673	2 915 512	3 060 149	2 302 343	75	653 379	21	104 427	3
North West Europe	2 189 892	2 513 975	2 722 550	2 077 976	76	603 205	22	41 369	2
South East Europe	2 348 259	2 538 869	2 644 532	1 869 345	71	378 972	14	396 214	15
South West Europe	944 770	1 245 939	1 395 228	891 489	64	250 934	18	252 805	18
EU 27	7 980 597	9 133 206	9 773 675	7 178 496	73	1 942 750	20	652 428	7
MCPFE	50 681 713	51 824 913	52 731 962	35 749 181	68	9 041 934	17	7 940 847	15
MCPFE excluding the Russian Federation	10 960 713	12 639 912	13 523 962	9 962 181	74	2 618 934	19	942 847	7

In contrast, the total CO_2 – equivalent emission of the EU-27 countries in 2004, expressed in carbon units, was 1.4 billion tC (as reported in the national inventory reports of the EU countries under the United Nations Framework Convention on Climate Change UNFCCC[2], Gugele et al., 2006, Romania 2006, Bulgaria 2006). Thus, an amount of carbon equivalent to about one-seventh of the huge amount of carbon stored in the EU-27 forests is emitted to the air each year due to the current high levels of greenhouse gas emissions of the developed economies.

Although only to a limited extent, forests can contribute to the offsetting of these emissions by sequestering carbon in biomass, deadwood and soil. From 2000 to 2005, the total amount of carbon that was added to the woody biomass of the forests of the EU-27 countries averaged 128 million tC per year. This could offset less than one-tenth of the CO_2 equivalent emissions from these countries. These figures do not include the carbon stored in harvested wood products.

Of all forest carbon, 68 percent is stored in the above-ground biomass, while 17 percent is stored in the below-ground biomass, and 15 percent in the deadwood. Note there is a high correlation between the growing stock and the biomass carbon stock, and the latter is usually computed from growing stock data using conversion and expansion factors. The distribution of biomass carbon stock is therefore closely related to that of the growing stock, and the carbon stored per unit area varies in parallel with the growing stock density, shown for forests available for wood supply in Figure 7.

[2] UNFCCC, http://www.unfccc.int.

The density of deadwood carbon per unit area is reported by fewer countries, and reveals even larger differences between countries than biomass carbon per unit area (Figure 11).

Trends 1990–2000 and 2000–05

Since 1990, the total forest carbon stock in MCPFE increased by 2 billion tonnes, or an average of 137 million tonnes C per year (Table 7). In general, the total carbon stock increased in almost all countries from 1990 to 2005. From 2000 and 2005, it only decreased in Albania, the Russian Federation and Serbia (Figure 6). The above-ground biomass carbon stock decreased in Albania, Estonia and Serbia between 2000 and 2005 whereas the deadwood C stock has only decreased in Czech Republic since 2000 (Figure 12).

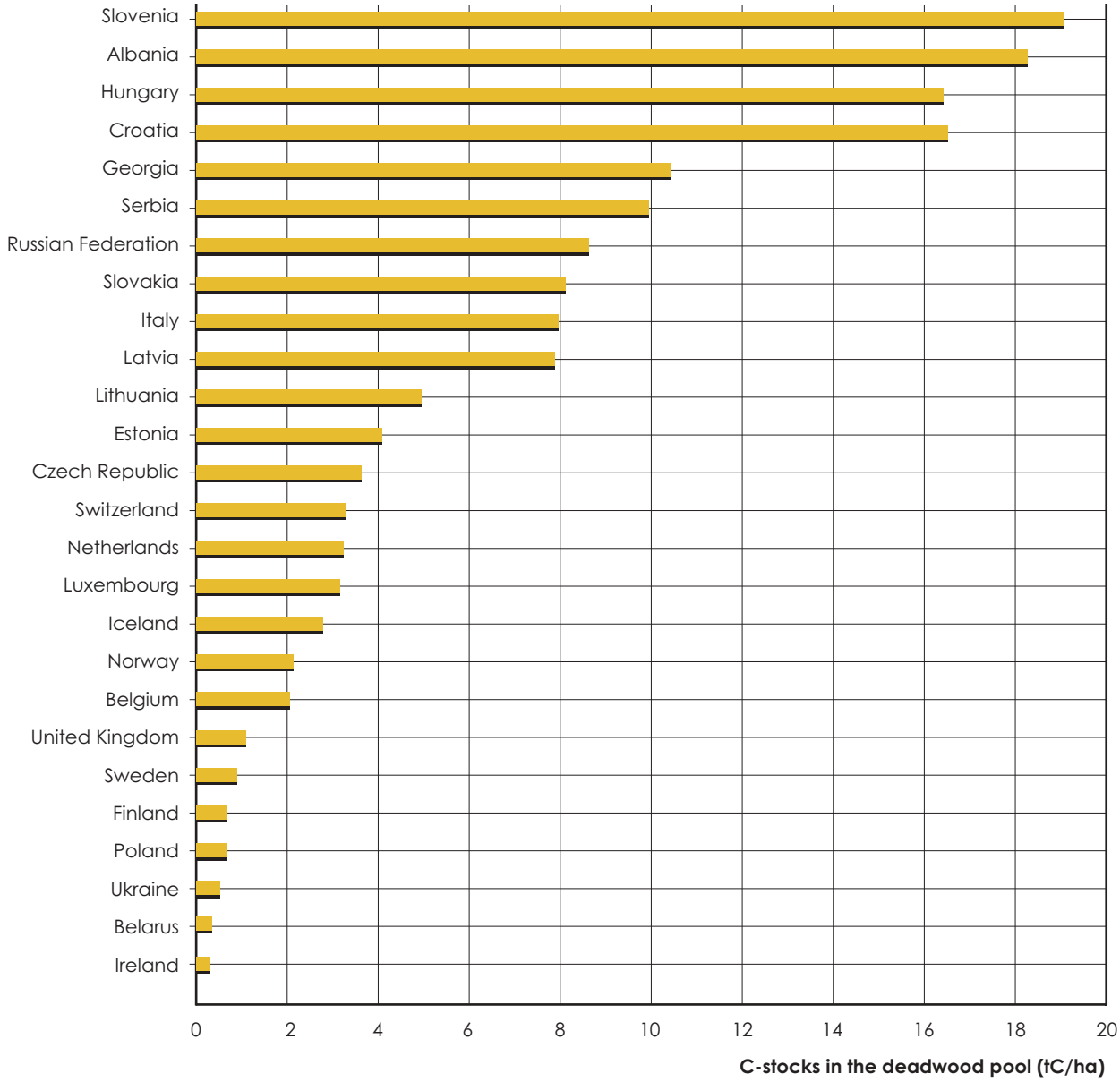


Figure 11. Deadwood carbon stocks per unit area across the MCPFE region for reporting countries, 2005

MCPFE countries are generally interested in preserving their forest carbon stock, since carbon stock losses must be reported as emissions under the Kyoto Protocol. Currently the carbon stored in harvested wood products is not considered under the Kyoto-Protocol. However, the estimation of forest carbon stocks has not yet been fully standardized, and there may be different estimates within a country. This is demonstrated by the fact that different carbon stock and/or carbon

stock change data are sometimes submitted by countries to relevant international organizations (e.g. FAO and UNFCCC) that require reporting of these data.

For deadwood, fewer data are available for detecting changes than for the biomass stock, because the assessment of deadwood is more complicated and has not been commercially or otherwise motivated until recently. Even fewer data are available for soil, although it can store much more carbon than the biomass, and substantial emissions can occur from soils (e.g. Bellamy et al. 2005). Information on carbon stock in soil and litter was not included in the present report and has only been reported by a few countries under the UNFCCC and the Kyoto Protocol. However, the carbon stock of soil and litter can also change substantially due to human activities, and in order to sustain the soil and litter carbon stocks and to fully utilize the mitigation potential of forests, the effects of forest management on these pools must also be considered.

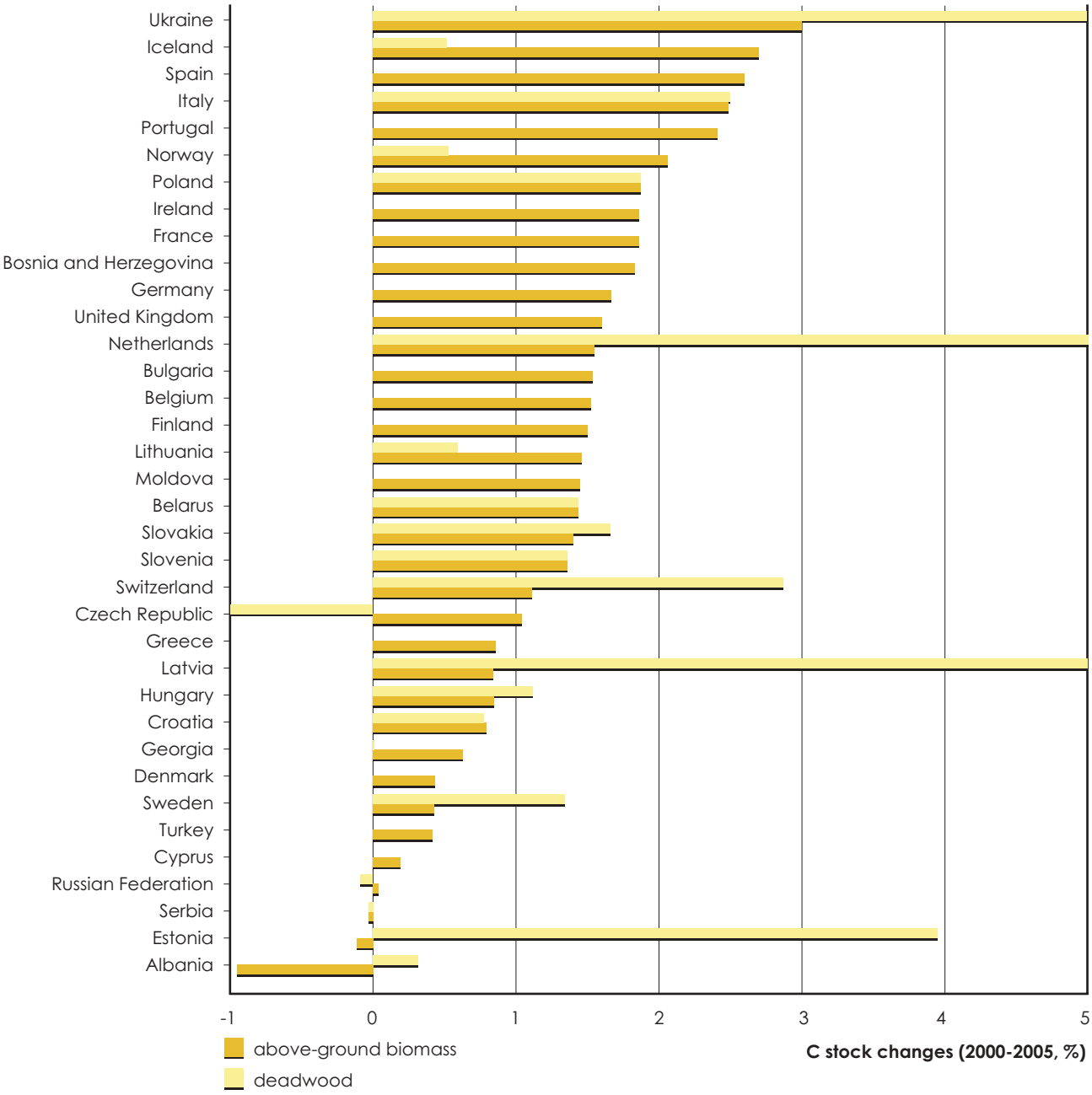


Figure 12. Carbon stock changes in the above-ground biomass and the deadwood pools between 2000 and 2005 for countries with reported non-zero data

Note: Dead wood data reported by Ukraine (a change of 5%), Latvia (6.5%), the Czech Republic (-8.1%), and the Netherlands (16.9%) are out of scale

Criterion 2. Maintenance of Forest Ecosystem Health and Vitality

Although air quality in Europe has improved, trees are still under stress. Further reductions in emissions are needed to improve ecosystem health and vitality.

Air pollution and depositions, especially of sulphur, have been reduced in recent years; however, past depositions accumulated in soils may lead to higher levels of nitrogen, sulphate and soil acidity, which make forests more vulnerable to environmental stress and changing climatic conditions. Tree crown condition has stabilized but defoliation levels are still high in most regions, indicating that trees have a reduced potential to withstand adverse environmental impacts. Further reduction of related emissions is needed to bring depositions below critical loads.

Forests in Europe have suffered severe storm damages, and forest fires continue to be a major challenge.

Since 1999, large storm damages have occurred in Europe almost annually. Hundreds of thousands of ha of forest are burnt annually. While the number of forest fires increased, the area burnt did not increase in the period 2000–2005, mainly due to more effective fire suppression in many countries.

Key findings by Indicator

2.1. Deposition of air pollutants

Nitrogen deposition presently exceeds critical loads on roughly two-thirds of the evaluated plots, including almost all sites in Central Europe. Accumulation of former and present depositions leads to eutrophication and acidification of forest soils and must be considered a substantial risk for forest sustainability.

2.2. Soil condition

Due to the variety of forest soils and deposition levels in Europe, changes in forest soil conditions are site-specific. Given the long time lag in soil recovery processes, the accumulation of former depositions can become a major threat for forest health and vitality at the local level.

2.3. Defoliation

Defoliation of tree crowns varies between climatic regions and species due to temporally and spatially changing natural and anthropogenic stress factors. Deterioration of crown condition may indicate that trees have a reduced potential to withstand adverse environmental impacts.

2.4. Forest damage

Damages by biotic and abiotic agents do not show a uniform pattern within Europe. Since 1990, Europe has had to face several heavy storms that have led to substantial damage and have had impacts on timber markets. At the local level, forest damages may be a threat to sustainable forest management.

Indicator 2.1. Deposition of air pollutants

Deposition of air pollutants on forest and other wooded land, classified by N, S and base cations

Introduction

Nitrogen, sulphur dioxide, heavy metals and ozone can be conveyed in the atmosphere over long distances. They cover distances of several hundreds to thousands of kilometres as gases or microscopic small particles (aerosols). Forests are exposed to particularly high inputs since their large crown surfaces are very effective at capturing deposition. Deposition can affect organisms or ecosystems either directly or by soil acidification and eutrophication. The nutrient status of trees may be influenced by air pollutants interacting with the foliage and also by changing availability of nutrients in the soil. Direct or indirect adverse effects of deposition on forest tree health and ground vegetation composition have also been demonstrated. Air pollution may also predispose trees to the effects of drought and attacks by fungi or insects.

Critical loads – the thresholds for long-term deposition – are calculated to identify sites where deposition levels have reached a critical state. According to current knowledge, inputs below critical loads do not lead to significant negative effects for the ecosystems concerned. The calculation of critical loads is based on a mass balance that takes into account stand structure, bedrock and soil chemistry.

Data on deposition of air pollutants were made available by International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests) and Forest Focus and are related to assessments on intensive monitoring plots (Level II plots), which are designed to study cause-effect relationships. Therefore, intensive monitoring plots have been established in selected sites and do not provide representative figures for Europe.

Current situation

Nitrogen deposition levels are generally higher on plots in Central Europe than in northern and southern regions. For sulphur inputs, plots with higher deposition are mainly located in north Western and Eastern Europe, and on some scattered plots in Southern Europe. The deposition of calcium (Ca) and potassium (K) is highest in Central and Eastern Europe and the Mediterranean area, whereas sodium (Na) is most frequently observed in countries located near the sea (Western Europe and the Mediterranean area). There is a clear relationship between base cation deposition and nitrogen and sulphate inputs. This is most likely due to associated emissions of sulphates and calcium from smelters and refineries.

Effects of deposition measured on the monitoring plots strongly depend on site factors such as the buffering capacity of the soils and on the forest type. Sites in Scandinavia are generally more sensitive to air pollution than those in Central and Southern Europe since naturally acidic soils are widespread in the north.

Nitrogen deposition presently exceeds critical loads on roughly two-thirds of the evaluated plots, including almost all sites in Central Europe and, to a lower extent, those in Spain (Figure 13). Excess nitrogen deposition causes soil eutrophication and the long-term stability of the forest ecosystem is at risk on plots where critical loads are exceeded. Critical loads for nitrogen are only, but rarely exceeded in plots in the Alps, Fennoscandia, the UK and Greece.

The situation is less dramatic for acidity. Critical loads for acidity are presently exceeded at 23 percent of the evaluated plots (Figure 14), mainly located in Central Europe and generally closely correlated with sites that have a very high level of nitrogen (Figure 13). The situation has improved over earlier years and decades, mainly due to significant reductions in sulphur emissions. Nevertheless, earlier deposits are still a burden to forest soils today and forest soil recovery takes decades. Further emission reductions are needed.

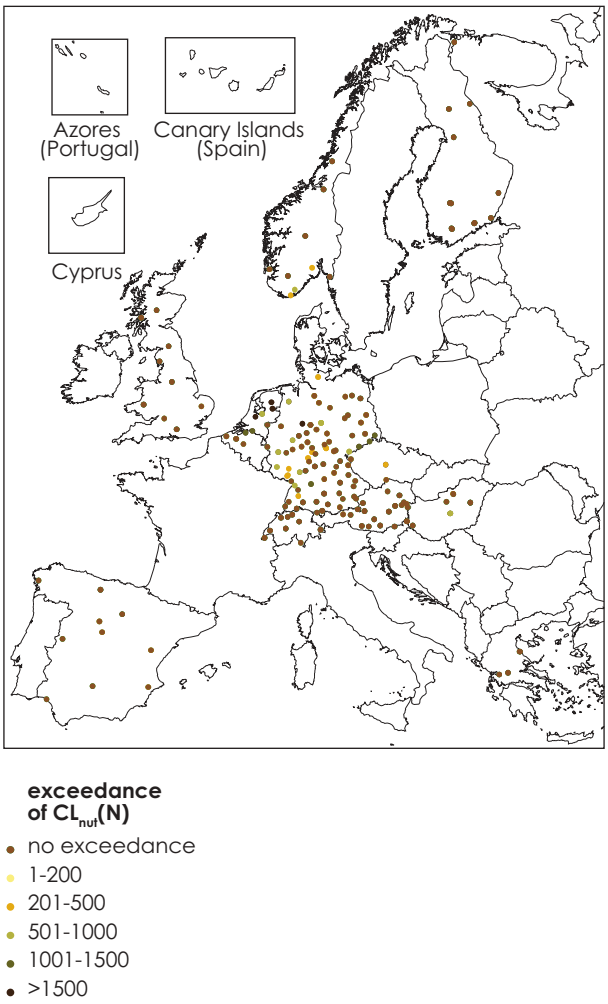


Figure 13. Exceedance of critical loads for nutrient nitrogen by present deposition on 186 plots

Note: Green plots = no exceedance, data submission for additional plots is ongoing

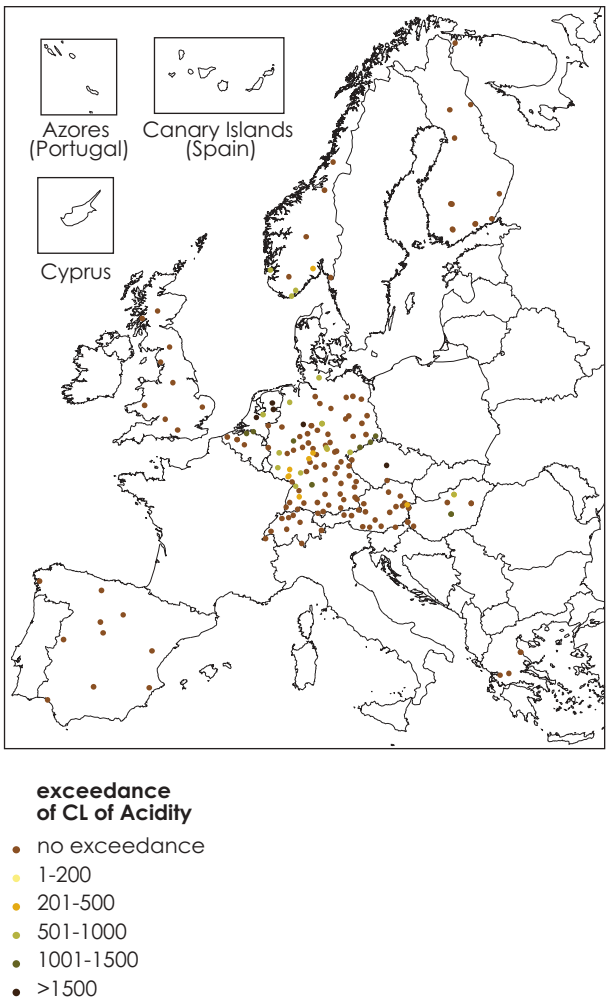


Figure 14. Exceedance of critical loads for acidity by present deposition on 186 plots

Note: Green plots = no exceedance, data submission for additional plots is ongoing

Trends

From 1999 to 2004, nitrogen inputs decreased on 13 percent of the observed plots; sulphur deposition decreased on 31 percent. The largest share of the plots did not show significant changes. Depending on the compounds of interest, a maximum of 3 percent of the plots showed increasing deposition. The calculations show, however, that in order to fall below critical limits in all plots, deposition of nitrogen or sulphur would need to be reduced by an additional 65 percent of the evaluated plots. Figure 15 shows the development of mean measured plot bulk deposition of sulphate (SO_4-S), nitrate (NO_3-N) and ammonium (NH_4-N) from 1999 to 2004.

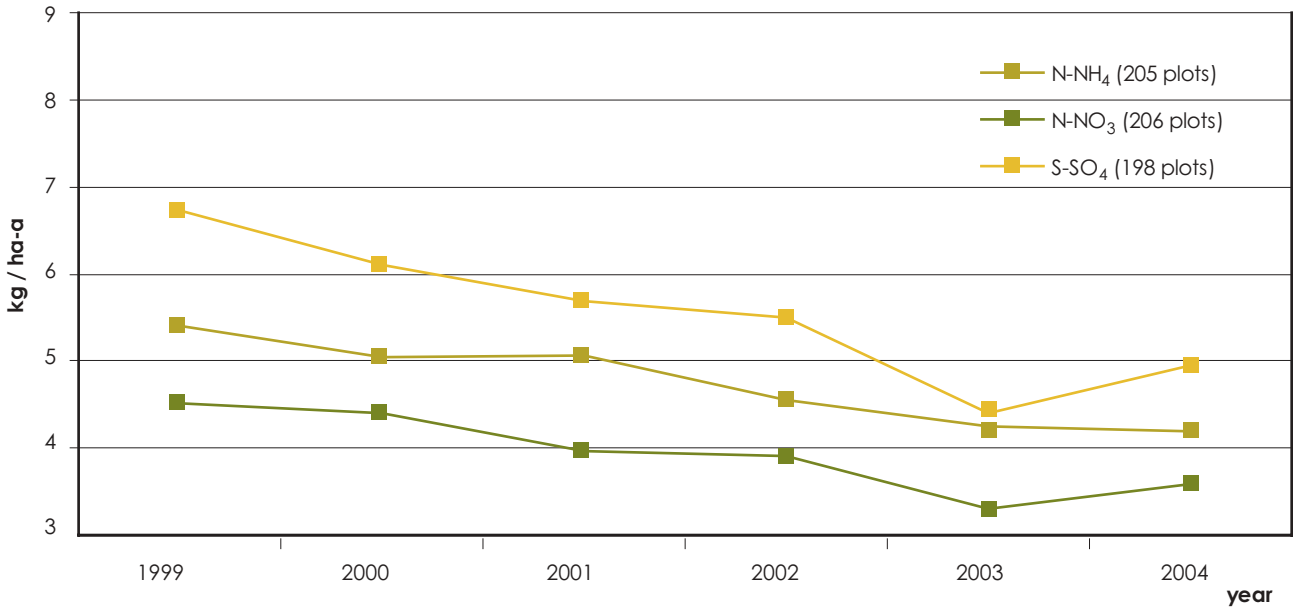


Figure 15. Development of mean measured plot bulk deposition of sulphate (SO_4-S), nitrate (NO_3-N) and ammonium (NH_4-N) in Europe, 1999–2004

Several studies reported on changes of the composition of herbal plants and epiphytic lichens as an effect of depositions (Kuhn et al., 1987; Seidling, 1990; Thimonier et al., 1992; Diekmann and Dupré, 1997). On plots with high nitrogen inputs, growth of pine, spruce and beech trees was consistently higher than expected for given site conditions, stand age and density.

Sulphur deposition will mostly increase leaching of base cations such as Mg^{2+} and Ca^{2+}, and possibly K. Experiments indicate that Mg-deficiency might become a critical issue for sensitive soils exposed to acid deposition. These changes in nutrient availability may affect tree vitality and may lead to a reduction of forest growth. Even if depositions are further reduced, the long time lag inherent in recovery processes will have negative impacts on forest ecosystem health and vitality.

Indicator 2.2. Soil condition

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

Acidification and changes in chemical soil properties and related nutrient cycles directly or indirectly affect tree vitality, species composition and tree resistance to insect attacks and diseases. The current tendency to acidification and eutrophication of soils and the associated changes in foliar chemistry of forests in many parts in Europe is a potential area of concern. On forest soils characterized by low buffering capacities, acid deposition may result in critical pH-levels and toxic aluminium concentrations.

Situation

A gradient from low pH values in northern Europe to higher values in southern Europe can be explained by natural conditions such as acidic soils in Scandinavia and calcareous bedrock in many Mediterranean regions. Extremely low pH values, i.e. below pH 3.1, were reported for the mineral surface layers in regions within Europe receiving the highest acid deposition load (see Figure 16). Soil types at these sites were mostly characterized by a low buffering capacity against acid deposition.

A common characteristic of these soils is a generally low reserve of basic exchangeable cations and a low base saturation. The coincidence of low pH, high acid load and low buffering capacity indicates that acid deposition is the driving forces for the high soil acidity at these sites. Historical land use of forests, such as forest litter utilization and forest pasture, may also contribute to soil acidification observed (Vanmechelen et al.,1997).

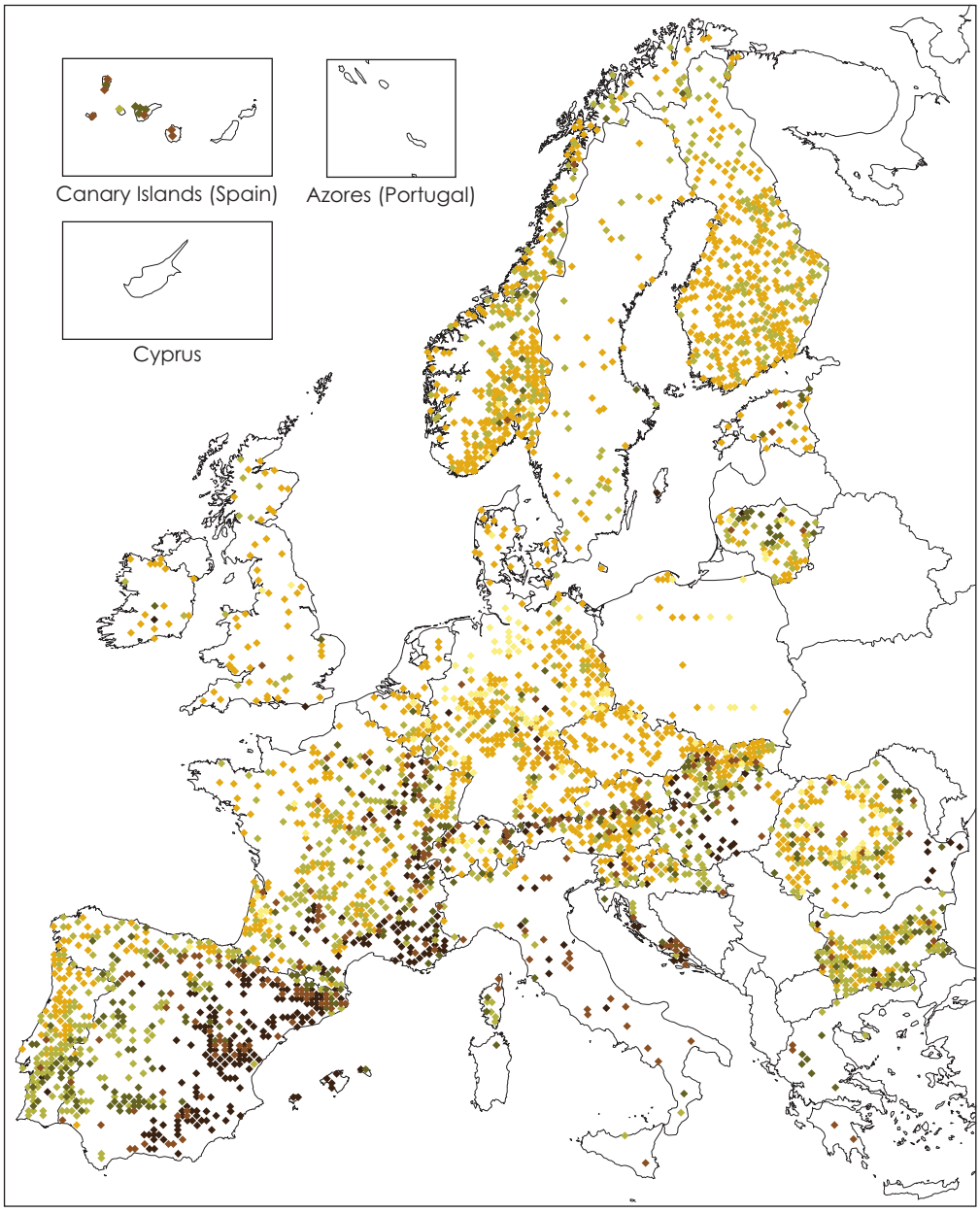


Figure 16. Soil pH measured in the top mineral soil layer of sample plots

Trends

Soils react slowly to changing environmental conditions; recovery processes can take decades. A quantification of measured changes in soil properties over time will only be possible for plots observed on successive occasions. Soil water is more directly related to atmospheric deposition. Dynamic models can help to evaluate its response to changing deposition scenarios. These models take into account specific site and stand conditions and were calculated for 158 plots based on modelled historical deposition values and a future deposition scenario following the UNECE Gothenburg Protocol. Results show a decrease of pH until the mid-1990s on plots in all regions studied (Figure 17). The reduction of sulphur and, to a lesser extent, nitrogen deposition, which has been

shown on the monitoring plots, has led to a recovery of the pH on most of the plots. It is predicted, however, that the original pH modelled for the beginning of the last century will not be reached again until 2050.

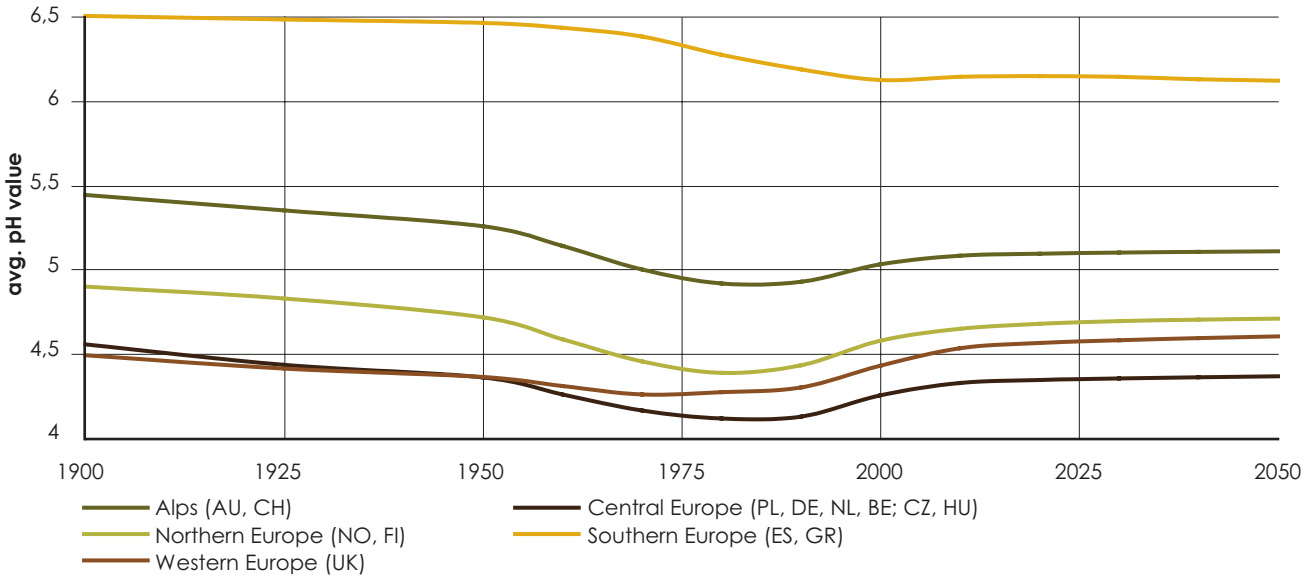


Figure 17. Modelled soil solution pH for 158 intensive monitoring plots located in 13 countries in Europe, 1900–2050

Note: Country groups are different from country assignments to MCPFE regions

Indicator 2.3. Defoliation

Defoliation of one or more main tree species on forest and other wooded land in each of the defoliation classes – "moderate", "severe" and "dead"

Crown condition is a fast-reacting indicator for numerous environmental factors affecting tree vitality. Under the joint EU/ICP Forests Programme, defoliation surveys are carried out annually using a harmonized and representative approach. In 2006, crown condition was assessed on a representative sample of 6 045 plots covering 129 880 trees.

In addition to air pollution, the variability of defoliation can be explained by tree age, weather extremes and biotic factors such as insect infestation and fungal disease. On a large scale, the current state of crown defoliation does not lead to a depression of tree growth. However, in large parts of Europe, favourable soil conditions and nutrient cycles can only be maintained by human interventions such as liming. The observed levels of defoliation may therefore indicate that trees have a reduced potential to withstand adverse environmental impacts.

Situation

In 2006, 21.9 percent of all trees assessed showed a needle or leaf loss of more than 25 percent and were thus classified as either damaged or dead. European and sessile oak had the highest share of damaged and dead trees at 34.9 percent.

The spatial variation of defoliation shows a scattered pattern within Europe; the small-scale variability indicates that tree vitality can be a critical issue at the local level.

Trends

In addition to the interpretation of current state, the changes of defoliation over time provide insight into tree vitality. A peak of mean defoliation was observed for most of the main tree species in 2004 an d 2005 (Figure 18). This peak was not a reaction to air pollution, but a natural reaction of trees to extreme heat and drought occurring in large areas of Central Europe. Also, the increasing defoliation of holm oak and maritime pine in southern Europe was most likely a reaction to successive drought years. Figure 18 shows that the mean defoliation of trees mainly varies from 5 to 27 percent over the 1990–2006 period.

During the past ten years, no change of defoliation levels was observed on two-thirds of the sites. The share of sites with increasing defoliation was much larger (24.6 percent) than the share of plots with decreasing defoliation (9.7 percent). Figure 19 shows that changes in defoliation levels cannot be related to specific regions. This can partly be explained by the natural variability of site conditions and their associated buffering capacities, as well as by the variability of spatial abundance of individual tree species, which react differently to changing site conditions.

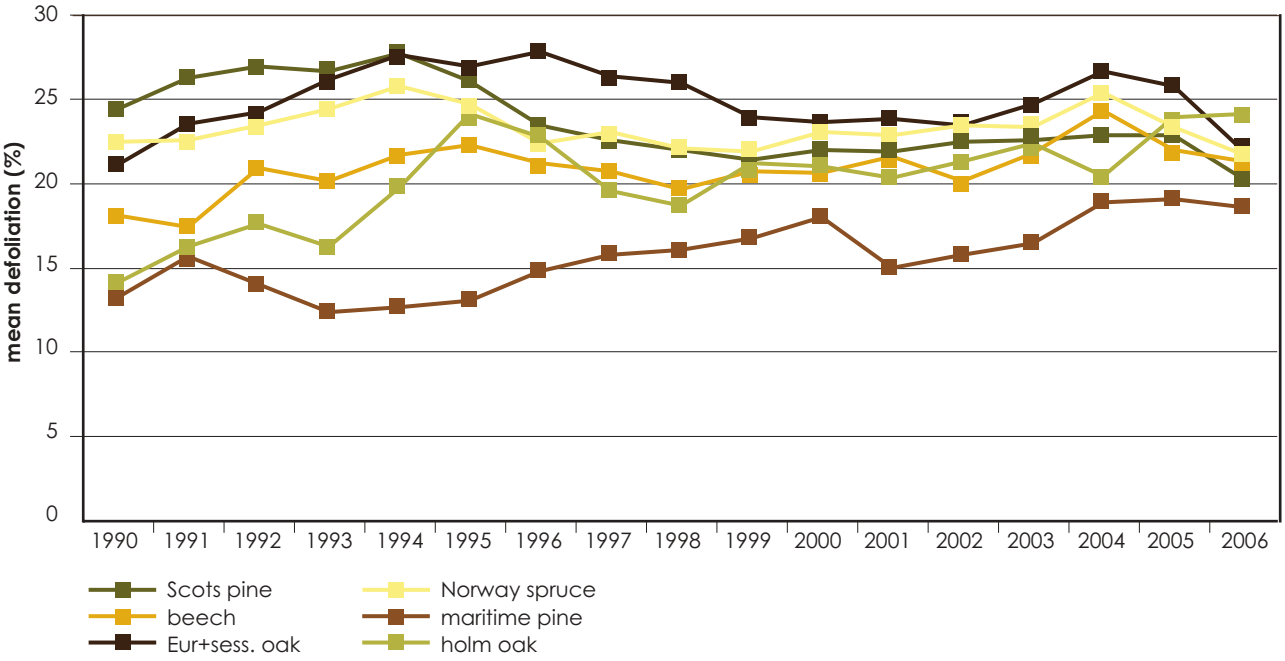


Figure 18. Mean defoliation for the most frequent tree species, 1990–2006

Note: Samples only include countries with continuous data submission

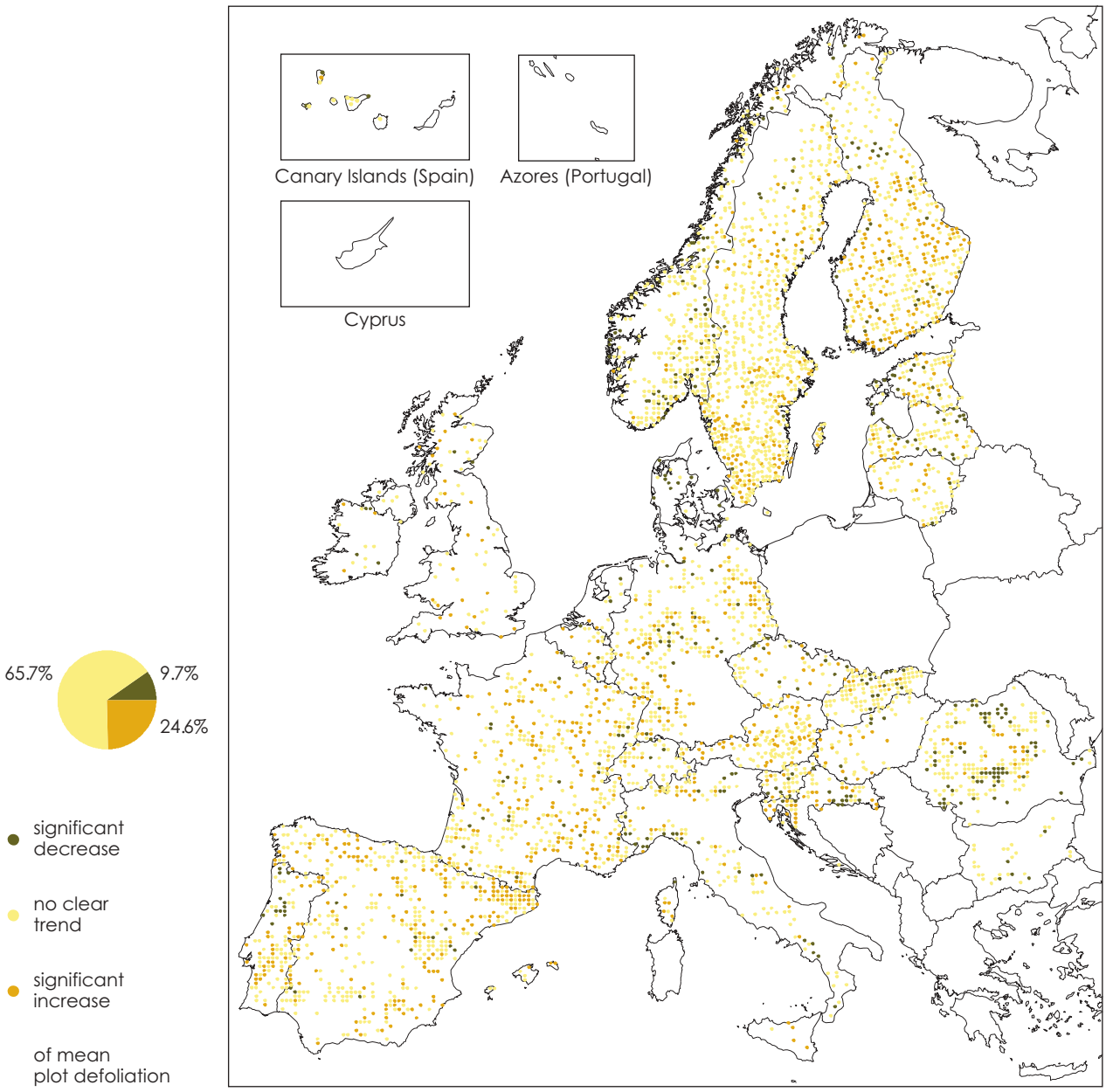


Figure 19. Plot-wise development of defoliation for all tree species, 1997–2006

Note: In some countries and regions of Europe shifts in plot locations hindered the calculation of plot-wise changes; these plots are not depicted

Indicator 2.4. Forest damage

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

Several damaging agents affect forests in Europe. The agents can be biotic or abiotic, of natural origin or human-induced. Biotic agents include insects and diseases, wildlife and cattle grazing in woodland. Abiotic agents include fire, storm, wind, snow, drought, mudflow and avalanche. Damages by biotic and abiotic sources are an essential component of natural ecosystems, since they foster processes such as regeneration, selection, adaptation and evolution. In managed forest ecosystems, however, damages often results in economic losses. Human-induced, long-range impacts on the environment, such as air pollution or climate change, expose forests to aggravated risks; reduced health and vitality of forests may promote a cascade of damaging effects and hinder the sustainable management of forests.

Situation

Damaged forest area

Within the MCPFE region, the response rate for the total of damaged forest areas was too low to report on meaningful findings. It may be concluded from the response rate for the Nordic region (86 percent of the total forest area) that 10 percent of the forest area within the Nordic region is affected by damages.

Insects and diseases

Heavy attacks of insects and phyto-pathogens (bacteria, viruses, fungi) may cause major impacts on forests, resulting in a risk for forest ecosystem health and vitality, and economic loss. Insect populations are also likely to react to long-term change processes such as climate change. Furthermore, biotic damages may result in deterioration of tree condition, not only in the year of occurrence, but also in later years. In particular, the heavy storm damages and the drought occurring in large parts of Europe in 2003 increased the risk of a mass propagation of bark beetles.

Information on the area of forest damaged by insects and diseases was provided by 27 countries (91 percent of the MCPFE region). Due to the low percentage of forest area damaged by insects and diseases in eastern Europe (0.6 percent) and the large weight of this region in the MCPFE forest area, less than 1 percent of the forest area in the MCPFE region was affected by damage caused by insects and diseases. In the MCPFE region excluding the Russian Federation, 2.7 percent of the forest area was adversely affected by insects and diseases. Except for South West Europe, where 10 percent of the area was subject to damage by insects and diseases, less than 5 percent of the respective forest area was affected in the other European regions.

Table 8. Damage by insects and diseases, 2005

Region	Reported forest area (1 000 ha)	Reported forest area (in % of total forest area)	Forest area with damage (1 000 ha)	Percent of forest area damaged (%)
Central Europe	18 218	83	610	3.3
East Europe	829 571	100	4 962	0.6
Nordic and Baltic	57 921	86	783	1.4
North West Europe	3 604	12	-	-
South East Europe	4 608	14	-	-
South West Europe	9 979	31	993	10.0
MCPFE	923 900	91	7 593	0.8
MCPFE excl. the Russian Federation	115 110	56	3 093	2.7

Note: – response rate too low for regional averages

Wildlife

Forests are the habitat for different forms of wildlife. The large abundance of wildlife populations can become a major threat to the regeneration of forests.

Except for Central Europe (65 percent) and the Nordic/ Baltic region (86 percent), data provision on forest damage caused by wildlife was poor. The forest areas affected by damages caused by wildlife exceeded 5 percent in the Nordic/ Baltic region only. Data provided for the MCPFE region, excluding the Russian Federation (for which data was not reported), indicated that roughly 3 percent of the forests are facing damages by wildlife.

Table 9. Damage by wildlife, 2005

Region	Reported forest area (1 000 ha)	Reported forest area (in % of total forest area)	Percent of forest area damaged (1 000 ha)	Forest area with damage (%)
Central Europe	14 344	65	36	0.3
East Europe	20 781	3	-	-
Nordic and Baltic	57 921	86	2 926	5.1
North West Europe	3 604	12	-	-
South East Europe	4 608	14	-	-
South West Europe	9 979	31	358	3.6
MCPFE excl. the Russian Federation*	111 236	54	3 418	3.1

Note: – response rate too low for regional averages.

* The Russian Federation did not provide data on damage by wildlife

Forest fires

Forest fires are a major threat, particularly to Mediterranean forests. While controlled burning might increase species diversity under controlled conditions, uncontrolled forest fires might have major negative consequences for the ecosystem, such as desertification, erosion, loss of water supply or economic loss.

The largest areas damaged by forest fires are found in East Europe, where 805 000 ha were burnt in 2005. However, the proportion of area burnt is slightly above 0.1 percent and thus within the range of all other European regions, except the Mediterranean area, where countries reported that 1.3 percent of the forest area was damaged by fire. The data on burnt areas for the EU-27countries have been taken from the European Forest Fire Information System (EFFIS) database, a joint effort of the European Commission and EU Member States, which is hosted by the EU Research Centre in Ispra, Italy. This resulted in additional information and changes to the data provided through the MCPFE Enquiry for countries in South West Europe.

Table 10. Damage by forest fires, 2005

Region	Reported forest area (1 000 ha)	Reported forest area (in % of total forest area)	Forest area with damage (1 000 ha)	Percent of forest area damaged (%)
Central Europe	22 073	100	8	n.s.
East Europe	829 571	100	805	0.1
Nordic/Baltic	66 808	99	2	n.s.
North West Europe	26 630	85	21	0.1
South East Europe	22 627	69	12	0.1
South West Europe	31 677	100	413	1.3
MCPFE	981 611	97	1 261	0.1
MCPFE excl. the Russian Federation	172 821	84	549	0.3

Note: n.s. not significant

Storm

Storm damages is also a serious threat to forest and other wooded land, possibly causing losses of timber yield, landscape quality and wildlife habitat. Since 1990, Europe has experienced several heavy storms. In December 1999, catastrophic storms felled 165 million m^3 of timber, mainly in France, Germany, Switzerland and Scandinavia equivalent to 43 percent of the regular annual harvest. In 2005 in Sweden, 75 million m^3, equivalent to one year's cutting, were damaged by storms. The economic consequences of storm damage can be severe. After the recent storm damages in 2007, the German Forestry Council estimated that the storm toppled some 20 million m^3, which

would cost the country's forestry industry about EUR1 billion in lost revenue and damages. In the case of non-site-adapted forest stands, however, the impacts may be evaluated as less serious than in the case of natural, semi-natural or site-adapted forest stands, since necessary reforestations may lead to site-adapted forests in the future.

The largest area affected by storm damage was reported by the Nordic and Baltic region for 2005 amounting to 1 638 000 ha (2.8 percent of the forest area). The largest proportion of forests damaged by storm (6.1 percent of the forest area) is found in South West Europe. The catastrophic storm events of 2007 are not included in Table 11.

Table 11. Storm damage, 2005

Region	Reported forest area (1 000 ha)	Reported forest area (in % of total forest area)	Forest area with damage (1 000 ha)	Percent of forest area damaged (%)
Central Europe	7 791	35	126	1.6
East Europe	20 781	3	160	0,8
Nordic and Baltic	57 964	86	1 638	2.8
North West Europe	19 827	63	8	-
South East Europe	4 608	14	13	0,3
South West Europe	9 979	31	605	6.1
MCPFE	120 949	59	2 551	2.1
MCPFE excl. the Russian Federation	120 949	12	-	-

Note: – response rate too low for regional averages

Human-induced damages

Direct human-induced damage factors include harvesting and forest operations damage, which may cause severe economical losses and decrease of the ecosystems' health and vitality (decrease in timber quality, rot, decay, destruction of natural regeneration, soil degradation).

Intensive tourism and recreational activities also impact forests and other wooded land, causing negative side effects such as contamination and vandalism. Human-induced damages by unidentifiable causes comprise damages from air pollution (see indicator 2.1), traffic and cattle rearing.

Damages from forest operations and other human-induced sources occur on less than 1 percent of the forest areas. Given the low response rates to the 2006 Enquiry, no differences between country groups could be found.

Trends 1990–2000 and 2000–05

The areas affected by storm damage and wildlife increased consistently over time in all European regions. In the Nordic/Baltic region the area damaged by wildlife increased by more than 10 percent between 2000 and 2005. By contrast, the areas affected by fire decreased in the last five years in all European countries except Spain and Portugal (Figure 20). In the MCPFE region, the forest area affected by insects and diseases increased by roughly 5 percent from 1990 to 2005. However, a non-uniform development was found in the different regions. For all other damaging agents, the impact was too small to show any trends over time.

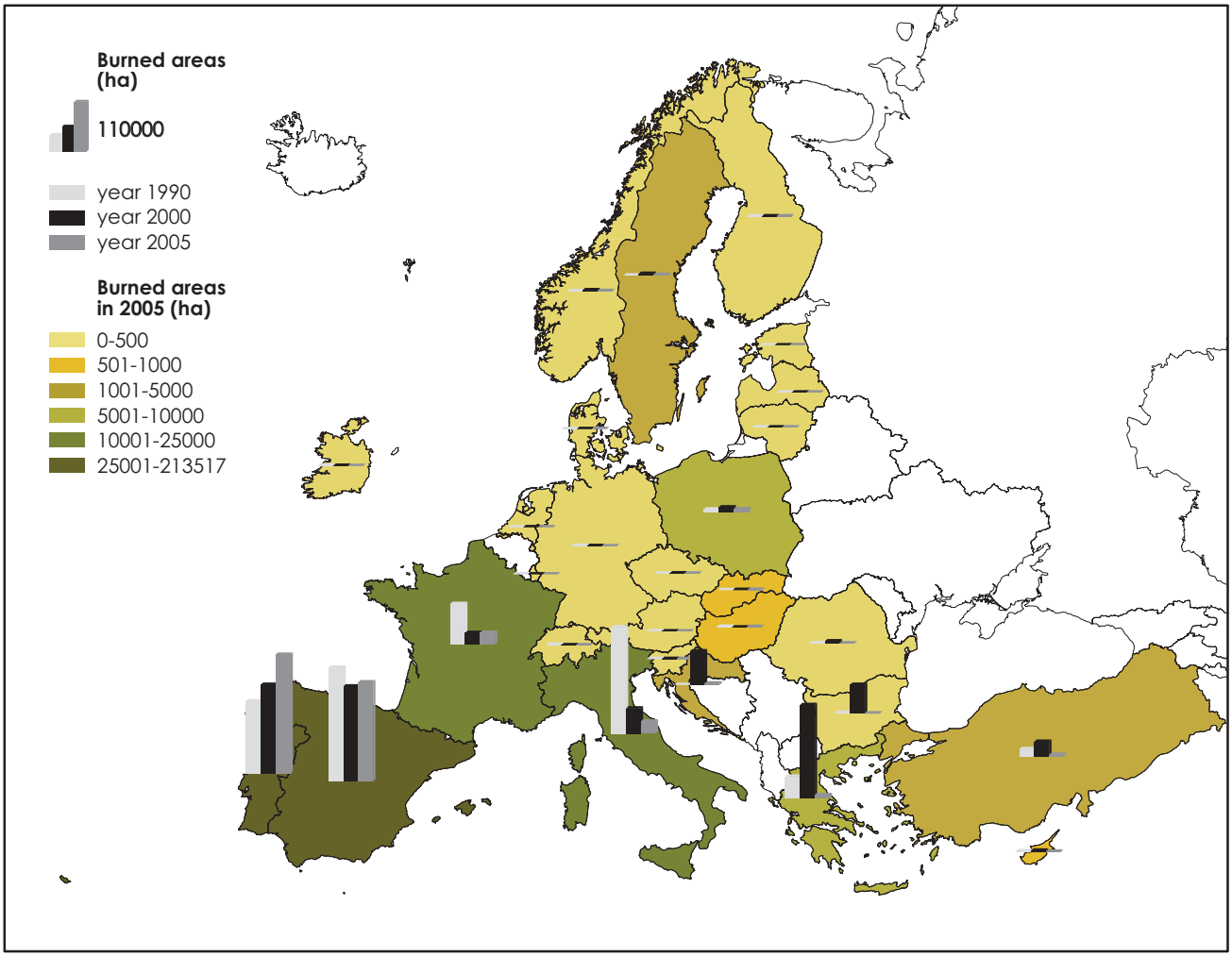


Figure 20. Forest area affected by fire

Source: EFFIS, 2005

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

Volumes of wood harvested in Europe's forests are increasing, but remain considerably below increment.

Harvesting of wood has steadily increased over the last ten years. The forests are growing at an unprecedentedly high and increasing rate that is well above the volume harvested, so the amount of wood in forests continues to increase.

Forests provide a wide variety of goods and services other than wood.

The economic value of non-wood goods and services (NWGS) provided by forests is increasing, but often they are not marketed. In some European regions, NWGS provide more revenue than wood sales.

98 percent of all European forests are covered by a forest management plan or equivalent.

European forest areas are almost completely covered by plans for their long-term management.

Key findings by Indicator

3.1. Increment and fellings

Harvesting of wood has steadily increased over the last ten years, but has not yet reached the level of 1990. Since European forests grow at an unprecedented high and increasing rate that is well above the volume harvested annually, the amount of wood available in forests has continued to increase.

3.2. Roundwood

European forests are among the primary wood producers in the world. The overall value of marketed roundwood is EUR12 415 million in 2005, more than half of which comes from Sweden, Finland and the Russian Federation.

3.3. Non-wood goods

The economic importance of non-wood goods provided by forests is increasing, but often they are not marketed; mushrooms, Christmas trees and cork are the most valuable marketed non-wood goods.

3.4. Services

Forest-related services are well identified, but it is often impossible to separate marketed from non-marketed services. The only well-documented marketed services are hunting and fishing licences.

3.5. Forests under management plans

European forest areas are almost completely covered by forest management plans or equivalent for their long-term management.

Indicator 3.1. Increment and fellings

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

Situation

The balance between net annual increment and annual fellings of wood on forest available for wood supply (FAWS) aims at highlighting, on a quantitative base, the sustainability of wood production over time, as well as the current availability of wood and the potential for the future. The following data refer to FAWS, while the report *State of Europe's Forests 2003* (MCPFE, 2003) referred to FAWS for felling data, and to forests and other wooded lands for the annual increments.

The total net annual increment (NAI) from FAWS in the countries with available data for 2005 amounts to 1 350 million m^3 (798 million m^3 excluding the Russian Federation). Most of this volume comes from the Russian Federation (about 41 percent of the MCPFE region) and Germany, France, Finland and Sweden, whose contribution represents about 30 percent of the MCPFE region, more than half of the MCPFE region excluding the Russian Federation. The values of net annual increment per ha tend to follow a geographical gradient, increasing from north east to south west due to more favourable climatic and growth conditions. The increment per ha reported for the Russian Federation is low compared to other MCPFE countries. The Russian definition for increment differs from the net annual increment definition used in most other countries. Using a harmonized definition, the increment in the Russian Federation would be higher, even for the vast forest areas that are in colder regions.

The annual fellings on forest available for wood supply in Europe are about 686 million m^3 for the 36 countries providing data for 2005. Figure 21 shows the five countries with the largest volume of fellings in 2005 (the Russian Federation, Sweden, Finland, Germany and France). These countries alone account for 65 percent of the total fellings from all MCPFE countries; this value reaches 70 percent with the contribution of Poland (the sixth country in order of the largest volume of fellings).

Trends:1990–2000 and 2000–05

The 1990–2000 and 2000–05 trends for the MCPFE region are reported in Table 12. The analysis covers 28 countries, which provided net annual increment values for all the three reporting years. Excluding the Russian Federation, these countries account for 70 percent of the total forest area in MCPFE countries. In general, the overall result for Europe has improved. There are several likely reasons for this increasing trend. Natural and artificial forest expansion took place in many European countries over the last 50 years and these stands are now in an optimal growing phase. Stands are composed of tree species with remarkable productivity, and more effective forest management regimes in regions practising intensive forestry are promoting forest growth. Environmental changes such as increased nitrogen deposition, rising temperatures and atmospheric CO_2 concentration also play a role, but a sound quantification of their contribution on a continental scale cannot yet be established. NAI is decreasing in East Europe only, with a negative change rate since 1990, strongly influenced by the trend observed for the Russian Federation.

From 2000 to 2005, the volume of the annual fellings increased for the Russian Federation, Sweden and Germany, while it has decreased for Finland and France.

Table 12. Trends of net annual increment on FAWS for reporting MCPFE countries, 1990–2000 and 2000–05

Region	Net annual increment			Annual change rate			
	1990	2000	2005	1990–2000		2000–05	
	10^6 m³/yr			10^6 m³/yr	%	10^6 m³/yr	%
Central Europe	43.27	49.80	52.66	0.65	1.42	0.57	1.12
East Europe	688.69	599.41	596.70	-8.93	-1.38	-0.54	-0.09
Nordic/Baltic	217.59	225.53	240.93	0.79	0.36	3.08	1.33
North West Europe	110.08	126.44	131.33	1.64	1.40	0.98	0.76
South East Europe	82.60	89.34	91.07	0.67	0.79	0.35	0.38
South West Europe	26.30	31.84	38.32	0.55	1.93	1.30	3.78
MCPFE	1168.52	1122.37	1151.00	-4.62	-0.40	5.73	0.51
MCPFE excluding Russian Federation	523.69	568.83	598.34	4.51	0.83	5.90	1.02

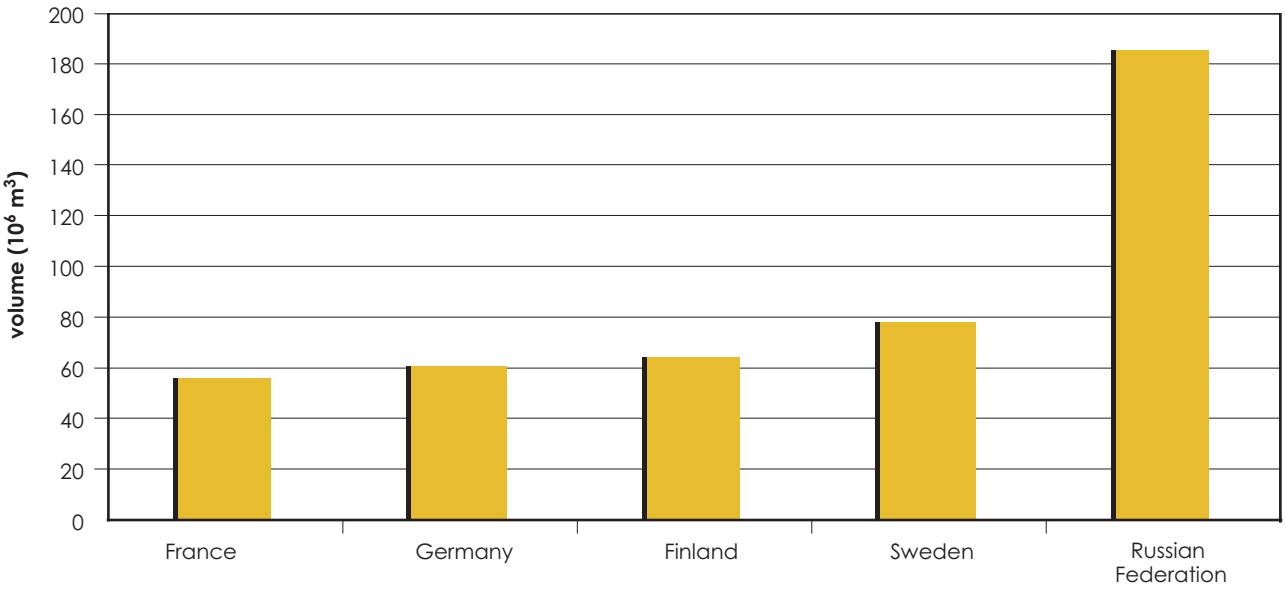


Figure 21. The five MCPFE countries with the largest volume of fellings, 2005

The overall trend of fellings, based on the data from those MCPFE countries that reported annual fellings for all reporting years (35 countries), is shown in Table 13. From 1990 to 2005, an annual change rate of –0.63 percent is shown. Data before 2000 might have been influenced by storms: parts of Europe experienced heavy storm fellings in 1991, 1992 and 1999. In particular, France, Switzerland, Denmark and Germany were severely hit by storm damages and harvested volumes increased in the years following the storms. From 2000 to 2005, wood removals increased for Europe as a whole; this was led by a strong rebound in the Russian Federation, where wood removals had declined sharply in the 1990s.

Figure 22 and Figure 23 show the annual fellings compared to the annual increments of MCPFE countries with both data available. These figures show the level of sustainability of wood production over time. Long-term sustainability requires the volume of growing stock to be maintained or enhanced, and the gross annual increment in growing stock must exceed the harvested volume. The difference between increment and fellings must compensate for the volume of unrecovered natural losses (e.g. fire, grazing, etc.) and the volume of stands left without any natural or artificial regeneration after harvesting.

Table 13. Trends of annual fellings on FAWS for reporting MCPFE countries, 1990–2000 and 2000–05

Region	Annual fellings			Annual change rate			
	1990	2000	2005	1990–2000		2000–05	
	10^6 m³			10^6 m³/yr	%	10^6 m³/yr	%
Central Europe	47.92	62.36	70.47	1.44	2.67	1.62	2.48
East Europe	361.93	185.92	214.08	-17.60	-6.44	5.63	2.86
Nordic/Baltic	142.84	185.10	179.87	4.23	2.63	-1.05	-0.57
North West Europe	113.25	126.49	133.57	1.32	1.11	1.42	1.10
South East Europe	44.09	39.14	42.70	-0.49	-1.18	0.71	1.75
South West Europe	40.84	39.11	42.48	-0.17	-0.43	0.67	1.67
MCPFE	750.86	638.13	683.17	-11.27	-1.61	9.01	1.37
MCPFE excluding Russian Federation	410.86	472.13	497.17	6.13	1.40	5.01	1.04

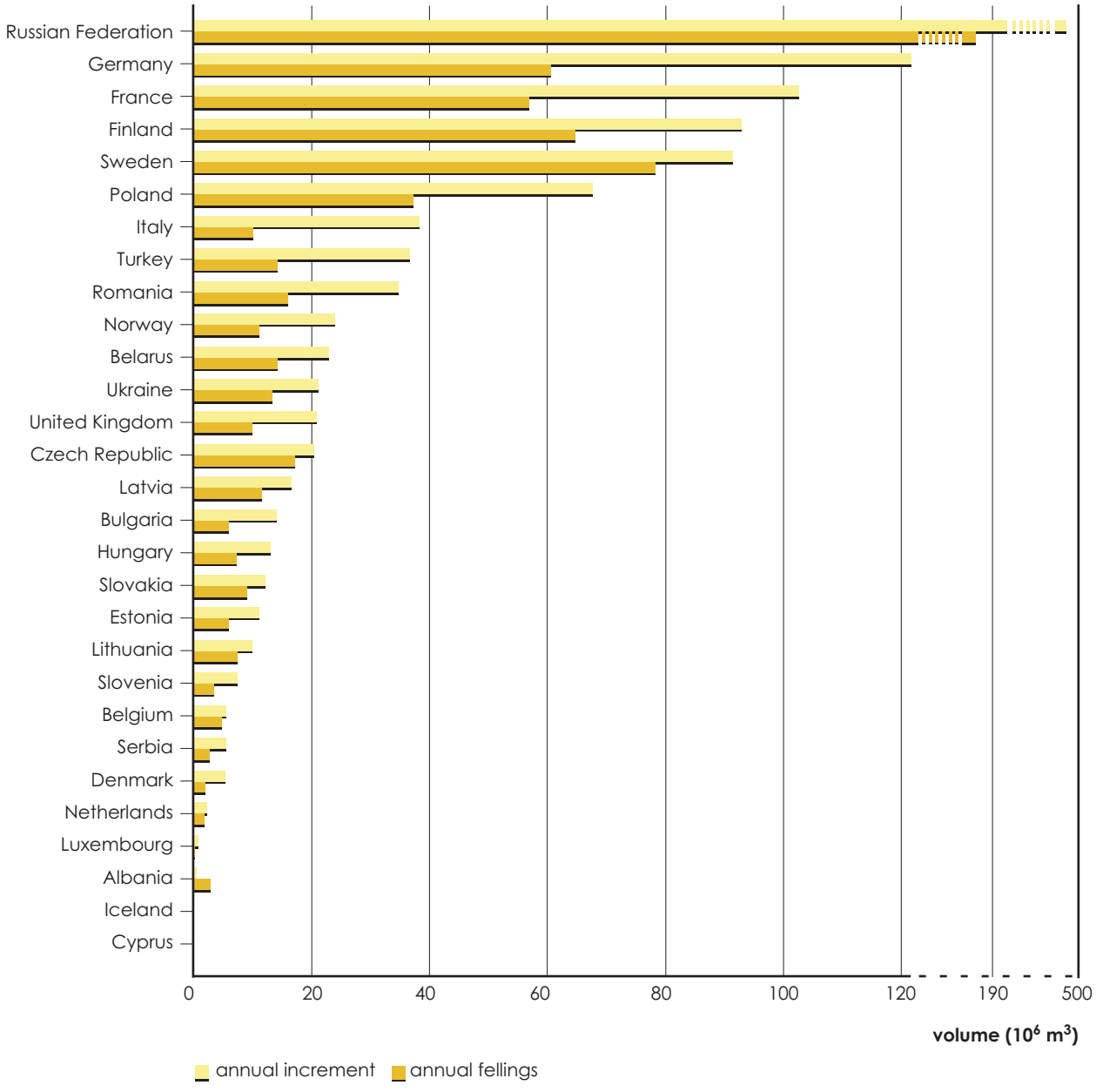


Figure 22. Annual fellings and annual increment for MCPFE reporting countries (million m³)

For the 29 countries that provided both annual fellings and NAI data, the utilization rate is 52 percent (excluding Albania, where the utilization rate exceeds 500%); this rate reaches 58 percent without the Russian Federation. This value is much higher than the previous rate (27 percent, MCPFE, 2003). It should be taken into consideration that the previous rate was computed from NAI of the whole forest and other wooded land, whereas fellings were calculated by FAWS only. Except Albania, all the MCPFE countries report a utilization rate lower than 100 percent. In general (with few exceptions), the ratio of fellings to NAI is over 50 percent in countries in Northern and Central Europe, while it is lower than 50 percent for countries in South East Europe. The ratio reported for the Russian Federation is remarkably low, at 34 percent.

The overall trend of the utilization rate, based on the data from the MCPFE countries that reported both annual fellings and NAI for each reporting year (25 countries), shows a decrease from 57 percent in 1990 to 52 percent in 2005. Considering the increasing demand for wood for energy, the utilization rate could still increase without threatening sustainable forest management.

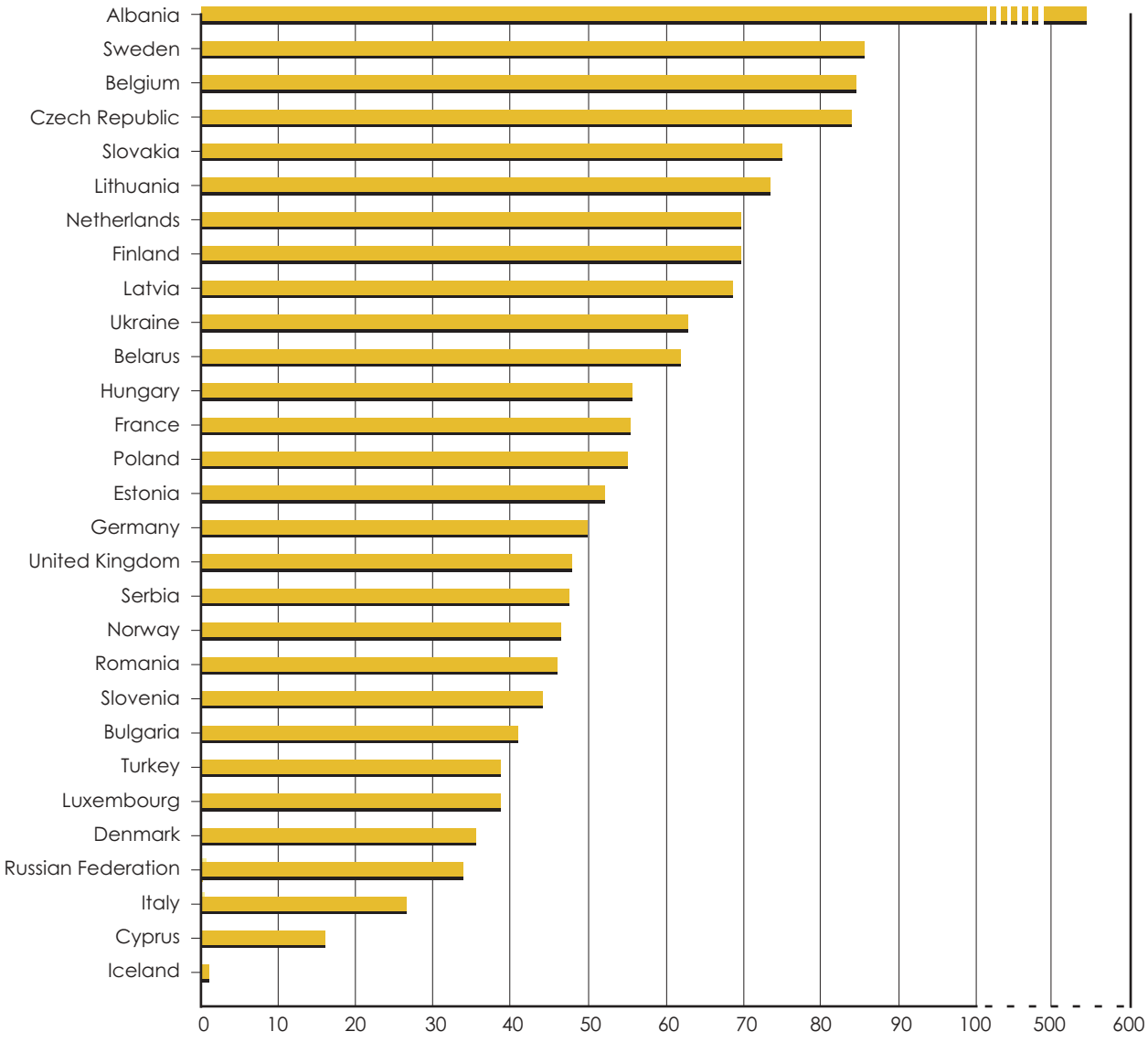


Figure 23a. Utilization rate (annual fellings expressed as a percentage of the annual increment) for MCPFE countries (based on available data)

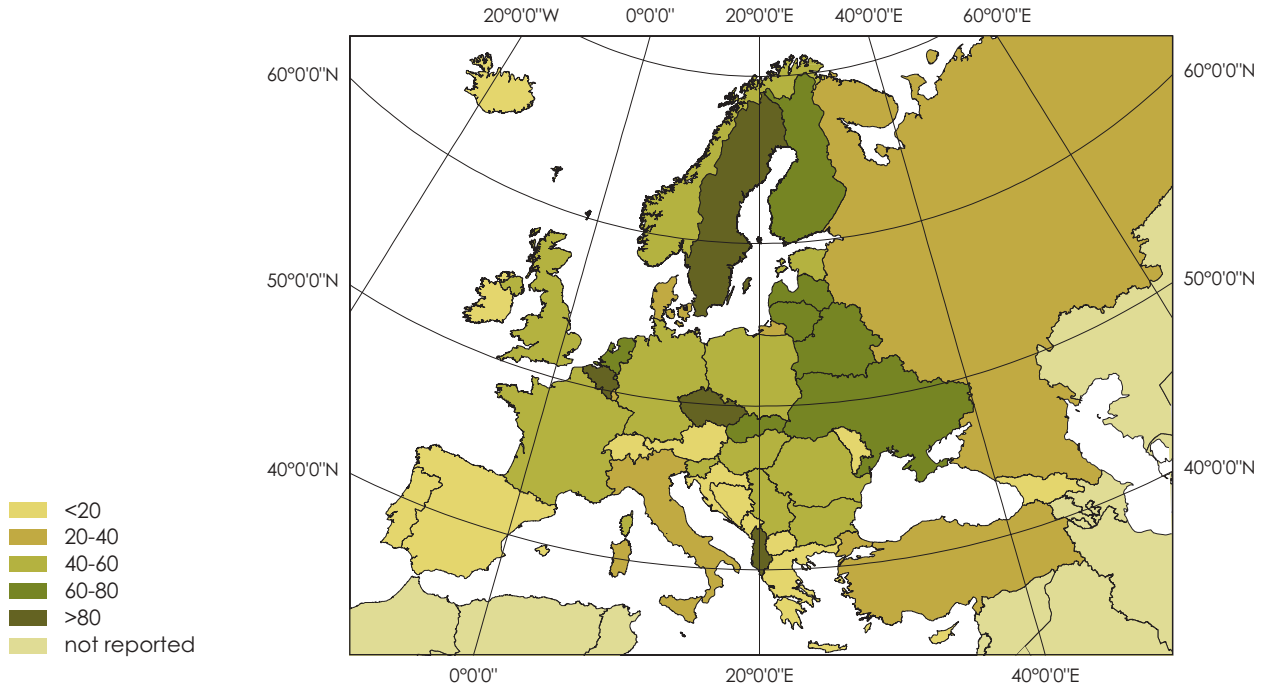


Figure 23b. Geographical distribution of utilization rate for MCPFE countries (based on available data)

Indicator 3.2. Roundwood

Value and quantity of marketed roundwood

Situation

Marketed roundwood figures give direct information about the maintenance of a sustainable supply and trade of wood products from the forest sector. This supply is a direct contribution to the income of the forest owner and an indicator of a part of the total contribution of forests to national economies.

Marketed roundwood comprises logs, fuelwood and pulpwood. Data were provided by 34 countries (some countries presented data derived by adjustments and modelling). Quantity and economic value of marketed roundwood for the MCPFE countries are shown in Figure 24 and Figure 25.

European forests are among the primary wood producers in the world. Sweden (98.3 million m^3), the Russian Federation (92.7 million m^3) and Finland (46.3 million m^3) supply more than 54 percent of the marketed roundwood reported. Total marketed roundwood amounts to 439.4 million m^3. This figure represents 14 percent of total world production (FAO, 2006). It must be also taken into account that the reported marketed roundwood is underestimated, because Germany, the third European producer in 2000, with a quantity of marketed roundwood larger than Finland and France, has not provided data for 2005. According to FAOSTAT, Germany's production would amount to almost 57 million m^3. Furthermore, some of the European countries mentioned that much of the merchantable wood cannot be harvested for economic or protection reasons. The total value of marketed roundwood was EUR 12 415 million in 2005, more than half of which comes from Sweden, Finland and the Russian Federation. The lower income of the Russian Federation with respect to Finland and Sweden can be related to the lower quality of timber.

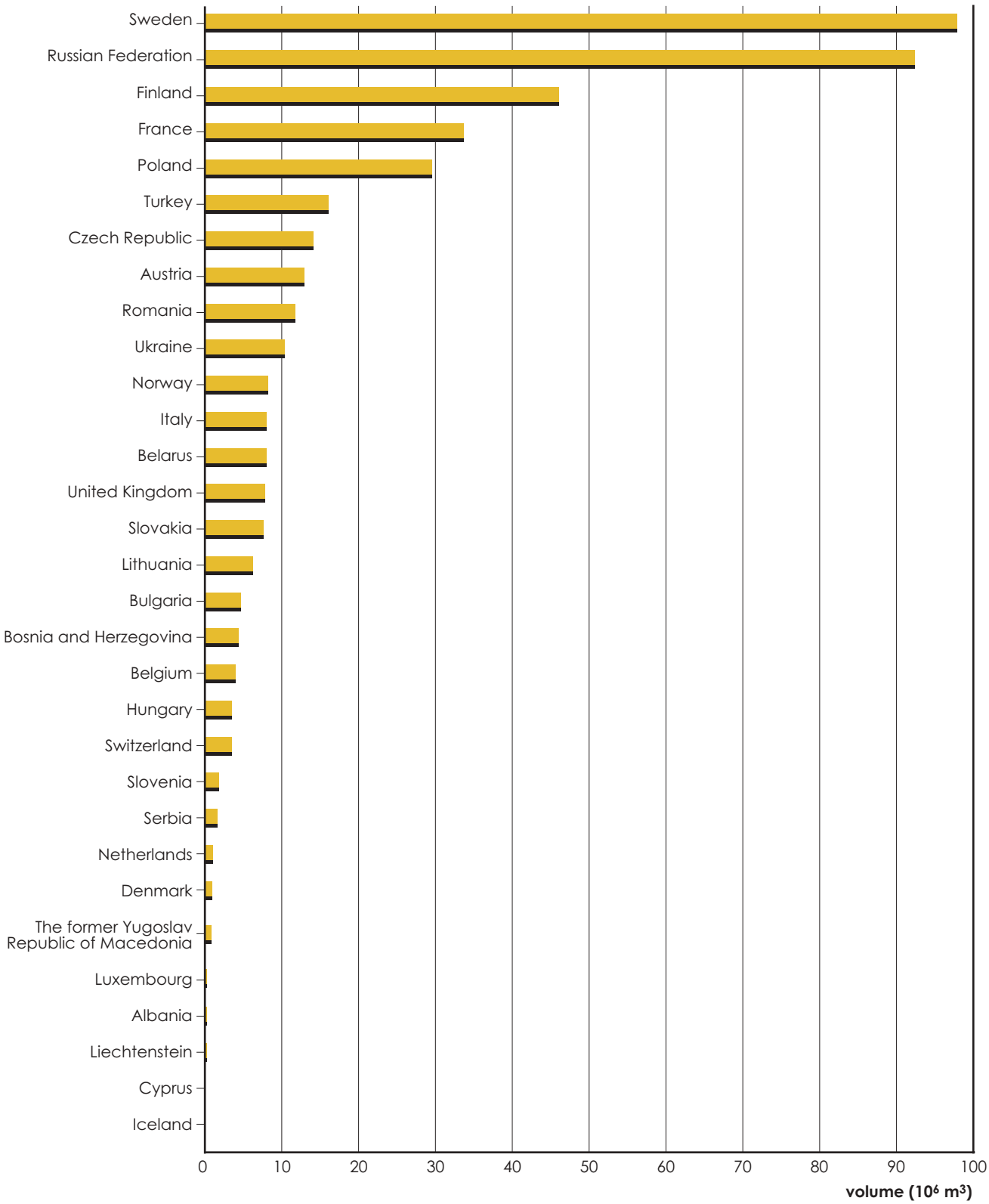


Figure 24. Quantity of marketed roundwood for those MCPFE countries with available data (million m^3)

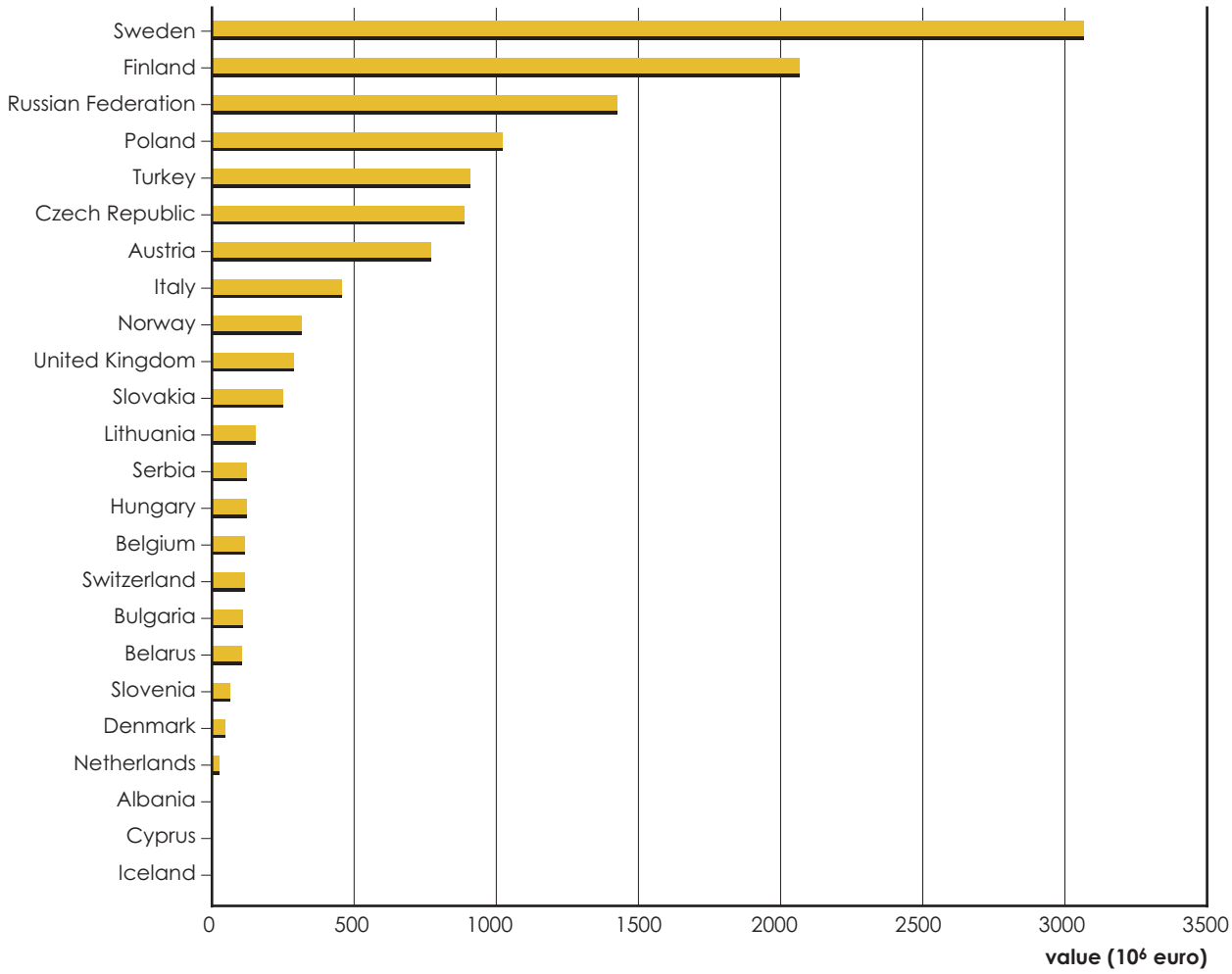


Figure 25. Value of marketed roundwood for those MCPFE countries with available data (EUR million)

Trends:1990–2000 and 2000–05

The marketed roundwood trends are reported for the 31 MCPFE countries with complete 1990–2000–2005 time series for volume and by 23 countries for value. During this period, fluctuations can be shown in many countries, associated with severe storms and changing and transitional socio-economic conditions. Storm fellings generally changed harvesting patterns, rendered trade regulations on forest products necessary, and had impacts on the supply of roundwood, timber prices, and environmental regulations. However, in some countries, environmental and work safety regulations have been temporarily relaxed in order to promote fellings from damaged forests. Economic growth also explains a considerable part of the short-term fluctuations of marketed roundwood value and some jumps in production and consumption. The magnitude of these sharp increases varies considerably between countries and regions, according to how other economic sectors were simultaneously affected and the ability of the respective economies to deaden the impact (Figure 26).

An overall positive 1990–2005 trend for the incomes from marketed roundwood (1.65 percent) can be highlighted. Between 2000 and 2005 there was an overall increase of the marketed roundwood of almost 2 percent for the above-mentioned 31 MCPFE countries after the negative trend observed in the 1990–2000 period. On the regional level, North West Europe (due to Germany lacking data), the Russian Federation, and South West Europe present negative trends.

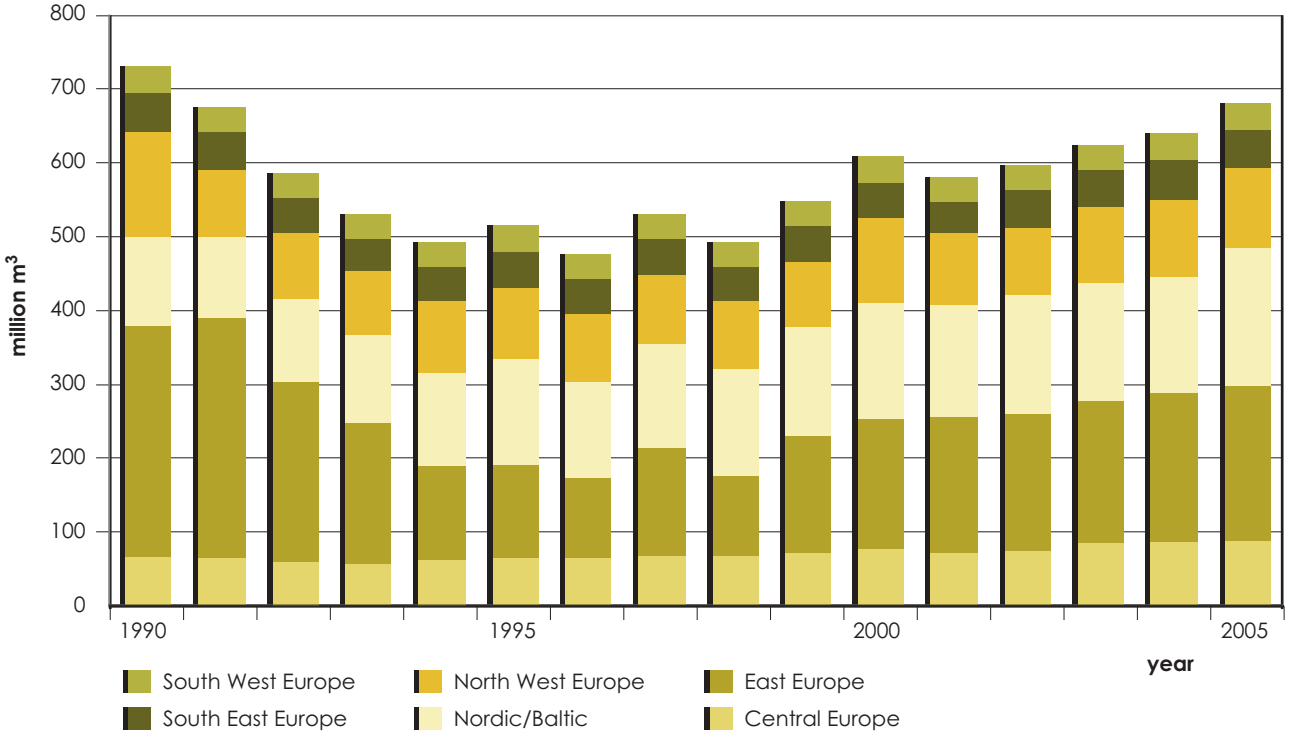


Figure 26. Annual trend of roundwood removals for MCPFE regions (FAOSTAT)

Indicator 3.3. Non-wood goods

Value and quantity of marketed non-wood goods from forest and other wooded land

Situation

Throughout the world, forests provide not only woody materials, but also a large variety of non-wood products. In many countries outside Europe, non-wood forest products (NWFPs) are one of the main sources of subsistence for rural populations. A substantial amount of non-wood goods is harvested for self-consumption and does not enter markets. This proportion of non-wood goods is not considered in this report, as indicator 3.4 covers only marketed NWFPs. It excludes non-wood goods harvested for self-consumption (subsistence) and other forms of uses without any market transaction.

In the available datasets, the main NWFPs are identified as follows: Christmas trees, mushrooms and truffles, fruits, game products, snails, ornamental plants, honey, cork, medicinal or colorant products, seeds of forest tree species, and litter racking for cattle breeding.

NWFPs therefore often have an important economic value with regard to forest economics and sustainable forest management; however, it must be considered that, depending on national laws, the income of, for example, berry-picking, might belong to the berry picker and not necessarily to the forest owner. Data on the quantity and value of marketed NWFPs were provided by 32 countries, despite the fact that comprehensive data are limited in most countries. At best, some countries collect data on the most important products or have data on commercial production or exports. Most of the remaining MCPFE countries are from East or South East Europe with strong rural traditions in which NWFPs are of important use. Some countries with very large forest area and/or with well-known traditions in NWFP consumption (e.g. mushrooms in France, cork in Portugal) only responded to a part of the enquiry. Since NWFPs are not considered economically important in many countries, and due to the difficulties and costs of collecting reliable data, many countries do not collect and report on them.

For many NWFPs, personal use accounts for the largest share of use; other uses include products such as Christmas trees and cork. At the same time, it can be seen from the values of NWFP that they can be an important source of income; the reported total amount of NWFP value almost reaches EUR 870 million for the MCPFE region, which is definitely an underestimation of the real value due to the poor response rates. Even where production data are available, estimates are seldom based on recurring inventories. This kind of survey cannot incorporate the value chain of the product, which is vastly more important than the absolute quantity of each product.

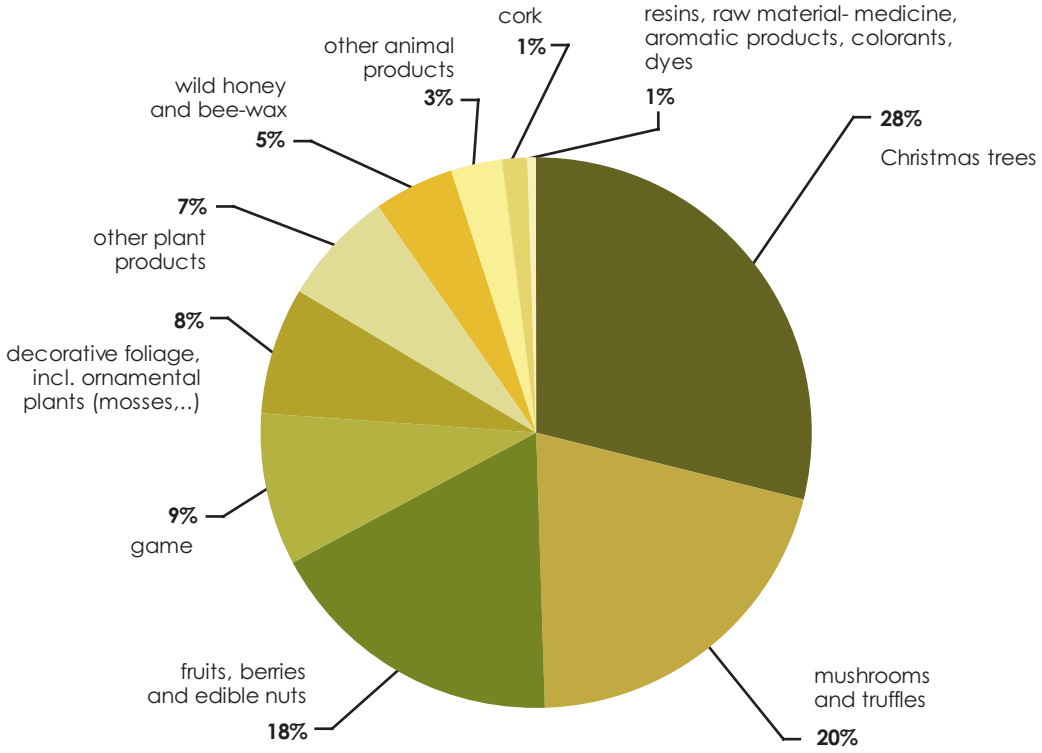


Figure 27. Marketed non-wood forest products (NWFPs) from forest and other wooded land in Europe. Share of total value in countries (based on available data)

A huge difference between some NWFPs in the value chain should be noted. For example, as soon as harvesting occurs, Christmas trees need no successive preparation before sales. On the contrary, after harvesting, cork needs further industrial processing to transfer it into a marketed product. These examples demonstrate the differences between the value generated from raw materials and the entire product chain.

Trends:1990–2000 and 2000–05

NWFPs can be measured in different ways, such as weight, volume and/or monetary value. In order to provide comparability between products and years, all figures reported on trends are based on monetary value (Figure 27). Christmas trees, mushrooms and fruits are the NWFPs with the highest value. Christmas trees account for almost 30 percent of the total reported value of non-wood forest products and are considered at the limit of actual forest production. Twenty-two countries, mainly in northern, eastern and central Europe, report data on Christmas tree production and its value. Christmas tree production mainly includes fir, spruce and pine trees from Christmas tree plantations as well as the harvest of individual trees from other forest areas. In many countries, Christmas tree plantations are not included as part of the forest area, but are classified as agricultural land. From the value point of view, the main producers of Christmas trees from forests are Denmark and the United Kingdom. It should be noted that many other countries have an important

production, from the volume point of view, but a low total value due to the poor unit value in in the country. All countries report a stable or increasing total value; for all MCPFE reporting countries combined, reported data show a stable overall change rate of 4.8 percent for the entire 1990–2005 period.

Mushrooms and truffles were reported by 21 countries, which accounts for 20 percent of the total value. This category covers a wide variety of species. The most popular mushrooms are chanterelles, boletus, matsutake and morels; products from mushroom farms are excluded. Many countries responded that a large part of mushrooms harvest is carried out for personal consumption and available to the public at no charge. Moreover, harvests fluctuate annually because mushrooms are sensitive to climatic variations. Among responding countries, Bulgaria is the top mushroom producer in terms of quantity, but due to a higher value per tonne, Serbia and Italy are the top producers in terms of value. The positive role of mycorrhizal mushrooms in the functioning and productivity of forest ecosystems has been known for many decades. Continued research on the production of mycorrhizal mushrooms *(boletus, saffron milk cap, etc.)* and on the optimization of forest management should eventually strike a balance between timber production and edible mushroom production. The latter could provide extra income for forest owners in certain regions, provided that the problem of unauthorized picking can be solved locally. For mushrooms and to a greater extent, truffles, a large part of the market is totally unknown, in terms of both quantity and value.

Quantitative estimates for fruits and berries were reported by 19 countries. This category accounts for 18 percent of the total value. Similarly to the mushroom and truffle harvest, many countries reported that the main use of this resource is self-consumption. Species such as bilberry, lingoberry, cranberry, blueberries, ashberries, juniper berries and strawberries were specified. Even in this case, price per tonne of material varies according to country.

Few countries noted a decline in the traditional collection of mushrooms and berries. Some countries indicated stable or increasing demand, particularly close to urban areas. Collected data show a stable change rate for fruit harvest (5 percent) for the entire 1990–2005 period, while mushroom harvests increased from 0.2 percent for the 1990–2000 period to 4.6 percent for the 2000–05 period. Harvest of mushrooms and berries appears to be dominated by personal use. In some European countries, its collection is often identified for subsistence purposes.

It should be noted that these three categories alone, Christmas trees, mushrooms and fruits, represent 67 percent of the total value of marketed NWFPs, totalling EUR 583 million for the MCPFE reportig countries combined.

Game and other NWFPs are also an important source of income for some countries. Game comprises all hunted birds and mammals, such as partridge, pheasant, hare, deer, wild boar and chamois. The figures presented include game whose habitat is forest-related or – dependent; excluded are products produced on game farms.

Data on game harvest, meat, hides and their value were reported by 21 countries. In some countries, the commercial sale of game meat is an important economic activity. Among the reported value of non-wood products, game made up 9 percent of the total value for all responding MCPFE countries. Game meat accounts for 59 percent of the total game value (EUR 77 million). Hides represent 26 percent of the total game value. For the entire 1990–2005 period, both game meat and harvest show a decline, -2.7 percent and -6.4 percent, respectively, while hides show an increase of 2.1 percent for the same period. This negative trend can be explained by current commercial constraints and regulations that were introduced some years ago and increased the utilization by self-consumption.

Data on decorative foliage were provided by 14 countries. The data include information on decorative evergreen branches and boughs, willows, mosses, lichens, leaves, flowers and pine cones. Ornamental branches are usually taken during thinning operations and during intermediate and final cutting. As more wood is produced from special plantations, the supply is increasing with a stable change rate of 4.7 percent for the entire 1990–2005 period.

Data on cork production were reported by 18 countries. Cork oaks for professional cork production grow only in the Mediterranean region. Portugal – the main producer – unfortunately did not provide data, so the overall marketed value is seriously underestimated. The value of cork harvested is difficult to evaluate because average prices estimated on the basis of expert opinion integrate a broad range of qualities and situations. Cork oak stand management policies have long been focused on different aspects of fire prevention. In recent years, local stakeholders have expressed an interest in enhancing these policies by including a gradual return to production. Different experiments have enabled the different stakeholders to determine the conditions required for a return to production: the presence of a real production potential for cork of marketable quality; minimal facilities for access and fire protection; motivation of owners; and official control over the choice of lots and monitoring of harvests. The recent rise in the price of cork due to world shortages could provide a new and interesting opportunity for owners.

Honey production was mentioned by 15 countries, but is certainly largely underestimated. Some of them reported that the full potential of honey from forest and other wooded land is not being exploited. This production can fluctuate substantially as a result of weather conditions and can sometimes even be nil, especially for fir honey.

Data on medicinal plants were reported by seven countries. Collecting medicinal plants for traditional remedies remains an important use in some regions. Collection for personal use appears to be the dominant use of these plants, but it seems that commercial exploitation is growing in response to growing markets.

Indicator 3.4. Services

Value of marketed services on forest and other wooded land

General situation and trends

Marketed services have been gaining more and more importance in recent years. Marketed services reported are forest-dependent or mainly forest-related, but are not necessarily marketed by forest owners (e.g. eco-tourism). Forest-related means that forests constitute an essential element of the service marketed. Some categories of services can be distinguished.

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

Marketed environmental services include services related to MCPFE Indicator 4.6 (*in situ* or *ex situ* gene conservation of genetic resources) as well as MCPFE Indicator 4.9 (protected forest area), e.g. nature protection on a voluntary contractual basis with compensation or other payments from private or public bodies. This includes NATURA 2000 sites. This class also includes carbon sequestration-related afforestation projects in the context of the Kyoto Protocol.

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

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

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

Data on marketed services were reported by 18 countries even if limited in most countries. Only some countries collect or have data on the most important services. Figure 28 presents the proportion of marketed services as provided by countries. However, only a few countries reported on all categories of services and most provided data only for recreational services.

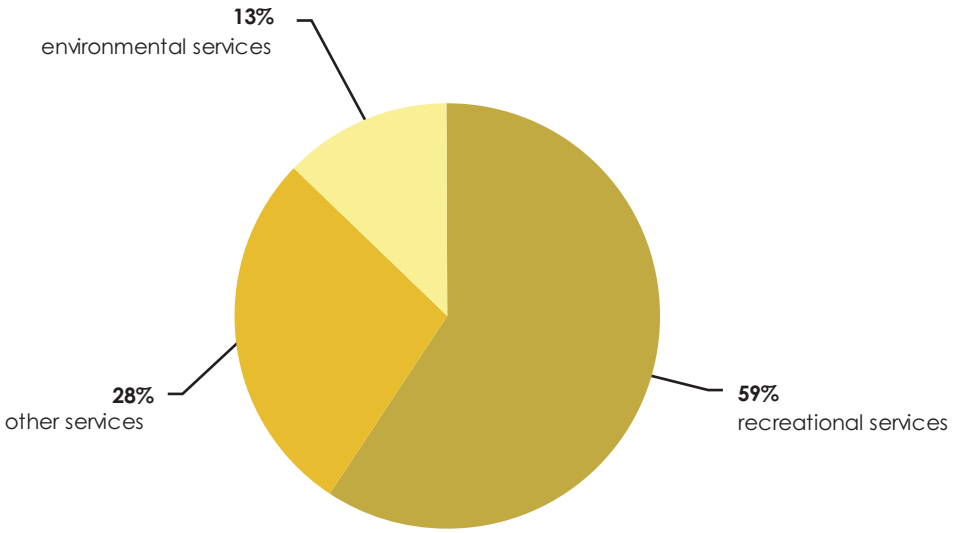


Figure 28. Marketed services from forest and other wooded land in Europe

Note: Share of total value in countries based on available data. (Protective services do not appear because they represent less than 0.2 percent of the total value)

Many countries reported numerous difficulties in quantifying marketed services value, the main reason for which is the impossibility of identifying properly marketed and non-marketed services. Many countries commented that marketed forest-related services are well identified, but income is not known or unregistered. The only well-documented marketed services are hunting and fishing licences.

The total amount of value for marketed services, considering all responding countries, is almost EUR 941 million.

Recreational services represent by far the most important value, with a share of 59 percent of the total marketed services value.

Several countries provided data on hunting licences, which are one of the most important traditional services. According to UNECE/FAO (2000), trends in hunting vary across countries: Austria, Croatia, Lithuania, and Portugal reported an increasing amount and value of hunting. Part of the increased demand in Lithuania is from foreign hunters. Stable demand was reported in Finland. The amount and value of hunting were reported as declining in the Netherlands as a result of anti-hunting sentiment. Some reasons for declining hunting participation include an increasingly urban population and time constraints.

Hunting licences can be a source of significant income for private and public landowners. The rates vary considerably across Europe and depend on the location and attractiveness of the hunting grounds.

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

Indicator 3.5. Forest under management plans

Proportion of forest and other wooded under a management plan or equivalent

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

This indicator quantifies the forest area for which a planning process has been carried out and documented in written form; the management document can be operational (management plan) or less specific (equivalent); it is often registered or approved by public authorities, but this is not a precondition. Currently, new forms of management plans are emerging, such as extensive planning of large territories for multiple uses and integration of forest, rural and landscape planning procedures. These could replace the traditional stand-based management planning in the future, but currently they are officially recognized only by a limited number of countries.

Figure 29 shows the share of forests under management plans or their equivalents for those MCPFE countries with available data for 2005. Around 98 percent of the forests in these countries are actually under management plans or equivalents. 18 countries reported that management plans or equivalents cover their entire forest area, among which 11 countries utilize only management plans but no equivalents. For South West Europe, only two countries provided information on management planning. It must be noted that in many countries, there is a trend of developing the use of the meso-scale management plan, i.e. a plan not for the forest management unit (FMU), but for a district, basin, valley, etc.

The situation in temperate and boreal forests appears to have remained stable or to have improved over the past 20 years. In the early 1980s, all areas classified as closed forests in the former Soviet Union were reported as being "managed according to a forest management plan" (UNECE/FAO 1985). In 2000, the Russian Federation and most of the States of the CIS reported that all forests were being "managed according to a formal or informal plan". Nineteen countries in Europe19 provided information on the forest management situation in the early 1980s, 1990 and 2000 (UNECE/FAO, 1985; UNECE/FAO, 1992; UNECE/FAO, 2000). The proportion of closed forests "managed according to a forest management plan" in 1980 was 64 percent; in 1990, the proportion of forests "under active management" was 71 percent; and in 2000, 95 percent of the forest area was reported to be "managed in accordance with a formal or informal management plan".

It must be emphasized that forest under management plan or equivalent is not necessarily equivalent to forest under sustainable forest management.

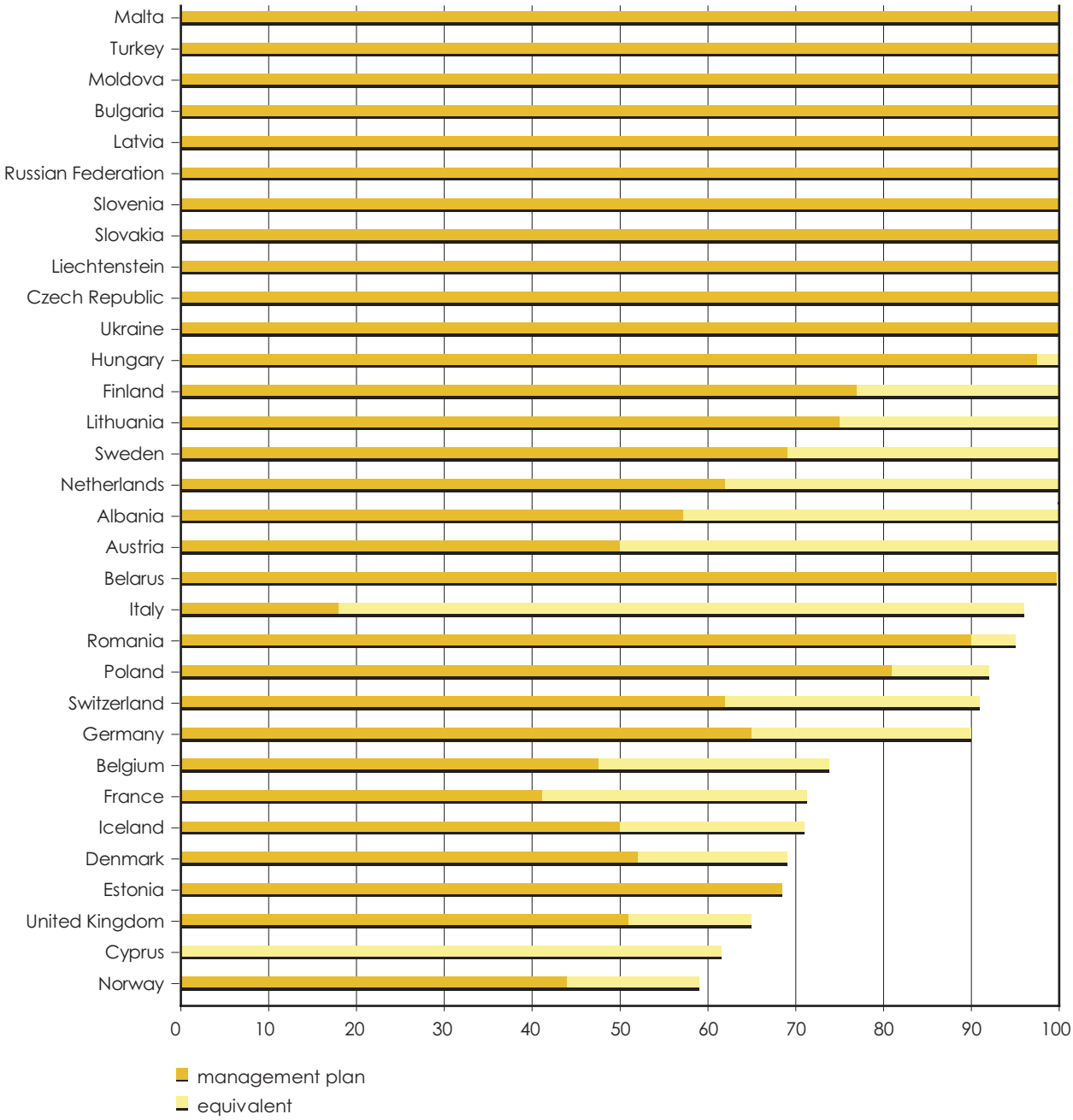


Figure 29. Share of forest area under management plans and their equivalent in European countries (%) (based on available data)

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

Forest management practices increasingly promote biodiversity.

Forest management practices have changed in ways that promote the conservation and enhancement of biological diversity, notably through the increased use of natural regeneration and more mixed species stands. Measures are also being taken to encourage deadwood accumulation.

Less than 1 percent of Europe's forests are dominated by introduced tree species.

In Europe excluding the Russian Federation, the area dominated by introduced tree species is around 4 percent. In many countries, introduced tree species are closely related to the establishment of plantations. Very few introduced tree species are invasive, and while significant in some countries, the total area of introduced tree species is not increasing.

The area of protected forests has expanded by about 2 million ha in the last five years to reach almost 5 percent of Europe's forests.

About 3 percent of Europe's forests are protected with the main objective of conservation of biodiversity and another 1.7 percent with the main objective of conserving landscapes and specific natural elements. For the MCPFE region excluding the Russian Federation, the figures are 8 percent and 10 percent, respectively. In the MCPFE region, these areas have increased by around 455 000 ha annually over the last five years.

Key findings by Indicator

4.1. Tree species composition

About 70 percent of the forests in Europe are dominated by mixed forests consisting of two or several tree species, and the remaining 30 percent are dominated by one tree species alone, mainly by conifers. The area of mixed forests has increased annually during the last 15-year period by over 1.0 percent.

4.2. Regeneration

Nearly 50 percent of the forests in Europe are regenerated by natural means (natural regeneration, natural regeneration enhanced by planting, and coppicing). The share of natural regeneration is increasing while the share of planting and seeding is decreasing. Forests dominated by conifers are mainly regenerated in west and central Europe by planting, whereas mixed forests and predominantly broadleaved forests are regenerated by natural means.

4.3 . Naturalness

Over 85 percent of forests in Europe are semi-natural. Plantations cover about 8 percent of the forest area, located mainly in North West Europe, and undisturbed forests cover about 5 percent of the forest area, located mainly in East and Nordic/Baltic Europe.

4.4. Introduced tree species

In total, about 8.1 million ha, or 5.2 percent of the total forest area, is dominated by introduced tree species, of which 10 percent are dominated by invasive species. The area of introduced tree species has remained stable during the 1990–2005 period.

4.5. Deadwood

The average volume of deadwood, both standing and lying, is about 10 m^3/ha in the forest area of the MCPFE region. However, the amount of deadwood varies considerably between the forest types, standing volume of the stands, decaying rates and vegetation zones.

4.6. Genetic resources

The area managed for conservation of forest tree genetic resources (*in situ* and *ex situ*) more than doubled from 1990 to 2005. Gene conservation and seed production efforts have been carried out for 135 tree species (including subspecies and hybrids), but the level of genetic conservation can be considered adequate only for a limited number of tree species in Europe.

4.7. Landscape pattern

A case study on the assessment methodology and preliminary results on landscape pattern over Europe has been presented. The study showed that despite stable overall forest coverage over the ten years, forest pattern has changed, and its variety in type, degree and direction over the European territory is striking. This methodology is operational and can be further developed for practical applications at various scales.

4.8. Threatened forest species

The data on threatened species by countries are very heterogeneous and does not yet allow monitoring of trends at the European level. The changes in forests are always very slow, which means that the new biodiversity orientation in forest management will be reflected in future results and trends of threatened species. In some countries the long-term monitoring of threatened forest species indicates that it has been possible to slow down the increasing trend in the numbers of threatened species by adopting new management measures in managed forests.

4.9. Protected forests

About 8 percent of Europe's forests are protected with the main objective of biodiversity and about 10 percent with the main objective of landscape protection, totalling 18 percent, or 34 million ha. The area of protected forests is expanding, especially the area designated for active management of biodiversity and landscape protection.

Indicator 4.1. Tree species composition

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

Species diversity and dynamics of forest ecosystems differ considerably throughout Europe, as reflected in the numbers and composition of tree species. Mixed forests and other wooded land, being composed of several tree species, are usually richer in biodiversity than one tree species forests and other wooded land. It must be considered, however, that some natural ecosystems have only one or two species, e.g. natural boreal pine forests on dry sites, natural sub-alpine spruce stands and

Mediterranean beech forest growing in favorable conditions on lowlands. At the European level, tree species composition also reflects the differences in biodiversity between the vegetation zones, e.g. boreal, temperate, Mediterranean and alpine zones.

Situation

Based on information from 23 countries, half of the forest area in the MCPFE region is covered by forests with 2–3 tree species composition (Figure 30). The threshold level to indicate a tree species is a minimum of 5 percent of basal area. About 30 percent of the forests are dominated by one tree species alone and the remaining 70 percent are mixed forests consisting of two or more tree species. One tree species forests are usually conifer forests.

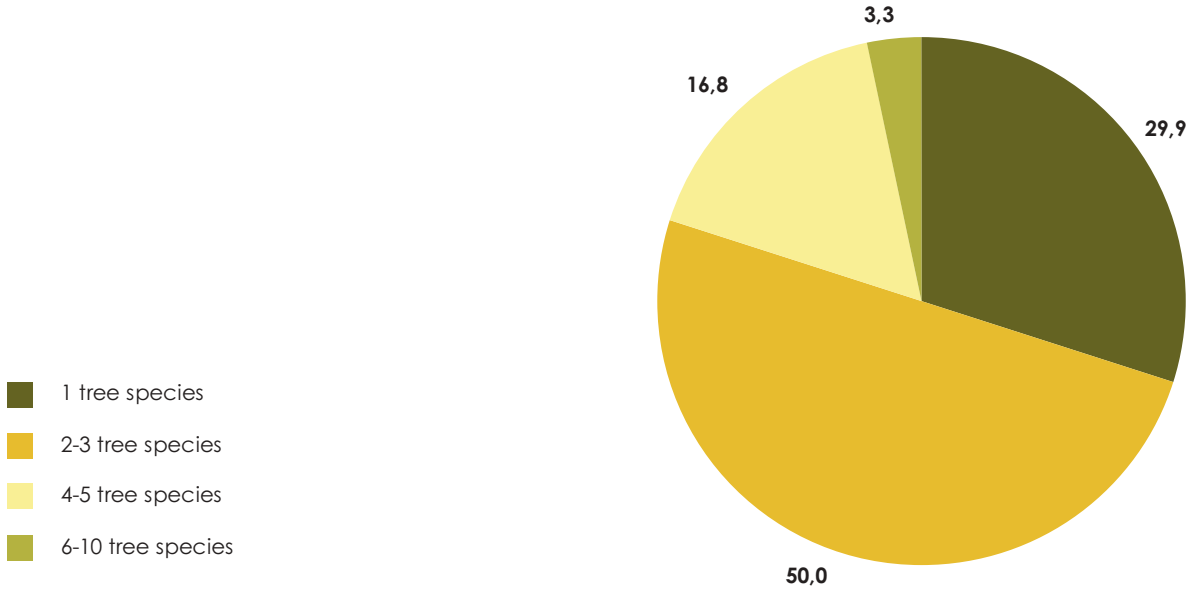


Figure 30. The share of the forest area by number of tree species for the MCPFE region, 2005 (%)

Few countries have reported tree species composition growing on other wooded land. Accordingly, they are mainly composed of a few tree species; 1 or 2–3 species occur on other wooded land areas. Exceptions are Italy and Albania, where compositions of up to 6–10 tree species occur.

One tree species forests with a proportion of over 40 percent share of the forest area are typical in Cyprus, Serbia, Albania, the UK, Belgium, Austria and Finland (Figure 31). Forest conditions in these countries are very different, indicating that one species forests are growing in climatic extremes, boreal or plantation forest areas. Mixed forests with over a 30 percent share of 4–6 tree species compositions or more are typical in Italy, Bulgaria, Luxembourg, Slovenia, the Czech Republic, Slovakia and Lithuania.

In predominantly mixed forests, the share of the occurrence of 2–3 tree species is as high as 70 percent. Taken together with the occurrence of 4–6 tree species, the share increases to 92 percent. In predominantly conifer forests, the number of tree species is small: one tree species forests and 2–3 tree species mixtures together cover 92 percent of the forests. The compositions of tree species in predominantly broadleaved forest is quite even; various compositions have roughly the same share of the forest area.

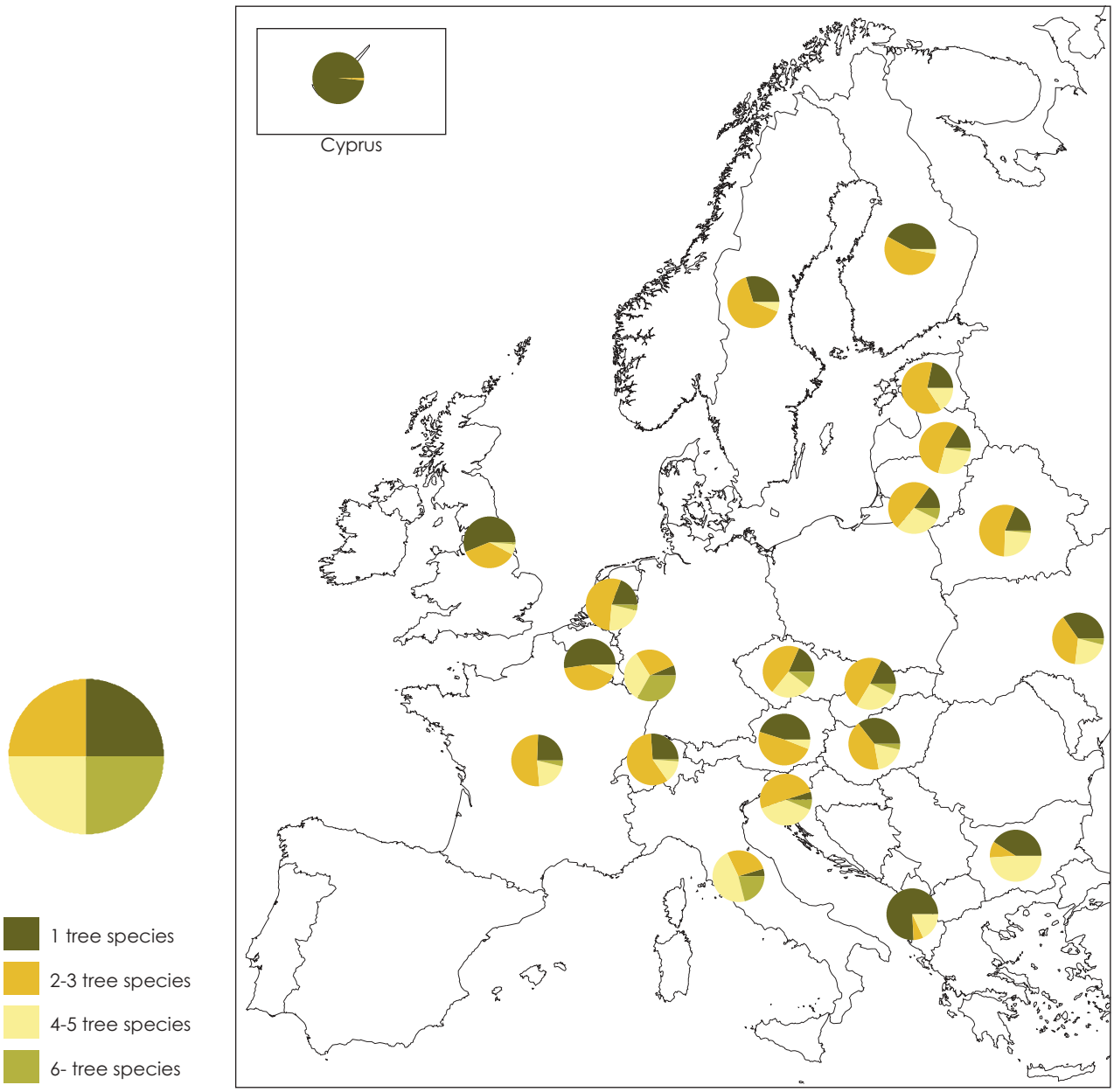


Figure 31. The share (%) of the forest area by number of tree species for MCPFE countries, 2005 (based on available data)

Trends

The area of multi-species forests has increased in the MCPFE region during the 15-year period (Figure 32). In particular, the proportions of mixed forests with more than 4–5 tree species and 6–10 tree species compositions have increased annually by 1.5 percent from 1990 to 2005.

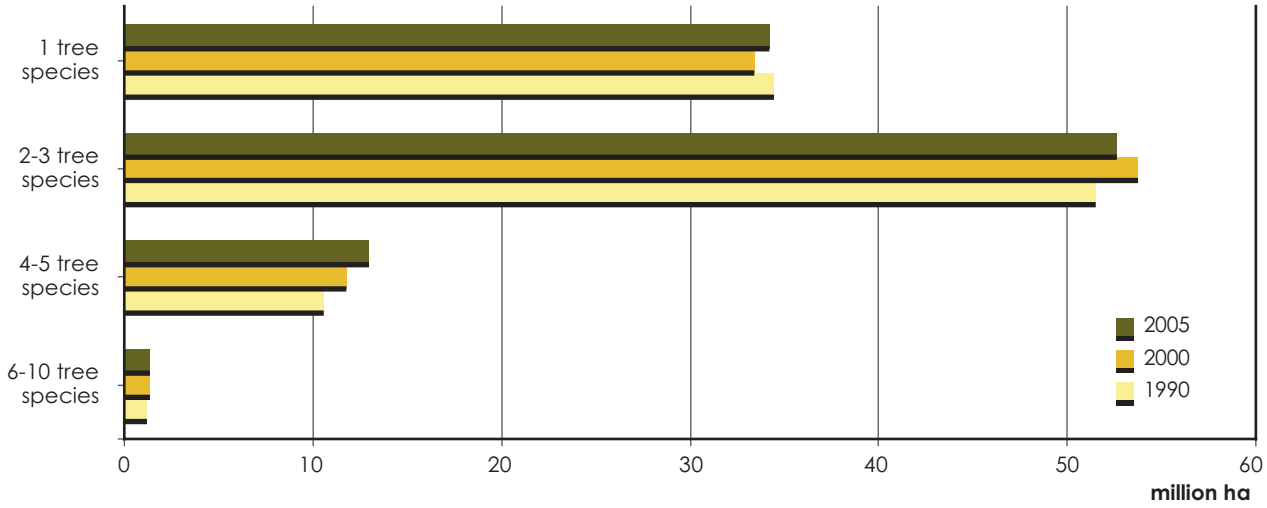


Figure 32. Forest area by number of tree species in MCPFE countries, in 1990, 2000 and 2005 (based on available data)

Indicator 4.2. Regeneration

Area of regeneration within even-aged stands and uneven-aged stands, classified by regeneration type.

Regeneration by natural seeding, vegetative regeneration or artificial planting and seeding is the prerequisite for maintaining the forested land permanently or long term as forests. Natural regeneration contributes to conserving the diversity of the genotypes and to maintaining the natural tree species composition, structure and ecological dynamics.

However, natural regeneration may not always be adequate to achieve biodiversity conservation goals. For instance, to convert forests from introduced tree species to native tree species, planting is necessary in most cases, and restoration activities may require the elimination of naturally regenerating trees growing outside their natural range. Also, the occasional replanting programmes, which were due to the heavy storms in Europe since 1990, may influence the share of regeneration methods, and consequently, the statistics.

Situation

Half of the MCPFE region countries (24 countries; the Russian Federation did not report) have reported on regeneration methods. Comments made by reporting countries indicate that there have been significant difficulties in classifying the data according to the reporting form requirements. The definition of forest and other wooded land "under regeneration" has been interpreted in various ways; as the threshold value, countries may use the number of trees regenerated, minimum height, or a time period of 5–20 years to classify areas as "under regeneration", depending on growing conditions. In general, no data for regeneration on other wooded land have been reported.

The type of regeneration varies considerably in Europe (Figure 33). About half of the even-aged and uneven-aged forests are regenerated by planting or seeding. The share of natural regeneration is also very high, about 40 percent. The two other reported regeneration methods, natural regeneration enhanced by planting and coppicing, are not very common at the European level, but together represent 7 percent of the forest area regenerated.

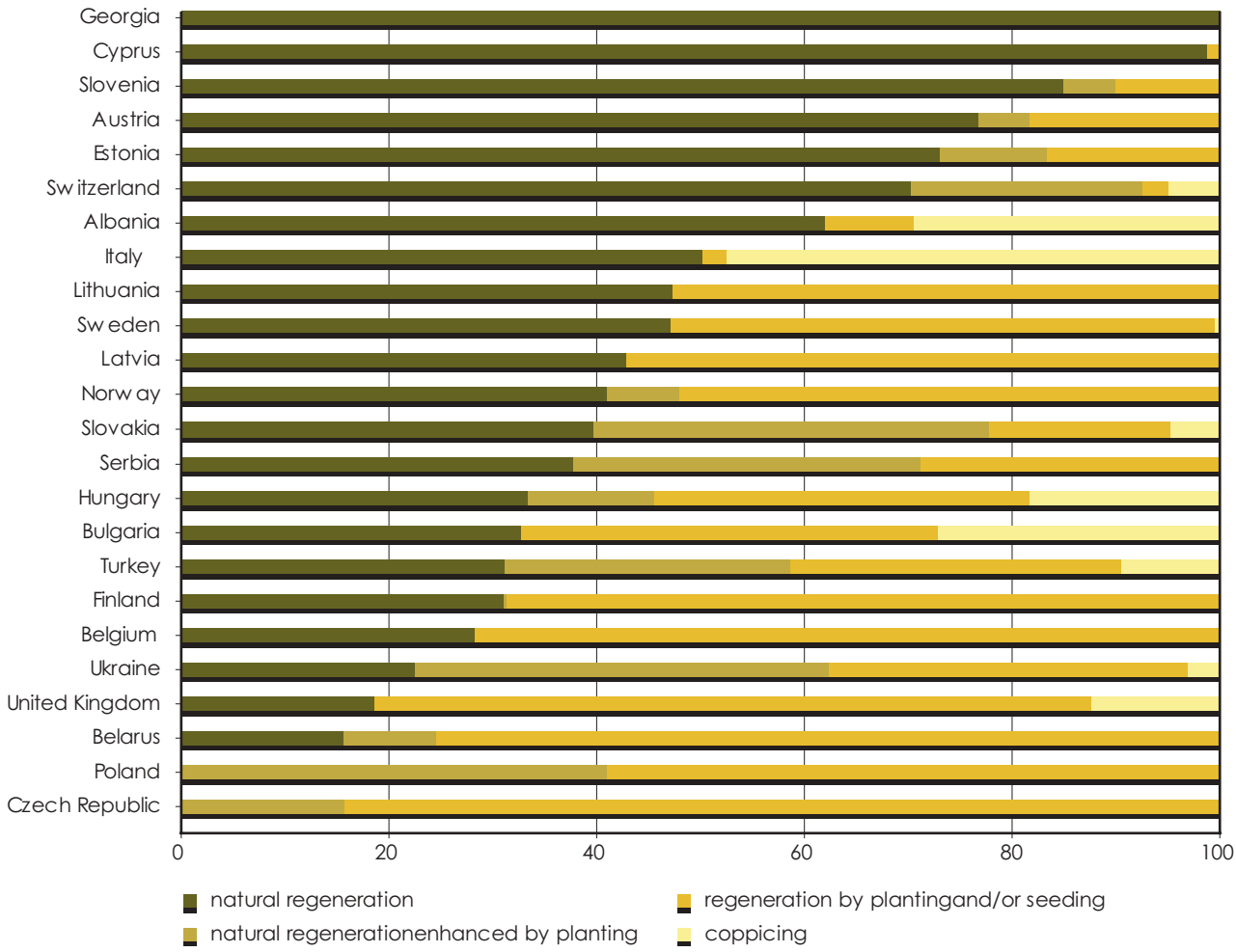


Figure 33. Share (%) of forest area (even-aged and uneven-aged) by regeneration types for countries in the MCPFE region, 2005 (based on available data)

Forests in Poland and the Czech Republic are regenerated mainly by planting and natural regeneration enhanced by planting, whereas in Georgia, Cyprus and Slovenia, all, or nearly all, forests are regenerated naturally. In several Central and North West European countries, natural regeneration has been enhanced by planting, but this is not common in the Nordic and Baltic countries. In some South East and South West European countries, coppicing is a common regeneration method; in Italy, nearly half of the forests are regenerated in this way. In the Nordic countries, planting dominates, but natural regeneration is used when reasonable regeneration conditions prevail.

There are few data that distinguish between regeneration methods of even-aged and uneven-aged forests. Based on the data from the countries, 276 000 ha of uneven-aged forests were regenerated in 2005, representing a 2 percent share of the total area regenerated in Europe. As expected, natural regeneration dominates, with a 72 percent share in the regeneration of uneven-aged forests. Coppicing is the main method in uneven-aged forests in wider areas than in even-aged forests. Planting and enhanced natural regeneration are practised in 21 percent of the uneven-aged forests.

There are clear differences between the forest types in regeneration. Forests dominated by conifers are mainly regenerated by planting, whereas mixed forests and predominantly broadleaved forests are regenerated by natural means. The range of regeneration methods is wide in forests dominated by broadleaves, in which natural regeneration enhanced by planting and coppicing also plays an important role.

Trends

Eleven countries have provided the complete data set on regeneration for 1990, 2000 and 2005. The figures from Sweden have been omitted from the calculations due to the extensive replanting after the storms in 1999 and again in 2005. A comparison between 2000 and 2005 indicates that the share of natural regeneration is slightly increasing, while the share of planting and seeding is decreasing (Figure 34). Coppicing has become more popular since 1990.

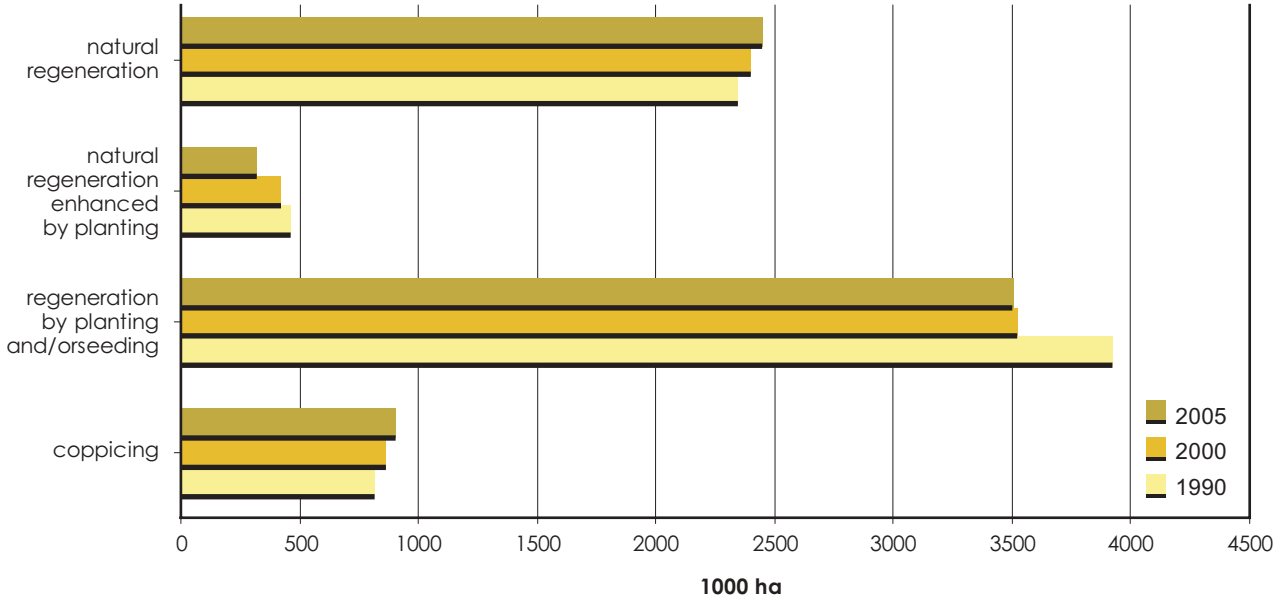


Figure 34. Forest area (even-aged and uneven-aged) by regeneration types in the MCPFE region, 1990, 2000 and 2005 (based on available data)

Indicator 4.3. Naturalness

Area of forest and other wooded land, classified as "undisturbed by man", "semi-natural" or by "plantations", each by forest type

The degree of naturalness of forests shows the intensity and history of human interventions. Different intensities of utilization are characterized not only by the remaining forest area in the country, but also by changing structures and different species communities within the forested areas.

Degrees of naturalness are described in this report by three categories: forest area undisturbed by man, semi-natural forests and plantations. Forests undisturbed by man are those where the natural forest development cycle has remained or been restored, and that show characteristics of natural tree species composition, natural age structure, deadwood component and natural regeneration and no visible sign of human activity.

Forests undisturbed by man have a high conservation value, especially when they form large-scale continuous forest areas allowing natural disturbance processes to occur. Undisturbed forests also serve as reference areas for understanding ecological principles and contribute to the development of forest management methods.

Plantations usually represent ecosystems on their own, established artificially by planting or seeding, often with introduced tree species, and are intensively managed. Semi-natural forests are neither undisturbed by man nor plantations, but display some characteristics of natural ecosystems. Semi-natural forests are further classified to a subclass "modified natural forests", which includes some characteristics of the forests undisturbed by man, such as close-to-nature forest dynamics, but show clear indications of human interventions as well.

Situation

Most forests in the MCPFE region (70.4 percent) are classified as semi-natural (Figure 35 and Figure 36). In Europe, excluding the Russian Federation, the share of semi-natural forests is as high as 87.2 percent. Due to the definition, semi-natural forests include a broad range of forests with different levels of naturalness and biodiversity.

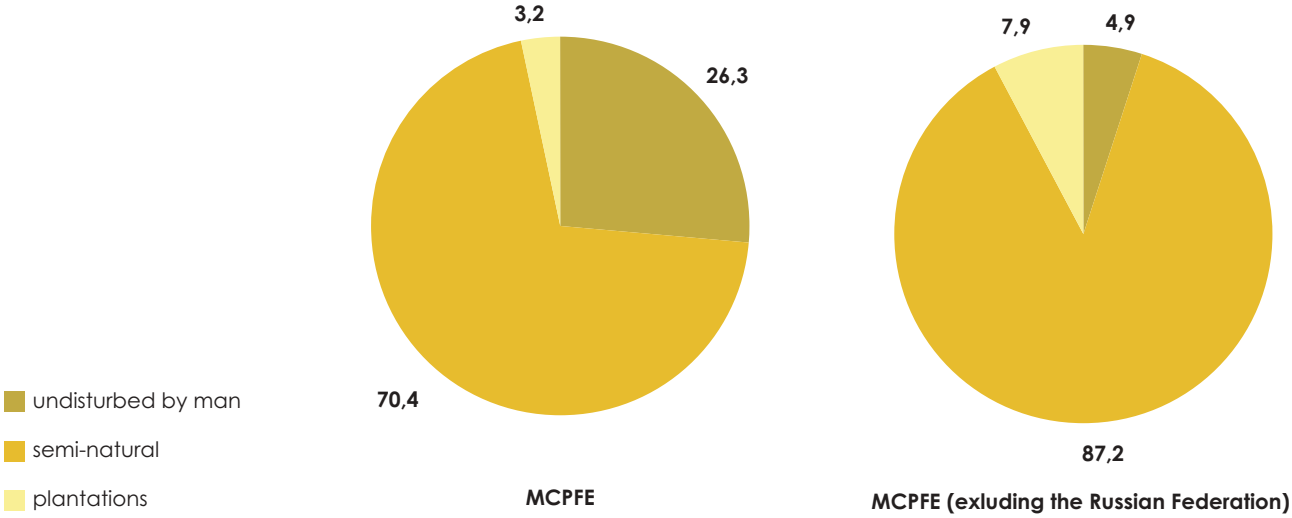


Figure 35. Distribution (%) of forest area in the MCPFE region and the MCPFE region excluding the Russian Federation by classes of naturalness, 2005

Twenty-four countries within the MCPFE region have also reported on their share of modified natural forests as a subgroup under the semi-natural forests. In total, their share of modified natural forests is 55 percent of the area of semi-natural forests. The Nordic countries, Finland, Norway and Sweden, as well as the Russian Federation have not reported on the modified natural forests. Eastern European countries have usually and more often than countries in other regions reported their semi-natural forests as modified natural, with a high share of modified natural forests, up to 100 percent. In 20 countries, namely Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Estonia, the former Yugoslav Republic of Macedonia, Georgia, Greece, Hungary, Iceland, Italy, Lithuania, Latvia,, Moldova, Slovenia, Turkey, Slovakia, Spain, Ukraine, and the United Kingdom, the share of the subclass modified natural forests out of the area of semi-natural forests is over 50 percent.

Other wooded land is most often classified as semi-natural. One-third of semi-natural other wooded land is characterized as modified natural. In general, there are no plantations growing on the other wooded land and only a small share is classified as undisturbed by man in most countries. An exception is the Russian Federation, which has up to 56 percent of the total area of other wooded land in the MCPFE region, and where nearly all the other wooded land areas are classified as undisturbed by man. Also, in Sweden, Finland, Norway, Austria, Portugal and Turkey, sizeable shares of other wooded land are classified as "undisturbed by man".

In the MCPFE region as a whole, the share of forests undisturbed by man is 26.3 percent. The Russian Federation has the highest share of forests undisturbed by man (Figure 35, Figure 36 and Figure 37), at 255 million ha, or about 32 percent, which is more than the total forest area in the MCPFE region excluding the Russian Federation.

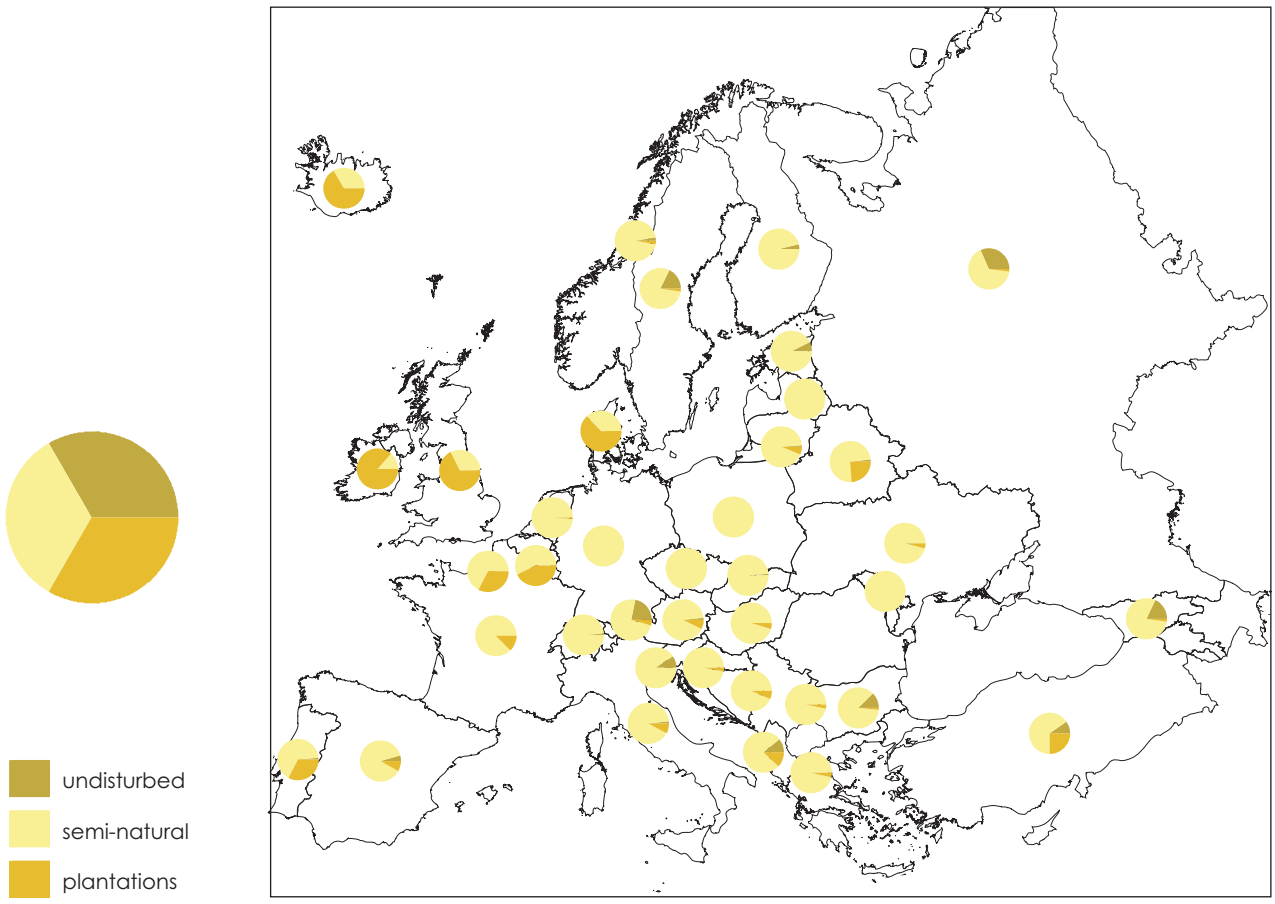


Figure 36. Share of the classes of naturalness (%) of the forest area, 2005 (based on available data)

Note: Germany included all forests in the "semi-natural" class. The area of forest undisturbed by man in the Russian Federation (255 million ha) is more than the total forest area in the MCPFE region excluding the Russian Federation

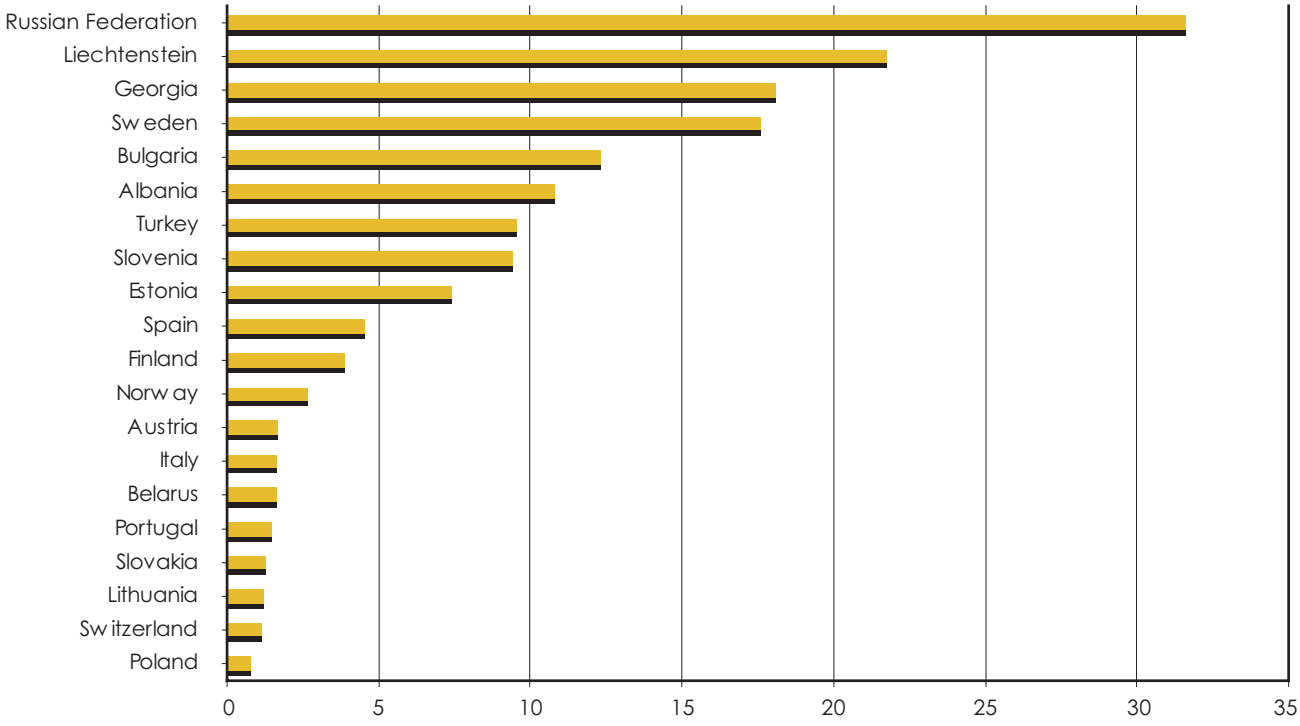


Figure 37. The 20 countries with the highest share (%) of forest undisturbed by man of the total forest area, 2005

In Europe excluding the Russian Federation, about 10 million ha, or 4.9 percent of forests, are defined as undisturbed by man. Nearly half of that area is in Sweden. Large areas of forests undisturbed by man, over 100 000 ha, can be found in Turkey, Spain, Finland, Georgia, Bulgaria, Norway, Estonia, Italy, Belarus and Slovenia (Figure 37). In most European countries, the share of forests undisturbed by man is low, ranging from 0 to 1 percent. The small quantity of forests undisturbed by man has also been noted in other statistics. The COST Action E4 on the "Forest reserves research network in Europe", a survey on forests left for free development (i.e. no forest management allowed) conducted from 1996 to 1999 in 27 European countries, showed that there are still about 3 million ha, or approximately 1.6 percent of "natural forests" located in strict forest reserves (European Commission, 2000; Parviainen et al., 2000).

Forests undisturbed by man are mostly located in remote or inaccessible areas where extreme climatic or topographic conditions prevail.

Plantations cover about 33 million ha, or 3.2 percent of the total forest area in the MCPFE region, and about 16 million ha, or 7.9 percent, of the forest area in Europe excluding the Russian Federation. Plantations are very important for wood production in many countries and dominate the forest areas in Malta, Ireland, the UK, Iceland and Denmark. Plantations account for more than 10 percent of the forest area in Belgium, Luxembourg, Portugal, Belarus, Turkey, France and Albania (Figure 38). The definition of plantation includes a reservation that the stands of native tree species that were established as plantations but that have been without intensive management for a significant period of time could be considered semi-natural forests. This might influence the interpretation, especially regarding the old plantations that have been partly shifted to semi-natural forests.

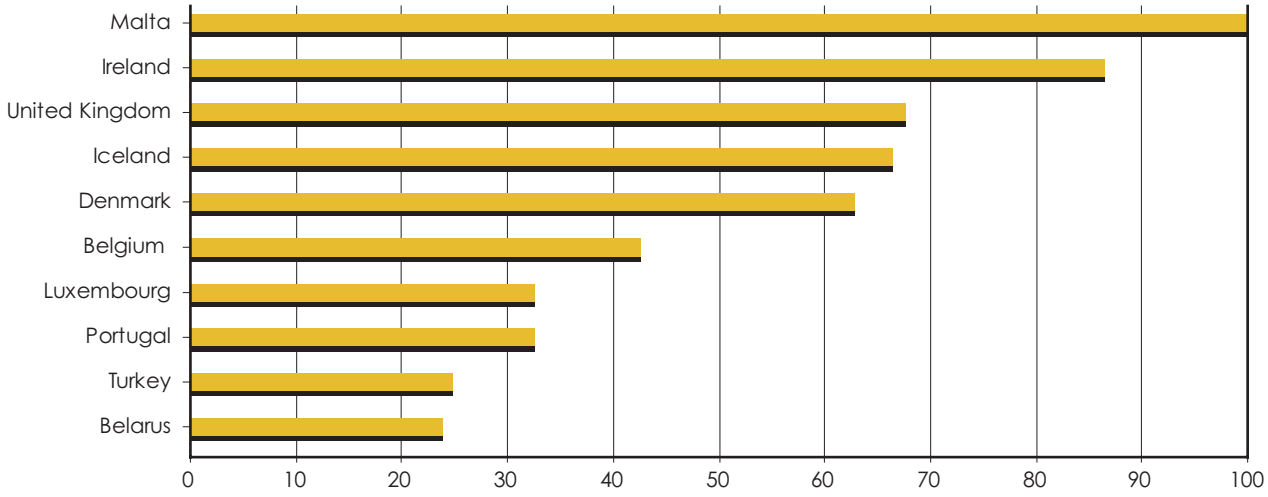


Figure 38. Ten countries with the highest share of plantations of the total forest area (%), 2005

Trends: 1990–2000 and 2000–05

In the MCPFE region excluding the Russian Federation, all three components of naturalness show an increase during the 15-year period. The area of forests undisturbed by man increased by 1.2 million ha; the area of semi-natural forests by 8.0 million ha; and the area of plantations by 2.7 million ha, at an annual rate of 180 000 ha during the 15-year period. These changes can be partly explained by the increase of the total forest area, afforestation and different interpretations of the definitions. The increase of the area of protected forests may influence the amount of undisturbed forests, while in several countries, the former semi-natural forests are designated for protected areas and then considered undisturbed forests.

Indicator 4.4. Introduced tree species

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

Non-indigenous tree species have been introduced for various reasons, such as forestry, gardening, protective functions and arboreta, and for increasing the forest area. Introduced species make a significant contribution to wood production and supply in many countries. Non-indigenous tree species are commonly considered introduced 150 to 400 years after being first planted.

Following the definition of the MCPFE data collection process, *introduced species* are tree species occurring outside their natural vegetation zone, area or region. They are also known as *non-indigenous species, exotic species* or *alien species*. Some introduced tree species have become problematic due to their ecological characteristics. For example, their spreading by natural regeneration and their competitiveness may change the dynamics of forest ecosystems and may influence sites, species composition, structure and functional diversity. These introduced tree species are termed *invasive species*.

Situation

There is a clear correlation between the establishment of plantations and the area of forests dominated by introduced tree species. The high proportion of plantations reflects a high proportion of introduced tree species. In total, about 8.1 million ha, or 5.2 percent of the total forest area, are dominated by introduced tree species in the 32 reporting MCPFE countries (excluding the Russian Federation), of which 10 percent are dominated by invasive species (Figure 39). The introduced tree species usually grow on the forest land area with exception of Turkey and Albania, where some introduced tree species grow on the other wooded land area as well.

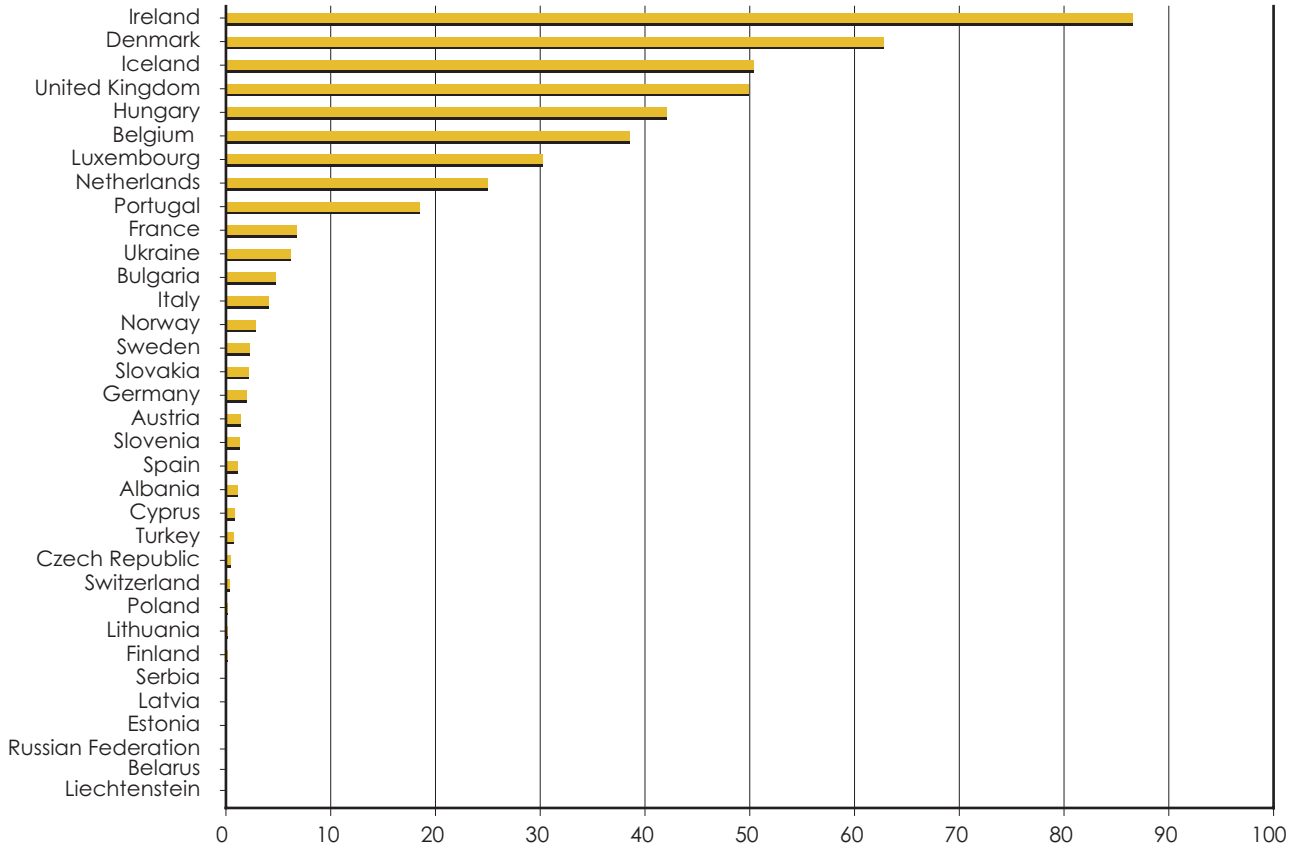


Figure 39. Share of forest area dominated by introduced tree species of the total forest area (%) for countries in 2005, based on available data

Source: Data for Germany (COST E4) and Spain (COST E4) are based on information from COST E4 (Parviainen et al., 1999) and COST E27 (Frank et al., 2007) reports

The occurrence of introduced species is highest in North West European countries, where the proportion of forest area dominated by introduced species is, on average, 15 percent of the total forest area. Countries with the highest share of introduced tree species are Ireland, Denmark, Iceland, the UK, Hungary, Belgium, Luxembourg and the Netherlands.

In the Baltic countries, Finland, Liechtenstein, Switzerland, Slovenia, Belarus and Serbia, introduced tree species have only been planted on an experimental scale.

Typically, the number of introduced tree species for forestry purposes varies between five and ten species in Central, East and North West Europe,. The variety of broadleaved introduced tree species is wider than that of conifers and might be up to 20–30 species.

The most important introduced conifer species for forestry purposes are: Norway spruce *(Picea abies)*, Sitka spruce *(Picea sitchensis)*, Douglas fir *(Pseudotsuga menziesii)*, various pine species (most often *Pinus contorta, Pinus nigra* and *Pinus strobus*), western hemlock *(Tsuga heterophylla)* and larch species *(Larix spp)*. Douglas fir is an important tree species in several countries due to its fast and high wood production capacity and excellent wood quality.

Norway spruce is often planted in Denmark, Belgium and the Netherlands, where it does not occur naturally. Sitka spruce is very common and an important introduced tree species for wood production in the UK and Ireland. In Sweden, the contorta pine *(Pinus contorta)* has been planted on over 0.5 million ha of forest area. It should be noted that among the important introduced conifers in Europe, only Douglas fir, Sitka spruce and contorta pine are indigenous to territories outside Europe, specifically from the western part of North America.

The most common broadleaved introduced tree species for forestry and wood production purposes are Red oak *(Quercus rubra)*, false acacia (Robinia) *(Robinia pseudoacacia)* and poplar species, especially Balsam poplar *(Populus trichocarpa x maximoviczil)*. *Eucalyptus* species have been planted for forestry in Spain in over 200 000 ha and in Portugal in about 700 000 ha (Parviainen et al., 1999; Latham et al., 2006). Most of the broadleaved introduced tree species grow as an admixture in the forests; they are of no specific interest for wood production, but grow in the understorey tree layer or as shrub.

Conifers are generally not considered invasive in Europe, but several introduced broadleaved tree species are. The most problematic invasive tree species for all the reporting countries is the false acacia (Robinia) *(Robinia pseudoacacia)*, with its excellent regeneration capacity and strong competitiveness. Half of the area reported to be dominated by invasive introduced tree species is occupied by false acacia. This tree species has been reported as invasive in Austria, Hungary, Slovakia, Slovenia, the Russian Federation, Belgium, France, Albania and Italy. The American black cherry *(Prunus serotina)* is considered invasive in several countries such as Belgium and Netherlands. Also, an Ailanthus species *(Ailanthus altissima)* is reported as invasive in Slovenia and Albania.

Introduced tree species are of special concern within the protected forest areas. In several countries, there are management plans for protected forest areas to eliminate non-indigenous tree species. These interventions are allowed in order to restore the natural tree species composition within the protected areas and to eliminate the external influences from surrounding areas (Frank et al., 2007).

Trends

The area of introduced tree species has remained stable in the 21 countries reported during the 1990–2005 period. In general, the increased amount of introduced tree species was planted for wood production or protective purposes in Ireland, Denmark, the UK, France, Hungary and Sweden, or also for increasing the forested area by afforestation, as in Iceland.

Most of the countries have reported no changes of invasive introduced tree species during the 15-year period – only Austria and Hungary have reported a slight increase in the number of invasive introduced tree species

Indicator 4.5. Deadwood

Volume of standing deadwood and of lying deadwood on forest and other wooded land classified by forest type

Situation

Deadwood in the form of decaying wood as standing and lying trees is a habitat for a wide range of organisms, especially saproxylic species, and is seen as an important component of biodiversity. After humification, deadwood also constitutes an important component of forest soils. During some part of their life cycle, some species are dependent on dead or dying wood of moribund or dead trees, or on wood-inhabiting fungi or invertebrate species. Examples of species dependent on deadwood are: hole-nesting birds such as woodpeckers, several forest-occurring beetle species, epixylic lichens and bryophytes.

The amount of deadwood between undisturbed and managed forests varies considerably. Late development phases of natural forests are characterized by a large amount and diversity of deadwood. As the European forests have been managed over long periods of time, the late development phases are missing or scarce. Because of the lack of deadwood in many forests, several of the deadwood-dependent species are endangered. On the other hand, in some circumstances, the accumulated fresh dying deadwood may cause a risk of insect outbreaks.

It is not yet well known how much deadwood is required in managed forests to favour certain species, but several research results indicate that a small amount is enough to constitute an adequate habitat for organisms to survive (Hahn and Christensen, 2004; Marchetti et al., 2004; Schuck et al., 2004). The relative deadwood ratio varies considerably between forest types, standing volume of the stands, decaying rates and vegetation zones.

For this report, data on deadwood have been systematically collected for the first time and have been provided in 22 countries. The data have been mainly collected by inventories, but some countries such as Hungary and Albania have used forest health monitoring plots (ICP-Forests). Countries define deadwood differently, making it difficult to arrive at harmonized definitions. A minimum length of 2 m and a minimum diameter of 10 cm for standing and lying deadwood were recommended for this assessment. In practice, nearly all countries have applied their own minimum requirements; for example, the minimum diameter is between 4 and 20 cm. The Russian Federation, Austria and Germany have also included stumps as lying deadwood.

The average combined volume of deadwood, both standing and lying, is 9.9 m^3/ha (from 0.9 to 23.0 m^3/ha) in the forest area of 22 countries in the MCPFE region (Figure 40). The amount of deadwood lying on the ground is higher than that of standing deadwood. In general, the amount of deadwood in managed forests is between 5 and 10 percent of the amount of deadwood in forest undisturbed by man, depending on the growing stock volume by forest types and vegetation zones (Hahn and Christensen, 2004).

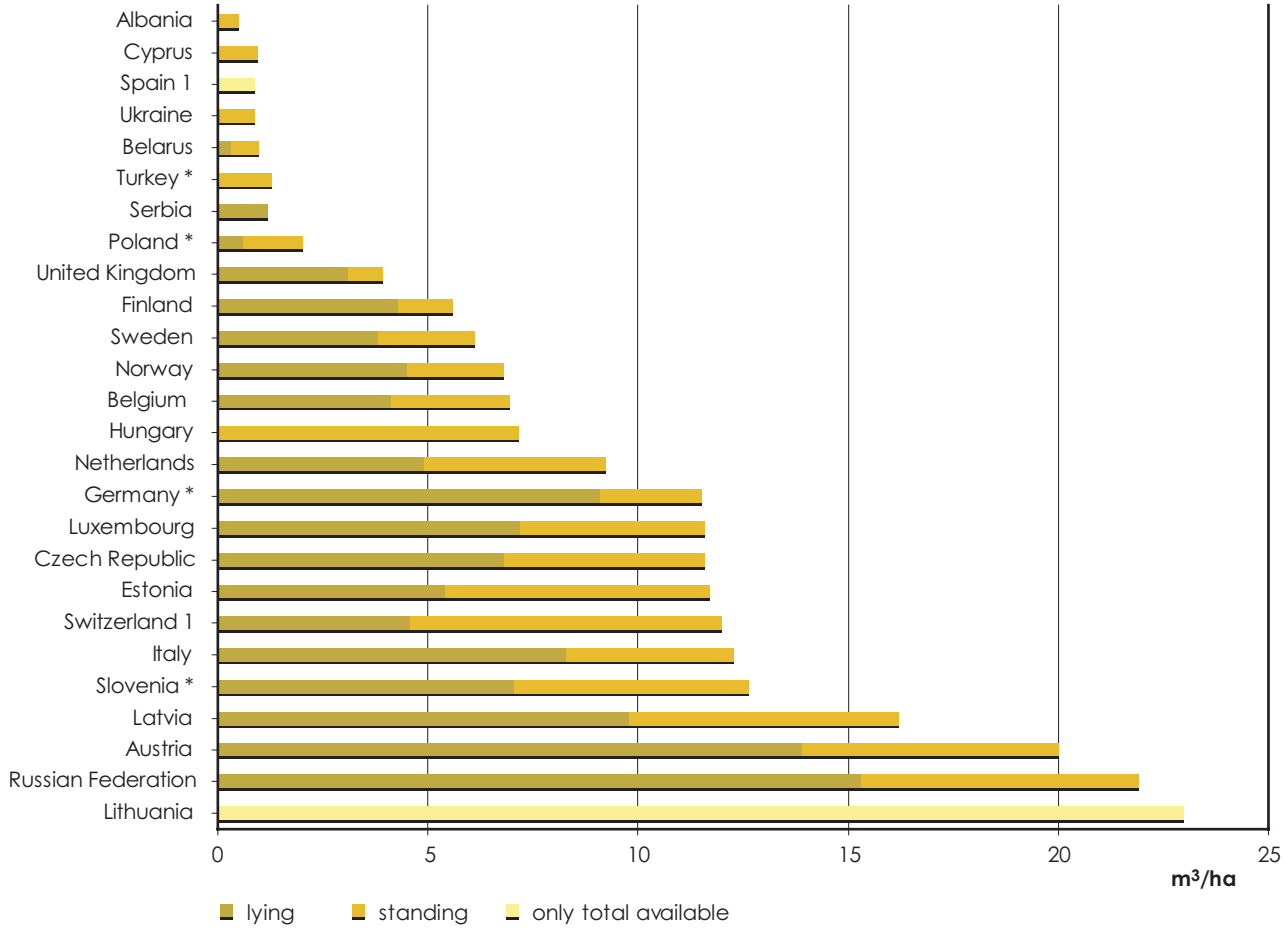


Figure 40. Average volume of standing and lying deadwood, 2005

Note: * based on available 2000 data; "1", based on available 1990 data

Small quantities of deadwood are found in other wooded land: several countries reported no deadwood, and in the 12 countries that did, the average was 2.4 m³/ha. The Russian Federation (12.8 m³/ha), Italy (8.6 m³/ha) and Lithuania (3.0 m³/ha) reported the highest amount of deadwood in their forest and other wooded land areas, whereas Estonia (1.3 m³/ha), Belarus (1.2 m³/ha), Sweden (0.8 m³/ha) and Finland (0.7 m³/ha) reported the lowest.

The large amount of deadwood in forests and other wooded land combined in the Russian Federation (34.6 m³/ha) may indicate the high share of forests undisturbed by man in the country or may also be influenced by the volume of stumps included in the numbers. In addition, in the Russian Federation, the amount of deadwood in other wooded land is five times higher (12.8 m³/ha) than the average in other countries.

The highest amount of deadwood has been observed in forests where conifers predominate. Compared to mixed forests and predominantly broadleaved forests, the differences are very small, however.

Trends

Data are available only from seven countries for the 15-year period from 1990 to 2005. No clear trends could be distinguished; the amount of deadwood has remained stable.

Indicator 4.6. Genetic resources

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

Genetic diversity is the ultimate source of biodiversity at all levels. Genetic resources of tree species should be conserved for the future, both to secure the width of genetic pools and to allow use of best provenances. A loss of genetic diversity may have negative consequences for general adaptation and production, and may prevent adaptation of tree populations in response to climate change and reduce their capacity to fix CO_2.

In situ conservation is the predominant method to conserve genetic resources of forest trees, while *ex situ* collections and stands are mainly used for conserving endangered tree species or populations. *In situ* gene conservation aims at maintaining evolutionary processes within tree populations to safeguard their potential for continuous adaptation. In the face of climate change, conservation and sustainable use of forest genetic resources are becoming even more important for maintaining the long-term sustainability of European forestry and for supporting forest biological diversity at large.

The areas managed for seed production also contribute to gene conservation of forest trees, but most seed production areas have been established for a few economically important tree species. European countries have increased their capacity to produce seeds of forest trees to meet the demand for artificial regeneration, which is a common regeneration method in several countries.

Data available

A total of 38 countries provided data on this indicator to the Secretariat of the European Forest Genetic Resources Programme (EUFORGEN) at Biodiversity International (Table A23, data by country). The total area managed for gene conservation and seed production per country does not provide adequate information to assess the status of gene conservation of various tree species since their distribution ranges and biological characteristics are considerably different. Therefore, additional information was collected for selected European tree species (Table 14, data by tree species). Table 14 shows species-specific data for most of those species listed under the Council Directive (1999/105/EC) on the marketing of forest reproductive material and those identified as priority species by countries participating in EUFORGEN.

In many countries, national parks and other protected areas are often classified as "gene conservation areas", although their suitability for this purpose has not been assessed and there is no active management for gene conservation. Furthermore, genetic material cannot be collected from protected areas in several countries nor are silvicultural measures allowed in protected forest areas to favour scattered tree species. Subsequently, the data on areas managed for *in situ* gene conservation overestimate the real situation.

The data reported in the species-specific table cannot be directly compared with the data by country, since many gene conservation units are managed for several tree species.

Some land races of exotic tree species are included in the data on *in situ* conservation, but it is difficult to determine when genetic material of exotic trees species can be considered land races.

The data on area managed for *ex situ* gene conservation includes several provenance trials that do harbour valuable genetic material but that are not necessarily managed for gene conservation. The data on exotic tree species also probably includes some plantations that are not managed for *ex situ* gene conservation.

In the statistics on area managed for seed production, in addition to seed orchards, national registers of basic material include large areas of seed collection stands that are not actively managed or from which seeds have not yet been collected.

Status and trends

In Europe, a total of 135 tree species, subspecies and hybrids are included in gene conservation and seed production efforts, but most of these efforts are targeted to a limited number of tree species. A group of seven economically important tree species with large distribution areas *(Fagus sylvatica, Picea abies, Pinus sylvestris, Abies alba, Quercus petraea, Larix decidua* and *Quercus robur)* alone account for 82 percent of the total area managed for *in situ* gene conservation.

The state of gene conservation is good for many stand-forming and widely distributed tree species, but the situation needs to be improved in the case of scattered tree species. In addition, the genetic resources of several rare and endangered tree species are still inadequately conserved and need urgent attention. Furthermore, the marginal populations of many widely distributed tree species are facing new threats at the edges of their geographical range areas due to climate change.

The areas managed for gene conservation of forest trees more than doubled from 1990 to 2005. The total area managed for *in situ* gene conservation increased from 316 341 ha in 1990 to 748 382 ha in 2005 (Table A23). During the same period, the number of tree species covered by *in situ* gene conservation efforts also increased, from 59 to 93 species.

Similarly, the area managed for *ex situ* gene conservation increased from 3 234 ha to 7 392 ha and the number of tree species from 56 to 85. The areas managed for seed production also show an increasing trend. In 1990, the total area managed for seed production was 464 080 ha and covered 85 species. By 2005, the seed production area had increased to 528 707 ha with 90 species.

In conclusion, a positive trend can be observed in areas managed for the conservation of forest tree genetic resources and for seed production, but the level of gene conservation can be considered adequate for only a limited number of tree species in Europe.

Table 14. Area managed in MCPFE countries for *in situ* and *ex situ* gene conservation and for seed production by tree species, 1990, 2000 and 2005 (based on available data)

	Area managed for *in situ* gene conservation			Area managed for *ex situ* gene conservation			Area managed for seed production		
	1990	2000	2005	1990	2000	2005	1990	2000	2005
	ha								
Abies alba	33 860.3	48 545.3	52 730.0	30.8	124.8	183.8	33 017.9	27 741.1	27 258.8
Abies cephalonica	–	–	–	0.5	0.5	0.5	0.0	2.1	1 568.7
Abies grandis	–	3.5	20.3	7.9	8.5	12.3	9.2	13.7	23.4
Abies pinsapo	–	–	100.0	–	–	–	0.0	–	–
Acer campestre	19.5	152.1	550.0	–	0.4	2.4	67.6	49.8	34.0
Acer platanoides	235.2	249.5	544.2	–	1.2	1.9	46.5	78.4	99.1
Acer pseudoplatanus	22 558.8	22 856.0	23 211.5	23.1	35.8	90.0	345.2	657.0	1 644.7
Alnus glutinosa	734.6	1 232.2	1 616.9	5.8	19.6	55.4	1 448.1	1 957.6	2 198.5
Alnus incana	10.0	115.0	132.5	3.2	2.2	2.2	0.5	6.7	14.4
Betula pendula	4 970.0	6 452.0	6 556.7	7.8	94.7	127.3	1025.7	1 485.3	1 397.7
Betula pubescens	73.6	743.0	863.6	1.0	4.9	6.9	1.9	135.9	174.1
Carpinus betulus	4 808.1	6 481.5	7 146.5	–	8.4	10.5	557.7	789.3	750.8
Castanea sativa	25.3	902.0	934.7	–	10.0	11.6	537.5	547.8	991.8
Cedrus atlantica	–	–	–	4.5	4.5	4.5	1 441.6	807.7	721.0
Cedrus libani	–	–	–	3.3	3.3	3.3	2 861.3	3 643.4	3 592.0
Fagus sylvatica	105 105.8	149 784.7	166 509.3	75.3	232.7	267.7	68 893.0	80 057.2	79 988.8
Fraxinus angustifolia	351.5	746.3	835.4	–	0.2	0.7	101.8	626.3	750.1

	Area managed for *in situ* gene conservation			Area managed for *ex situ* gene conservation			Area managed for seed production		
	1990	2000	2005	1990	2000	2005	1990	2000	2005
	ha								
Fraxinus excelsior	8 064.0	10 373.7	11 497.4	5.5	26.7	51.3	2 628.2	3 213.5	4 175.1
Junglas regia	41.1	54.2	53.2	7.9	11.0	25.0	1.0	12.9	54.6
Larix decidua	28 478.0	29 902.3	30 495.9	247.4	302.8	328.4	6 873.1	7 061.0	8 485.6
Larix sibirica	1 924.0	1 924.0	3 989.0	–	4.0	10.3	49.0	183.6	84.9
Picea abies	85 482.2	126 804. 3	156 284.0	618.6	956.5	1 284.8	163 798.3	153 202.9	129 816.7
Pinus brutia	26.0	7 862.6	8 820.6	10.1	10.1	20.0	8 038.6	12 091.7	12 714.1
Pinus canariensis	–	–	–	–	–	–	–	–	108.8
Pinus cembra	1 206.1	2 105.7	2 106.7	21.8	33.0	34.0	13.4	202.7	1 729.1
Pinus contorta	–	–	1.1	38.0	39.4	40.5	191.5	950.2	965.6
Pinus halepensis	1 982.0	1 898.0	1 858.7	22.6	17.0	17.0	331.8	477.0	2 176.7
Pinus leucodermis	3 160.0	3 354.9	4 381.9	–	–	–	61.2	77.9	307.5
Pinus nigra	636.0	13 463.8	15 992.7	55.6	78.9	151.7	20 373.5	38 592.5	38 611.9
Pinus pinaster	2 923.0	2 922.0	2 905.0	5.6	58.4	58.4	1 505.9	5 730.6	7 198.3
Pinus pinea	589.0	904.0	893.0	9.1	9.1	9.1	1 496.6	4 214.8	5 841.5
Pinus sylvestris	27 826.31	77 990.03	120 858.38	1 608.06	2 443.40	2 673.54	63 132.50	77 189.29	69 536.17
Populus alba	–	43.0	64.6	2.3	2.1	12.1	33.5	32.0	58.8
Populus nigra	637.0	683.5	725.2	3.1	115.3	117.6	5.0	105.7	88.1
Populus tremula	297.90	1 010.65	1 495.68	3.20	4.46	31.16	220.03	183.85	164.04
Prunus avium	2 328.6	2 395.5	2 618.0	2.8	25.4	65.1	315.9	643.7	830.7
Pyrus pyraster	0.2	8.6	14.1	–	6.4	6.7	5.0	14.9	62.9
Quercus cerris	2 391.7	4 958.5	4 868.3	–	–	–	2 451.4	3 143.3	3 072.1
Quercus frainetto	38.0	5 017.2	5 123.7	–	–	2.5	4 770.2	5 078.4	5 031.5
Quercus ilex	2 542.0	2 608.0	2 567.0	–	–	–	–	1 855.9	3 437.8
Quercus petraea	15 177.2	32 207.7	32 839.0	50.0	42.7	70.6	40 609.2	41 450.5	46 982.1
Quercus pubescens	2 993.0	3 332.0	3 377.8	3.6	4.7	1.1	41.7	57.5	43.9
Quercus robur	20 471.62	23 939.91	25 195.52	90.2	480.53	792.50	18 049.92	19 186.20	19 944.23
Quercus suber	–	–	–	–	48.8	48.8	10.7	16 480.9	19 656.0
Sorbus aucuparia	31.0	254.7	915.7	4.3	6.1	7.1	14.7	31.2	56.1
Sorbus domestica	–	2.1	2.1	0.2	2.8	10.1	–	4.7	14.7
Sorbus torminalis	1 867.2	1 876.2	1 972.7	0.8	9.9	26.1	63.2	35.0	44.4
Taxus baccata	132.4	218.5	292.1	2.0	49.9	18.1	0.0	12.3	45.5
Tilia cordata	6 215.81	6 533.49	7 003.61	1.7	13.0	28.3	743.17	1 047.89	1 605.24
Tilia platyphyllos	233.4	906.1	1 113.7	–	2.4	1.3	154.8	737.1	608.0
Ulmus glabra	3 080.0	3 071.9	3 244.9	11.4	17.3	24.1	9.5	78.4	151.9
Ulmus laevis	450.0	517.2	514.3	3.8	11.3	22.7	0.7	7.7	8.3

Indicator 4.7. Landscape pattern

Landscape-level spatial pattern of forest cover

The landscape-level spatial pattern of forest cover gives information on the size, shape and spatial distribution of forests in a landscape as it reflects the potential of landscape to provide forest habitats. Spatial features such as core and edge habitat, isolated patches and corridors represent prime conditions for regional biodiversity.

Fragmentation of forest land has historically occurred in many regions in Europe. The long-term survival of forest species may be threatened by fragmentation of the forest land into isolated patches of insufficient size and lack of forest connectivity. Fragmentation can occur permanently because isolation of forest within other land use forms has been caused by the expansion of agricultural areas, settlements or it may be temporary and recoverable within forested areas after forest operations such as cuttings or replanting.

The methodology for assessing landscape pattern is still under development at the national level. Only a few countries, France, Italy and Germany, can provide data on pattern measures such as forest edges. National pattern data, when available, are not harmonized and cannot be used to implement the MCPFE 4.7 indicator.

For the purposes of this report, a case study on European applications on the implementation of the forest landscape pattern indicator is presented. The proposed method represents an applicable assessment scheme, suitable for the large-scale and complex implementation such as for the whole European territory. The methodology has been developed by the European Commission– Joint Research Centre (JRC).

In contrast to other indicators, information on landscape pattern could not be made available from either international data providers or countries, so JRC contributed a case study on landscape pattern in Europe.

Data available

Only two Pan-European harmonized forest maps are currently available as input to compute the landscape pattern indicator at the European level. These are the CORINE-based forest mask and the JRC forest map.

Results are presented on the basis of the European pattern maps, which utilize the CORINE Land Cover forest definition at 100 m spatial resolution for 1990 and 2000. Five pattern components were measured: core forest, core forest edges, small forest fragments (external fragmentation), forest perforation (internal fragmentation) and forest structural connectivity (Figure 41). More information on the methodology can be found at www.forest.jrc.it/biodiversity; and Estreguil et al. (2007); Vogt et al. (2007a, 2007b).

Spatial resolutions between 25 and 100 m are adequate when considering average size of forest units and openings resulting from forest operations, anthropogenic and natural disturbances, as well as the sizes of fragments to which most species of insects, mammals and birds are sensitive. Trends were studied over the last decade on the basis of the CORINE Land Cover forest areas. The CORINE mapping class for forests includes broadleaved, coniferous and mixed forest classes with a canopy closure of at least 30 percent.

Status

The assessment results over landscape pattern are presented on the basis of summary maps that depict the trends (reduction, stable, increase) of the five pattern components per provincial administrative units. Figure 42, for example, shows the trends for core and structure connectivity throughout Europe] in order to easily relate to abundance and connectivity of the forest habitat, which are the prime requirements for biodiversity. When observed at a 100 m spatial resolution with CORINE Land Cover, the average forest size is stable over the ten-year period from 1990 to 2000. Nevertheless, significant modification in pattern and a regional variety of changes are observed.

The summary map identifies which pattern components and geographical regions should be monitored to better protect interior species. The distribution of the core forest units in a few area intervals is an additional measure of relevance for interior forest species and minimum habitat area requirement.

The pilot study suggests that despite stable overall forest coverage over the last ten years, changes in forest pattern occurred and their variety in type, degree and direction throughout the European

territory is striking. These changes can be interpreted as positive or negative depending on priorities set for forest biodiversity. The regional distribution of the changes can also be observed.

Results will also be available in the near future on the basis of the JRC forest map of Europe at 25 m spatial resolution, validated against the FAO forest definition (www: forest.jrc.it/ForestResources/ForestMap; Pekkarinen et al., 2007). This resolution allows subtle changes in forest spatial pattern to be identified even over a short time period (Kozak et al., 2007a and 2007b). Ideally, European maps of forest types would be more suitable for distinguishing ecologically relevant forest patches and two or three decades would be the minimum to measure changes; however, such maps are not yet available.

Figure 41. European forest spatial pattern map (EU-27, 2000, based on the CORINE forest definition)

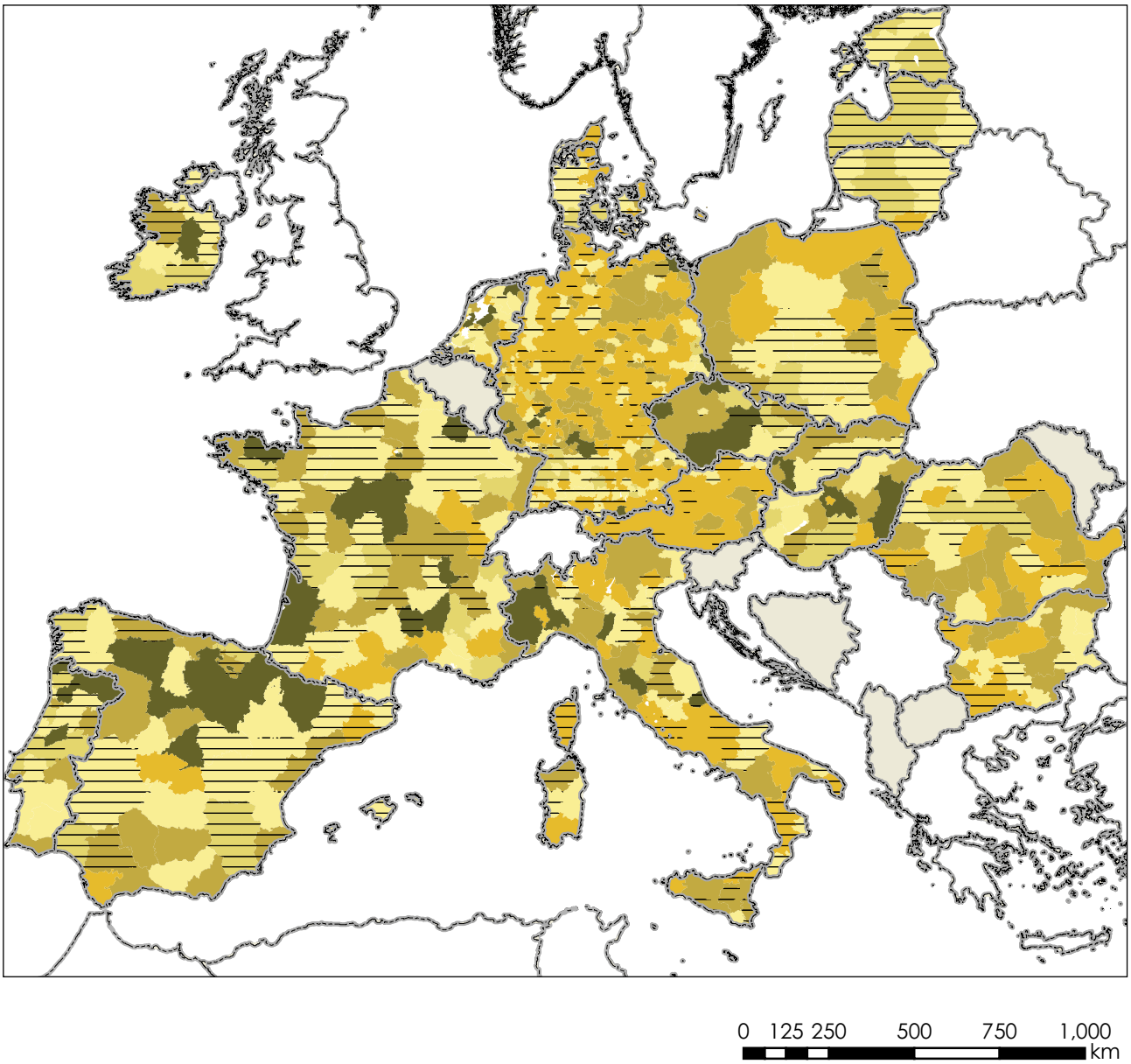


Figure 42. Summary map of trends in forest pattern (core and connectivity), examined at 100 m (Forest CLC data, 1990–2000); reporting units are NUTS level 3 (a). Zoom over central eastern Europe with all pattern components favouring more forest interior species (b)

Indicator 4.8. Threatened forest species

Number of threatened forest species, classified according to the World Conservation Union (IUCN) Red List categories in relation to total number of forest species

The most recognizable form of depletion of biodiversity is the loss of plant and animal species. Slowing down the rate of species extinction due to anthropogenic factors is a key objective of biodiversity conservation. Threatened forest species are seen as indicators of change in the forest ecosystems.

Two approaches are suggested to maintain the biodiversity in forests: the creation of protected forest networks and more nature-oriented methods in forest management. The deadwood component and protection of key habitats have been introduced as new elements, into forest management (Parviainen, 2003).

According to the IUCN Red List categories, a species is listed as threatened if it falls in the critically endangered, endangered or vulnerable categories. A forest species is one that is dependent on a forest for part or all of its requirements for day-to-day living or reproduction. Therefore, an animal species may be considered a forest species even if it does not spend most of its life in a forest. The figures on birds are based on those that breed in the country.

Most threatened species are limited in their geographical distribution to single countries. This indicator is therefore important for the implementation of sustainable forest management at the national level.

Available data

Collecting information on various species groups is very demanding and time-consuming. The Enquiry for this report requested data on numbers of threatened forest species and their relation to the total number of forest species for trees, birds, mammals, other vertebrates, invertebrates, vascular plants and cryptogams and fungi. The data coverage in terms of reported countries is the most extensive on the number of threatened tree species, vascular plants, mammals and birds, and least extensive on the number of invertebrates and cryptogams and fungi. Only 11 countries have provided information on invertebrates; information is particularly lacking in South East and South West Europe.

The data provided by countries are very heterogeneous. While some countries have detailed inventories of forest species and threatened species (Red Lists), others could provide only fragmentary information or none at all. Huge differences in the numbers of threatened species between neighbouring countries, such as Latvia and Lithuania, and Bosnia and Herzegovina and Serbia signal lack of data or different approaches to reporting.

In several countries, data are from 2000 or before, often coming from different sources and national classifications rather than IUCN, and are often estimations due to the lack of quantitative measurements (UNECE/FAO, 2000) Also, the reliability and accuracy of the information varies depending on the quality and coverage of data as well as on how the risk to become a threatened species is assessed. There have occasionally been many difficulties in distinguishing between forest and non-forest species. The most recent information is considered the most reliable. Some countries have completed a new survey for 2005, but the analysis is still underway and therefore it is not possible to report the most recent data.

In addition to interpretation, it should be noted that, in general, the number of species increases gradually from north to south, but the proportion of forest-occurring species is high in the north

and in countries where the forest cover is high (Puumalainen, 2001). Therefore, comparisons of absolute numbers between the countries are difficult. Also, if the total number of forest-occurring species is related to the unit area, i.e. divided by the area of forests and other wooded land in a country, the small countries are the most species-rich.

The relationships between threatened species and forest structure and its components are complex. In particular, the required amount and quality of deadwood need more research and quantification. Many species are also dependent on small key biotopes or habitats within the managed forests. These habitats should be protected and integrated within forest management. To date, these elements have not been sufficiently implemented, monitored or studied in all countries in Europe.

Situation

The largest number of threatened forest tree species was found in Serbia (34 species), but generally varies from 1 to 5 species. (Table 15 and Figure 44). The share of the number of threatened tree species of the total forest tree species varies from 10 to 15 percent. Most forest-occurring tree species are endangered in Albania, Serbia, the Russian Federation, Ukraine and Austria. Seven countries have reported no threatened tree species. In total, three forest tree species have been reported as extinct in the wild, one in Albania and two in Belgium.

Table 15. Numbers of threatened[3] forest-occurring tree species, birds, mammals, other vertebrates, invertebrates, vascular plants, cryptogams and fungi, 2005 (based on available data)

Country/region	Trees	Birds	Mammals	Other vertebrates	Other invertebrates	Vascular plants	Fungi
Austria	11	15	11	18	-	270	97
Albania	32	–	–	–	–	–	–
Belarus	3	57	15	13	75	144	95
Belgium	4	11	–	–	–	14	–
Bosnia and Herzegovina	1	–	–	–	–	–	–
Bulgaria	0	13	2	1	8	31	0
Cyprus	1	12	1	2	–	17	–
Czech Republic	1	248	31	47	0	771	582
Finland	2	8	4	0	284	35	288
Ireland	1	–	–	–	–	–	–
Italy	2	16	21	3	–	–	–
Latvia	3	19	9	2	46	76	28
Lithuania	0	0	2	–	4	–	–
Luxembourg	0	9	–	–	–	61	–
Norway	1	7	2	4	194	14	245
Russian Federation	22	41	18	19	78	166	109
Serbia	34	117	94	60	250	213	55
Slovakia	7	22	7	–	–	207	77
Slovenia	2	43	23	30	227	–	82
Sweden	4	15	8	4	335	45	420
Ukraine	13	12	5	13	63	108	16
United Kingdom	10	0	4	0	38	32	88

These threatened forest tree species often grow in one particular country on the border of its geographical range and thus are categorized as threatened. For example, silver birch *(Betula pendula)* is

[3] Threatened species include the IUCN "vulnerable", "endangered" and "critically endangered" categories.

threatened in Czech Republic, but it is very common in the neighbouring countries moving towards the north. On the other hand, some tree species are endemic and rare, and only occur in very restricted areas, such as Serbian spruce *(Picea omorica)* in Bosnia and Herzegovina, and are therefore seen as threatened.

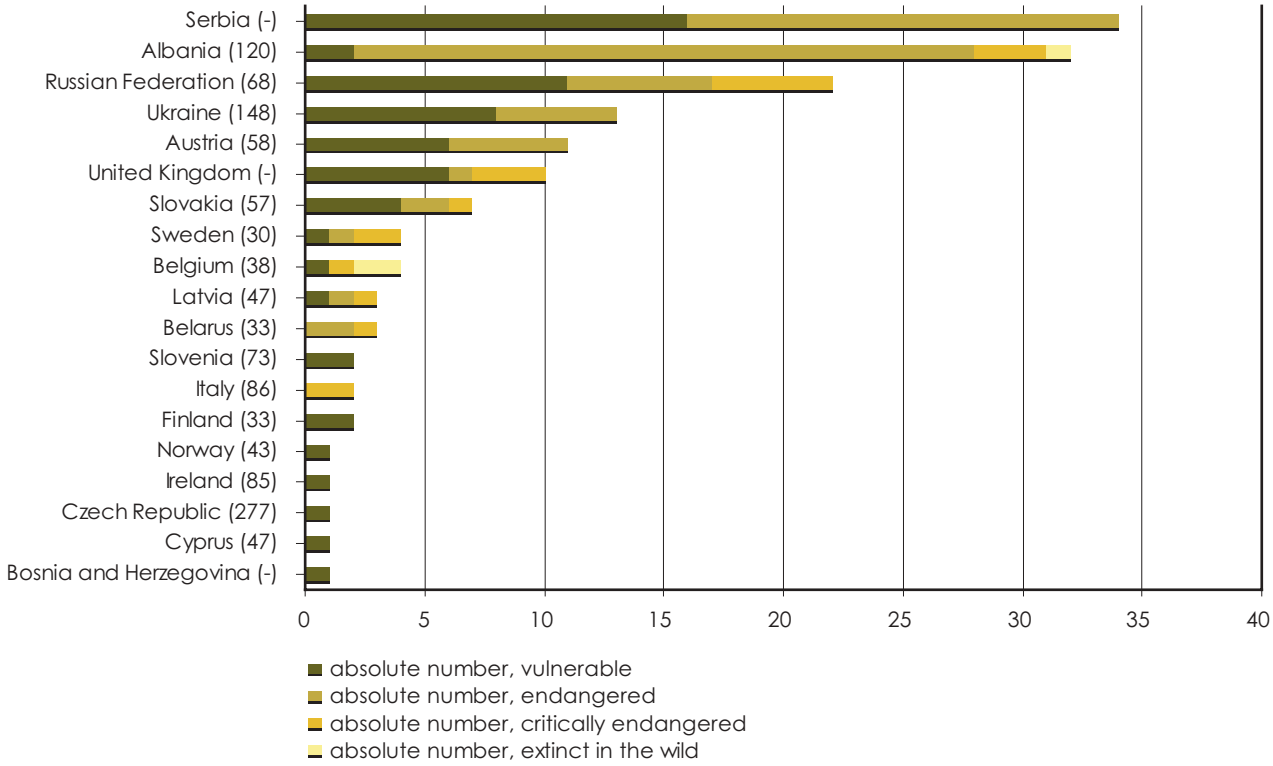


Figure 43. Number of threatened forest tree species, 2005 (based on available data)

Note: The number in brackets after the country name indicates total number of forest-occurring tree species in the country
Source: State of Europe's Forest 2003, MCPFE Liaison Unit Vienna and UNECE/FAO

The number of threatened vascular plant species occurring in the forest, including the tree species and herbal plants, range from 14 to 771 (Table 15). Central and East European countries reported the highest numbers of threatened vascular plant species occurring in the forests. The numbers are lowest in Lithuania, Cyprus, Bulgaria, the United Kingdom and Finland. The share of the threatened vascular plants out of the total number of forest-occurring vascular plants ranges from 5 to 20 percent.

Larger animals, particularly mammals and birds, tend to be proportionally more threatened than the smaller ones and other organism groups reported in this review. Forests are important habitats for big mammals in Europe, especially in the northern countries, for example, for wolf (Canis lupus L.), bear (Ursus arctos L.) and lynx (Felix lynx (L.). The proportion of forest-occurring endangered mammals out of the total number of forest-occurring mammals generally ranges from 5 to 25 percent. The number of endangered mammals is over 10 percent in Serbia, the Czech Republic, Italy, Slovenia, the Russian Federation, Belarus and Austria.

In Europe, birds seem to be less dependent than mammals on forests as habitat (Puumalainen, 2001). Typically, one-fifth of forest-occurring bird species have been reported as threatened. The highest numbers are reported in Central and East European countries, but the numbers vary significantly between individual countries.

The number of other forest-occurring threatened vertebrates reflects the richness of species between the vegetation zones within Europe. In the Nordic countries, only a few (two to four) other

vertebrates occurring in the forests are seen as threatened. The data availability from Southern European countries is sparse.

Twelve countries have reported on invertebrates, cryptogams and fungi. It seems that countries with a high proportion of forests, such as the Nordic countries, have established reporting systems for these organism groups. The numbers of forest-occurring invertebrates, cryptogams and fungi are also the highest in Sweden, Norway and Finland. While the number of invertebrates is generally very high, the proportion of threatened forest-occurring invertebrates remains low, i.e. at its highest, from 2–3 percent.

Trends

The data provided on threatened species by country are very heterogeneous and does not yet allow monitoring of trends at the European level. Changes in forests always occur slowly, which means that the new biodiversity orientation in forest management will be reflected in the results and the trends of threatened species in the future. Forest management is now becoming more biodiversity-oriented, which influences the numbers and the occurrence of threatened species. This influence can be observed only in the long run, not in one or two years. It will take ten to 20 years before one will be able to see changes in management methods in the numbers of threatened species. Nevertheless, in some countries, especially Nordic countries, the long-term monitoring of threatened forest species indicates that it has been possible to slow down the increasing trend in the numbers of threatened species with the new management measures in managed forests (Maa- ja metsätalousministeriö, 2007).

Indicator 4.9. Protected forests

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

Protected areas are one of the oldest instruments for protecting nature and natural resources, and are included as a main pillar in nature conservation laws across Europe. Explicitly designated protected areas focus mainly on conserving biological diversity, landscapes, natural monuments and protective functions of forests.

The MCPFE Assessment Guidelines for Protected and Protective Forest and Other Wooded Land in Europe were created in 2001–2003 especially for European conditions where protected forests areas are often small, with most located in fragmented landscapes with other land use categories and protected with various management options and regimes. According to these guidelines (MCPFE, 2003), the preliminary information gathered on protected forest areas in Europe show that minor differences in interpretation can produce wide variations in the results. Harmonization and further clarification of the guidelines were therefore needed in order to provide more reliable and comparable data. This harmonization work was carried out in EU COST Action E 27 (Frank et al., 2007) from 2002 to 2006, with an output of MCPFE Information Document 2006 used for this assessment (Parviainen and Frank, 2006).

Natura 2000, an essential European conservation network, focuses on the conservation of habitats and species in the European Union. It is not a classification system per se and does not exclusively focus on protected forest areas, but rather, also includes areas with a multi-purpose use of forests and other ecosystems. It is not, therefore, included as such in MCPFE reporting on protected/protective forests and other wooded land. However, the legally binding and long-term protected areas included in Natura 2000 networks appear according to the normal assessment rules through the interpretation guidelines into the MCPFE classes for protected and protective forest.

Situation

Information was provided from 35 countries according to the Assessment Guidelines. Germany, Estonia and Luxembourg have included their Natura 2000 networks in the data, which makes the comparison with other countries difficult. In some cases, the countries could provide data only for forest but not for other wooded land, whereas in others, information was available on the forest and other wooded land combined. The basis for the European scale calculations was the area of forests and other wooded land.

About 31 million ha, or 3.0 percent, of the forest and other wooded land has been protected in 35 countries in the MCPFE region with the main management objective of biodiversity. Over half of this area is located in the Russian Federation. Excluding the Russian Federation, the area protected for biodiversity is in the remaining MCPFE region – 15.1 million ha, or 8.1 percent, of the forest and other wooded land (Table 16). Within the forests protected for biodiversity, the share of MCPFE class 1.3 active conservation management is clearly the highest. The share of the class MCPFE 1.1, with no active intervention, is only 15 percent in MCPFE region excluding the Russian Federation (Figure 44).

Table 16. Area of forest and other wooded land (FOWL) protected for biodiversity (MCPFE Classes 1.1–1.3) and landscape (MCPFE Class 2) in Europe excluding the Russian Federation, 2005

Management objective and MCPFE Category	ha (million)	Percent of forest and other wooded land (FOWL)
Biodiversity, MCPFE categories 1.1–1.3	15.1	8.1
1.1 No active intervention	2.4	1.3
1.2 Minimum intervention	5.7	3.1
1.3 Conservation through active management	7.0	3.8
Landscape, MCPFE Category 2	18.8	10.1
Total – Biodiversity and Landscape	33.8	18.3

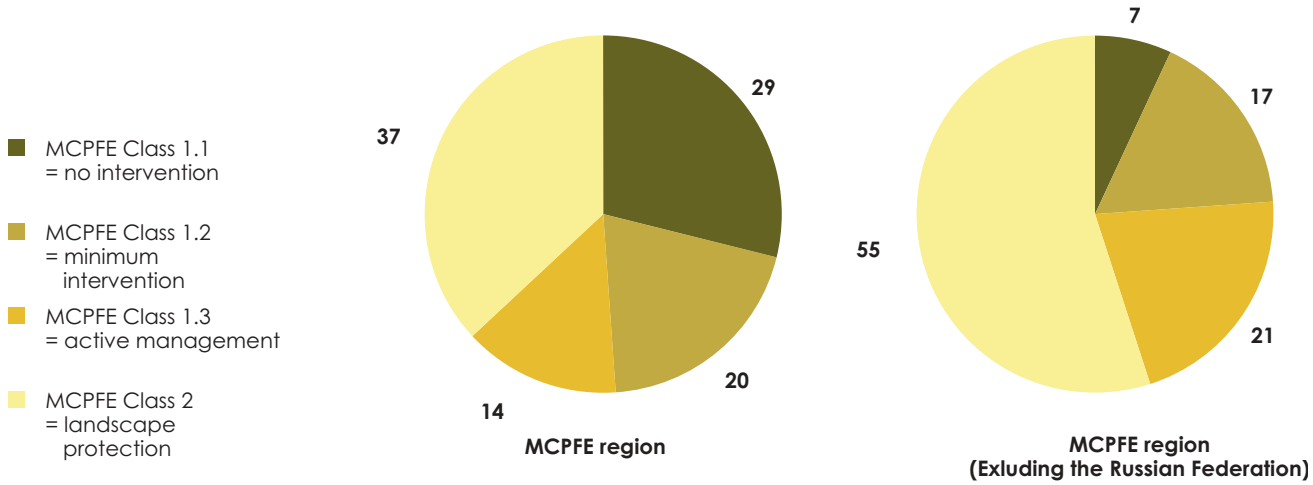


Figure 44. Share of protected area (%) by MCPFE classes 1.1–1.3 and 2 of the total forest and other wooded land area protected in the MCPFE region, 2005

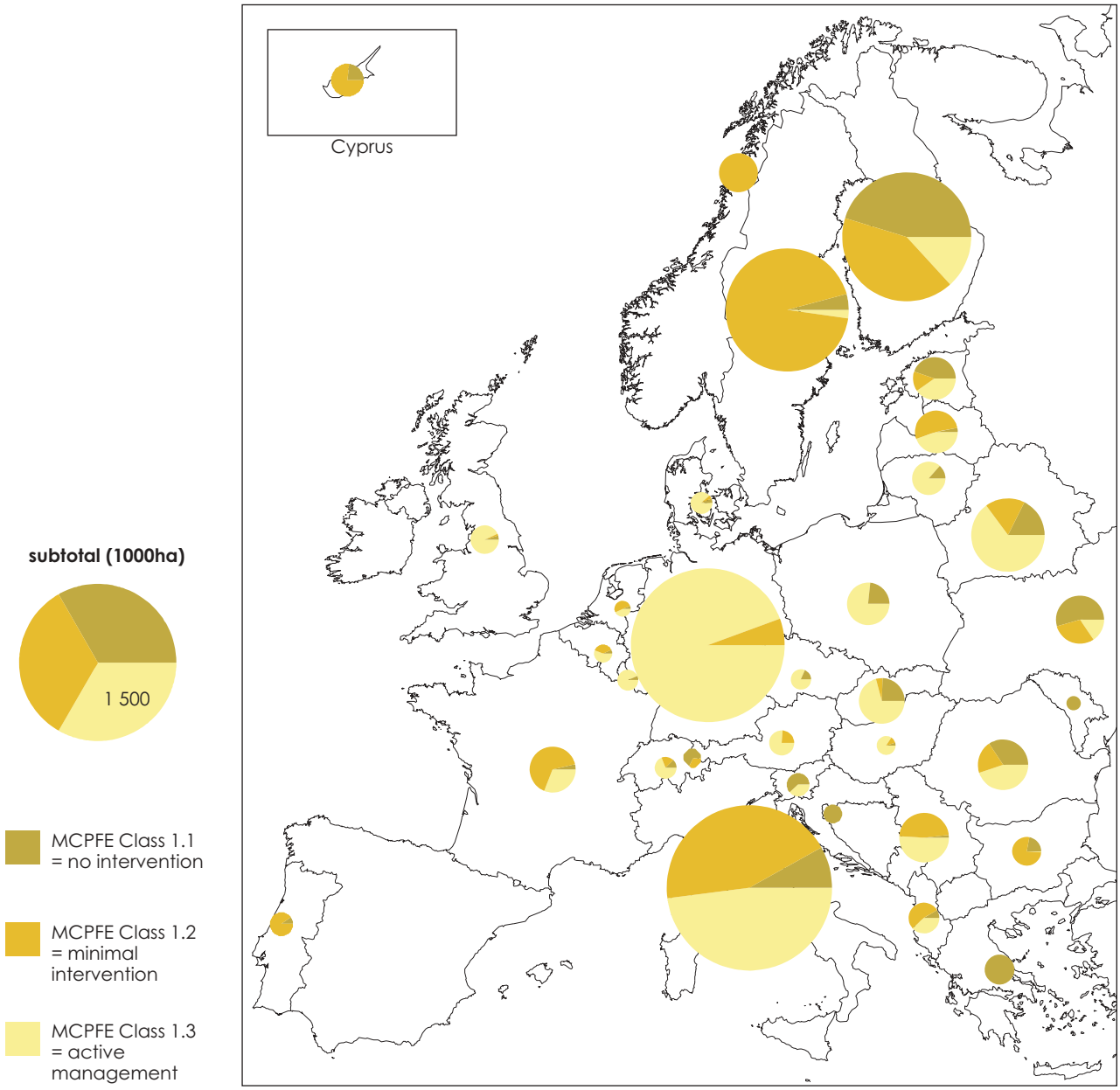


Figure 45. Share of the protected area by MCFE Classes 1.1–1.3 of the total forest and other wooded land area protected for biodiversity by countries in the MCPFE region, excluding the Russian Federation (1 000 ha and %), 2005

Note: For Germany, Switzerland, Poland and Slovenia, only data for forest area are available. Data for Germany, Estonia and Luxembourg include the Natura 2000 areas

The amount of protected forest areas for biodiversity (MCPFE class 1) varies considerably between the countries. Also, the share of the subclasses MCPFE 1.1–1.3, i.e. the strictness of management for biodiversity, also shows very clear differences between the countries (Figure 45). Excluding the Russian Federation, the largest areas with no active intervention (MCPFE Class 1.1) of the total area of forests protected for biodiversity in Europe are located in Finland – nearly half (930 000 ha) of the area. Sizeable areas with no active interventions over 100 000 ha are located in Italy, Ukraine, Greece, Romania, Belarus and Estonia. The largest protected forest areas for biodiversity with minimum intervention (MCPFE Class 1.2) are located in Sweden and Italy.

The largest protected forest area with active conservation management (MCPFE Class 1.3) is found in Germany, with 2 634 000 ha. Germany included all Natura 2000 areas, which were not generally included by other countries in the MCPFE class 1.3. Large areas for active biodiversity management can also be found in Italy, Belarus, Finland, Poland and Slovakia.

These differences between the MCPFE classes for biodiversity reflect the various approaches to forest protection: Nordic/Baltic and Eastern Europe emphasize strict protection, whereas Central, North West and South European countries emphasize active management depending on forestry conditions.

The proportion of protected areas for biodiversity (MCPFE Classes 1.1,1.2 and 1.3 combined) of forest and other wooded land is highest in Luxembourg, Italy, Germany, Denmark, Serbia and Slovakia) (Figure 46).

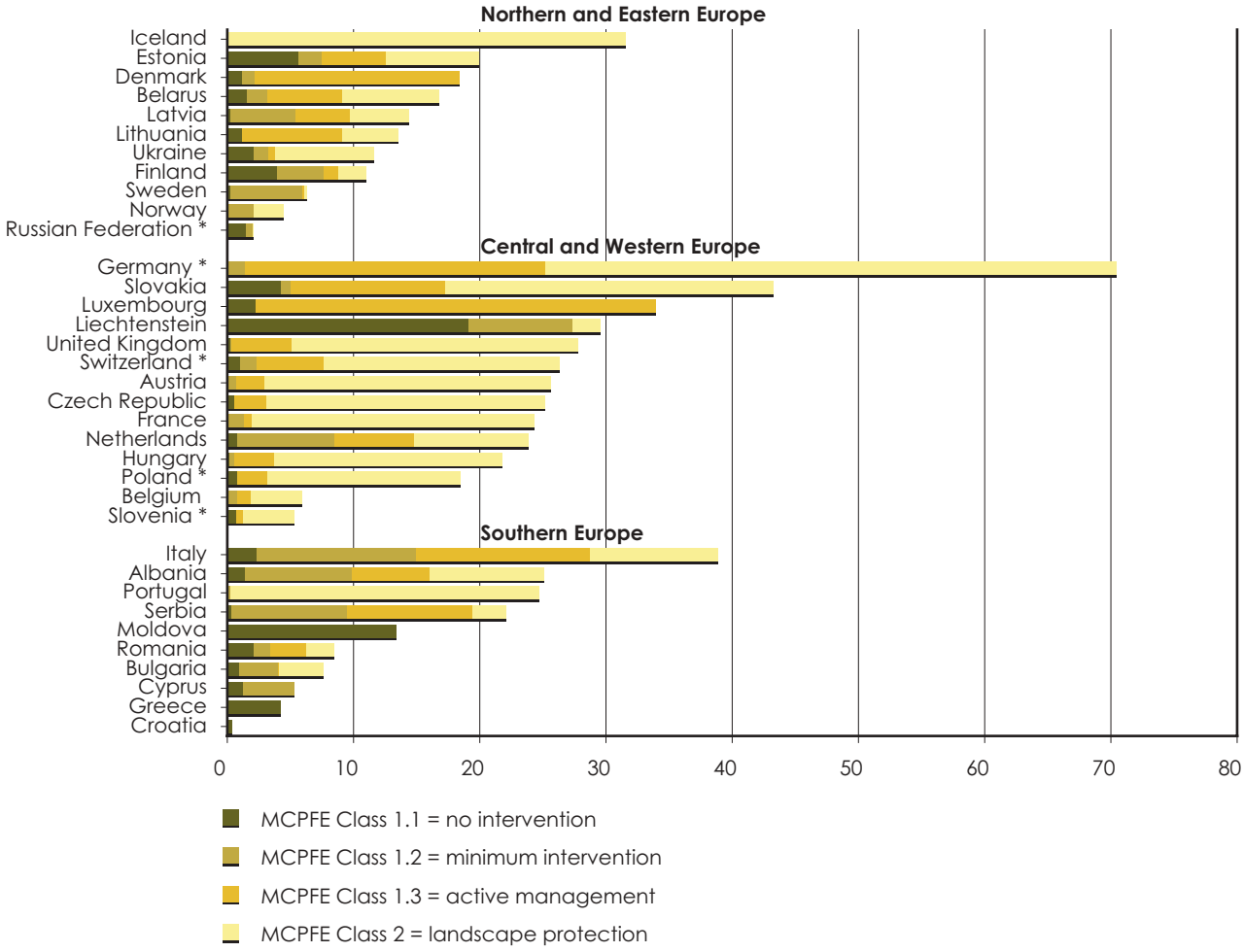


Figure 46. Share of protected area of the total forest and other wooded land area for biodiversity (MCPFE Classes 1.1–1.3) and for landscape (MCPFE Class 2) (%), by country in the MCPFE region, 2005, classified according to the share of forest protected for biodiversity

Note: *Only data for forest available
The numbers of Germany, Estonia and Luxembourg include Natura 2000 areas

MCPFE Class 2, whose main management objective is, "the protection of landscape and specific natural elements", supports the conservation goal for biodiversity, in particular by protecting special natural elements (in some cases this class also includes Natura 2000 areas). However, this objective is principally aimed at achieving the goals of landscape diversity, cultural, aesthetic, spiritual and historical values and recreation. In general, commercial forestry is possible in these areas as long as it complies with the primary objective of landscape protection. Therefore, the results are described separately from MCPFE Classes 1.1–1.3, whose main conservation goal is biodiversity.

Up to 2005, in the MCPFE region, about 18.7 million ha, or 10.1 percent of forests and other wooded land, have been protected for landscape and specific natural elements (Table 16 and Figure 46). Figure 46 includes the MCPFE area excluding the Russian Federation (where the proportion of MCPFE Class 2 is under 0.01 percent).

Landscape protection prevails mainly in central and western European countries. Countries with the highest proportion of landscape protection areas are Germany, Portugal, Slovakia, France, Austria, the United Kingdom and the Czech Republic. In Germany, the forest area for protection of landscape reaches 5 million ha. In countries with a high proportion of boreal forests and low population density, such as Finland, Sweden, Norway and the Russian Federation, the area of landscape protection area is very small.

Trends

Data provided by some selected countries show changes in the area of protected forests for biodiversity between the MCPFE Classes in 2000 and 2005, and most of the countries reported the highest amount for 2005 (Figure 47). The numbers indicate in particular that the area of active management has increased. A trend of increased areas of forests protected for landscape can also be observed.

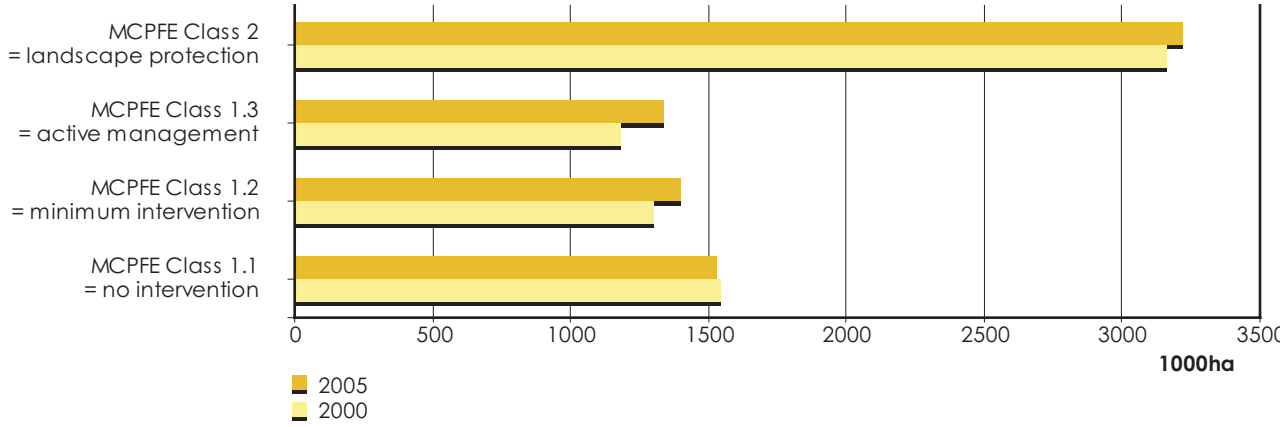


Figure 47. Area of protected forest and other wooded land (1 000 ha) of selected MCPFE countries excluding the Russian Federation, by MCPFE classes (1.1–1.3 and 2), 2000 and 2005 (based on available data)

Criterion 5. Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (notably soil and water)

More than one-fifth of European forests are managed primarily to protect water, soil and infrastructure.

Ten percent of European forests are designated primarily for the protection of soil and water, and 11 percent for the protection of infrastructure or managed natural resources. In some areas, notably mountains, the protective functions are particularly important and override the others.

Key findings by Indicator

5.1. Protective forests – soil, water and other ecosystem functions

Forests often play a significant protective role, especially to prevent erosion and protect water supplies, which is more important than is often assumed in forest policy. Measures are in place in many countries to recognize and safeguard these functions.

5.2. Protective forests – infrastructure and managed natural resources

Forests protect a wide variety of man-made infrastructures in all MCPFE regions, including roads, railways, pipelines, cultivated areas, industrial areas and settlements. Adapted regimes have been developed for the specific needs of particular types of protection forests. However, only about half of MCPFE countries reported specific measures to identify forests with these protective functions, due to the overlap with other functions.

Introduction

Nearly all forests perform some protective functions, including the prevention of erosion and soil loss, the protection of drinking water resources. the fixing of sand dunes and the mitigation of noise pollution. In mountain areas, forests protect infrastructure such as roads, railway lines, or buildings from avalanches and landslides. Many of these services are highly site-specific. Although a primary role of these forests is to protect, they must themselves be protected if they are to perform their functions. In fact, the breakdown of the protection function of many European forests during the Middle Ages and up to the 19th century was one of the one of the driving forces of the creation of modern forestry law and practice.

Most forests are multi-functional to some degree, so functions other than protection are often provided by protection forests. Similarly, protection functions are supplied by many forests not explicitly designated as protection forests. Thus, the information in this criterion gives only a partial picture of the actual protection benefits provided by European forests. In particular, there are many overlaps in area and management methods between protection forests (Criterion 5) and forests managed for conservation of biological diversity (Criterion 2), although these two categories are conceptually distinct. Protection forests have been classified in MCPFE Class 3 with a further breakdown according to whether the objective of the protection is natural (soil/water, indicator 5.1) or man-made (infrastructure, indicator 5.2). The MCPFE Classification specifies that in Class 3:

management is clearly directed *to protect soil and its properties or water quality and quantity or other forest ecosystems, or to protect infrastructure and managed natural resources against natural hazards. Forests and*

*other wooded land are **explicitly designated** to fulfil protective functions in management plans or other legally authorized equivalents. **Any operation negatively affecting** soil or water or the ability to protect other ecosystem functions, or the ability to protect infrastructure and managed natural resources against natural hazards **is prevented**.*

The indicators therefore aim to measure not the quantity of protective services provided by European forests (which would be very hard to measure objectively), but rather, the management/policy decisions in favour of, "maintenance and appropriate enhancement of the protective functions of forest management".

Both the indicators 5.1 and 5.2 refer to area of forest and other wooded land designated for protective functions, implying legislative or management decisions. However, the notes provided by national correspondents show that the concepts used by countries vary widely, so there is little comparability between countries. The different approaches are described below. It is also not always clear to what extent the areas designated under indicators 5.1 and 5.2 overlap with those under criterion 4 on forests protected for conservation.

Indicator 5.1. Protective Forests – Soil, water

Area of forest and other wooded land designated to prevent soil erosion, to preserve water resources, or to maintain other forest ecosystem functions, part of MCPFE Class "Protective Functions"

Many forests play a significant protection role, especially in preventing erosion and protecting water supplies. Measures are in place in many countries to recognize and safeguard these functions, including zoning of forests and restriction of certain management practices. Some of these designations are legal or administrative in nature, whereas others result from managers' decisions, notably in the context of forest management plans for the areas concerned.

Status

Thirty-eight countries, accounting for practically all of MCPFE region forests, provided information on the area of forests designated in 2005 for the protection of soil and water (Figure 48).

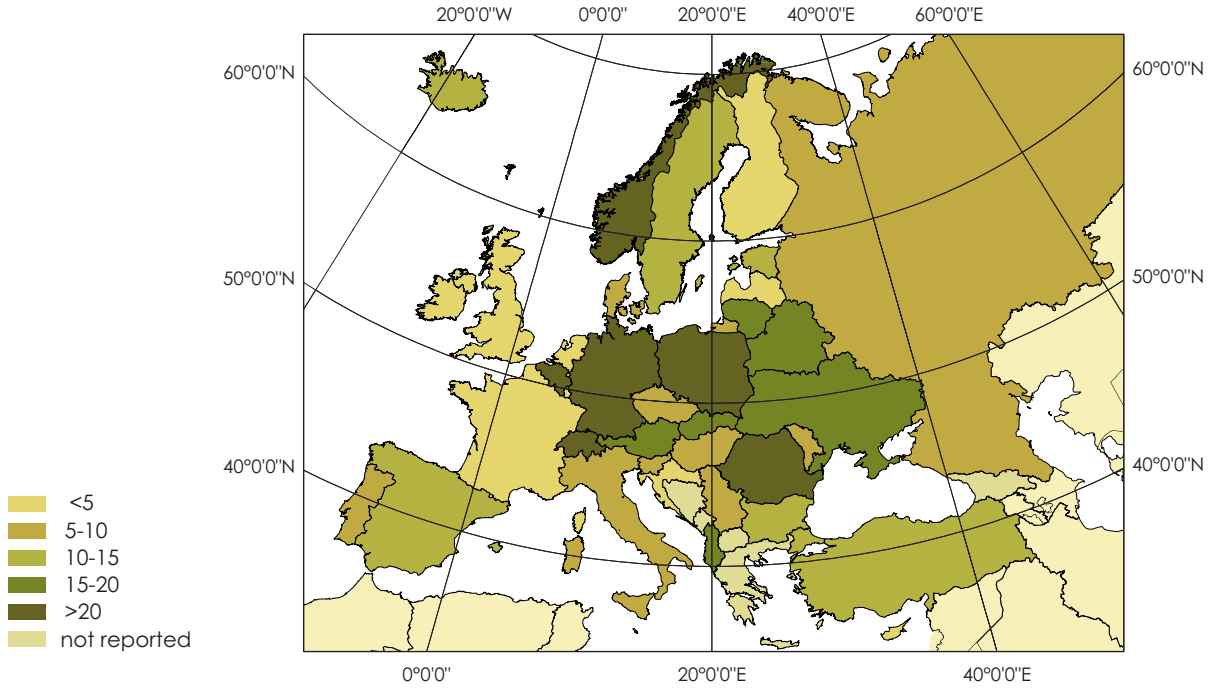


Figure 48. Forest area designated for the protection of soil and water, 2005 (% of forest area)

Furthermore, 96.3 million ha of MCPFE region forests (9.6 percent of the total forest area) are reported as designated for the protection of soil and water (Table 17). Of this, 70.6 million ha are in the Russian Federation (8.7 percent of its forest area). Under this category, the Russian Federation reported forests designated for: soil protection; drinking water catchment protection; shading spawning grounds for valuable fish (38.5 million ha), and forested strips alongside rivers and other water bodies (21.5 million ha). Thus, in the Russian Federation, the main objective of forests under this indicator is water protection.

Table 17. Forest area designated for the protection of soil and water, 2005

Region	Area (1 000 ha)	% of forest area
Central Europe	4 573	20.7
East Europe	73 605	8.9
Nordic/Baltic	7 200	10.7
North West Europe	4 395	14.1
South East Europe	3 505	10.7
South West Europe	3 065	9.7
MCPFE	96 343	9.6
MCPFE excl. the Russian Federation	25 787	13.2

The interpretation of the assessment guidelines in the Enquiry has not been consistent across countries, which may have been inevitable given the wide variation in physical and policy circumstances. The reported share of protection forests ranges from 0 to 100 percent. The functions of forest reported under indicator 5.1 reflect different concepts and management regimes. Comments given by national correspondents show differences in national approaches, which include: planted forest primarily aimed at soil conservation and erosion prevention; site-protecting forests on sites endangered by erosive forces and which require special treatment; forests with watershed and/or similar management plans; sanitary protection zones; state forest managed for protection of drinking water; and forest where the main functions are erosion control, water management and water protection. Switzerland stated that according to Swiss forest law, the management of the entire forest area should be directed to protect soil and its properties, water quality and quantity or other forest ecosystem functions. Thus, the entire forest area of Switzerland was reported under this indicator. For the reasons given above, data on this indicator are not comparable between countries.

Trends

Thirty-seven countries, accounting for 98 percent of forests in the MCPFE region, provided information on the area of forests designated for protection of soil and water in both 2000 and 2005. Coverage was weaker for other wooded land, which is therefore not included in the analysis below.

Table 18. Trends in area of protective forest, soil and water 2000–05

Region	Area 2000* (1 000 ha)	Area 2005* (1 000 ha)	Annual change in area (1 000 ha) 2000–05	Annual change rate (%) 2000–05
Central Europe	4 326	4 573	49	1.12
East Europe	73 019	73 605	117	0.16
Nordic/Baltic	7 181	7 200	4	0.05
North West Europe	3 561	4 395	167	4.30
South East Europe	1 907	1 904	–1	–0.03
South West Europe	3 008	3 065	11	0.38
MCPFE	93 003	94 742	348	0.37
MCPFE excl. the Russian Federation	22 617	24 186	314	1.35

Note: *Area only of those countries that provided data for both 2000 and 2005

From 2000 to 2005, a slight increase of the area reported under indicator 5.1 can be observed in Central Europe (1.1 percent per annum) and North West Europe (4.3 percent per annum), as well as in the MCPFE region excluding the Russian Federation (1.4 percent per annum), while in the other regions, the forest area designated for protection of soil and water remained more or less unchanged. Given the conceptual problems outlined above, however, it is not possible to determine to what extent this reflects a change in practice (on the ground or in policy) and to what extent it results from weak comparability over time.

The functions of the identified protective forests varied widely, as demonstrated above, and do not allow for a sound quantitative statement. In the countries that have not provided data for this indicator, it cannot be concluded that their forests have no protective function related to water and soil. It is clear, however, that many forests play a significant role in preventing erosion and protecting water supplies.

Indicator 5.2. Protective forests – Infrastructure and managed natural resources

Area of forest and wooded land designated to protect infrastructure and managed natural resources against natural hazards, part of MCPFE Class "Protective Functions"

Forests protect a wide variety of manmade infrastructures in every country of the region, yet there is more pressing need in mountainous areas or areas with extreme climates. Countries reported forests protecting areas such as roads, railways, pipelines, human settlements or facilities, and cultivated soils as well as shelter belts, health resorts and forest stands of special value. Forests offer protection from various impacts, including rock fall, avalanches, wind, noise, emissions and climate. Adapted regimes have been developed for the specific needs of particular types of protection forests.

Status

In 2005, 31 countries, accounting for 94 percent of MCPFE region forests, provided information on the area of forests designated for the protection of infrastructure.

The same problems of lack of comparability apply to indicator 5.2 as to indicator 5.1. Furthermore, 16 countries reported that they had no forest land specifically designated for protection of infrastructure, in addition to the 15 countries that did not reply on this indicator.

In the 15 counties that reported having forest land specifically designated for the protection of infrastructure, a total of 106 million ha (11.1 percent of their total forest area) was designated for this purpose, (Table 19), of which 99.4 million ha are in the Russian Federation. About 6.4 million ha, or 4.5 percent of the forest area, are designated for infrastructure protection in reporting countries of the MCPFE region excluding the Russian Federation,

Two Alpine countries, Switzerland and Liechtenstein, reported a significant share of their forest designated for infrastructure protection, with 57.4 percent and 37.8 percent of their forest designated for these purposes, respectively. Ukraine and the Russian Federation also reported a large share of their forests, 22.5 percent and 12.3 percent, respectively, as designated for the protection of infrastructure. Many of the former centrally planned economies correlated this indicator with class 3 of their forest classification (specially protected forests), which has a wide range of non-wood forest functions. In particular, recreation forests around towns and resorts have often been included in this category. Other frequently mentioned objects of protection are roads and railways, core zones of nature reserves and noise control.

Table 19. Forest area designated for the protection of infrastructure, 2005

Region	1 000 ha	% of forest area
Central Europe	2 325	12.8
East Europe	103 099	12.4
Nordic/Baltic	22	–
North West Europe	0	0
South East Europe	372	3.1
South West Europe	1	n.s.
MCPFE	105 818	11.1
MCPFE excl. the Russian Federation	6 420	4.5

Note:– response rate too low for regional averages

Trends

Twenty-nine countries, accounting for 93 percent of MCPFE region forests, provided information on the area of forests designated for protection of infrastructure for both 2000 and 2005. This is less than the number of countries reporting on protection of soil and water. Coverage was weaker for other wooded land than for forest, so other wooded land (OWL) is not included in the analysis below.

Table 20. Trends in forest area designated for infrastructure protection

Region	Area 2000* (1 000 ha)	Area 2005* (1 000 ha)	Annual change in area (1 000 ha) 2000–05	Annual change rate (%) 2000–05
Central Europe	2 673	2 325	–70	–2.76
East Europe	104 335	103 099	–247	-0.24
Nordic/Baltic	13	22	2	11.10
North West Europe	0	0	0	–
South East Europe	233	147	–17	–8.80
South West Europe	0	0	0	–
MCPFE	107 254	105 593	–332	–0.31
MCPFE excl. the Russian Federation	7 682	6 195	–297	–4.21

Note: *Area only of those countries that provided data for both 2000 and 2005

For the MCPFE region excluding the Russian Federation, countries reported a decrease in the area of forest designated for the protection of infrastructure from 2000 to 2005 of 297 000 ha, or 4.2 percent on average every year.

Only one country, Lithuania, reported an increase in the area of forest designated for infrastructure protection in the 2000–05 period, while seven countries reported decreases in these areas, with rapid rates of decrease (up to 9 percent per year). None of the countries that reported declines commented on the causes, but all of these countries are in transition, undergoing profound changes in their administrative and forest policy systems. It should be investigated whether or not the marked decline in these countries' areas of forest designated for the protection of infrastructure in fact represents any change in the management objectives or priorities of certain forest areas.

Some broad conclusions may be drawn from the reports received under Indicator 5.2:

- Forests protect a wide variety of manmade infrastructures in every country of the region, although the need is more pressing in mountainous areas or those with extreme climates. Examples are roads, railways and pipelines as well as wind breaks, shelter belts and forests near resorts. Adapted regimes have been developed for the specific needs of particular types of

protection forests. However, only about half of MCPFE countries reported specific measures to identify forests with protective functions.

- The apparent decline in area of protective forest in transition countries is not explained and may be due to administrative changes rather than changes in management practice.

Criterion 6. Maintenance of Other Socio-Economic Functions and Conditions

Forests are mainly public in about half of European countries, and mainly privately owned in the other half.

Due to the vast areas of public forests in the Russian Federation, in Europe as a whole, 90 percent of forest area is public and 10 percent is privately owned, but ownership patterns and trends vary widely across regions and countries. Without the Russian Federation, almost half of Europe's forest area is owned by private forest owners. The number of private forest holdings, currently more than 11 million, continues to grow, mainly due to the ongoing restitution process in some European countries as well as fragmentation due to inheritance laws.

European production and consumption of wood is increasing, as are exports of wood products.

Since the mid-1990s, wood consumption per capita has been rising, reaching 1.1 m^3 in 2005. At the same time, Europe has become a major net exporter of wood products to other regions (100 million m^3 per year). Large volumes of wood are used for energy, with a significant increase in recent years. Forestry activities, wood industries, and the pulp and paper industry combined contribute about 1 percent to the gross domestic product in Europe and substantially more in a few countries. The total added value and the net revenue of forestry activities remain stable.

Around 4.3 million people work in the European forest sector.

Employment in forestry continues to decrease in Europe, but the loss of jobs is slowing down. In 2005, employment in forestry activities, wood industries and pulp and paper industries accounted for 1.1 percent of total employment in Europe. Occupational safety is improving, but forestry remains one of the most hazardous sectors.

More than 90 percent of European forests are open to public access.

More than 90 percent of the forests in Europe are open to public access, and the area of forest available for recreation is increasing. A very large number of archaeological sites, nature monuments, and other sites of cultural and spiritual value are found in forests.

Key findings by Indicator

6.1. Forest holdings

In the MCPFE countries, 90 percent of forests are public and 10 percent private, but ownership patterns and trends vary widely across the regions and countries. The number of small private forest holdings continues to grow mainly due to the ongoing restitution process in some European countries.

6.2. Contribution of forest sector to GDP

Forestry activities, wood industries and the pulp and paper industry combined contribute 1 percent to the GDP, but significantly more in a few countries. The contribution of these three subsectors to GDP is decreasing as other sectors of the economy grow faster, including the service sector.

6.3. Net revenue

There is a large variation in annual figures of net revenue due to market conditions. The total added value and the net revenue of forestry and logging activities remain stable (EUR 50–140/ha in different MCPFE regions).

6.4. Expenditures on services

Forest owners and governments incur additional expenditures for producing recreational, environmental, protective, and other long-term services from forests that are demanded by the public. As information on expenditures for services is rare, a case study was conducted. Thirteen countries reported spending a total of EUR 760 million of public funds on these services in 2005. However, the case study does not make it possible to draw a representative figure for the MCPFE region.

6.5. Forest sector workforce

In Europe, employment in forestry continues to decrease, but loss of jobs is slowing down. In 2005, employment in forestry activities, wood industries, and pulp and paper industries was at 4.3 million and accounted for 1.1 percent of total employment.

6.6. Occupational safety and health

Forestry continues to be one of the most hazardous occupations in Europe, but occupational safety is improving.

6.7. Wood consumption

Wood consumption per capita has been rising since the mid-1990s and currently averages 1.1 m^3 per head per year.

6.8. Trade in wood

Europe has become a major net exporter of wood products to other regions. The competitive trade position of European wood industry has improved significantly. Total exports of wood and paper products have more than doubled since 1992 and net exports to other regions reached 100 million m^3 in 2005.

6.9. Energy from wood resources

Latvia, Finland and Sweden lead the way with more than 10 percent of their energy consumption originating from wood. Most countries reported a significant increase in recent years.

6.10. Accessibility for recreation

Accessibility for recreation is granted either by a legal right of access or customary rights and other de facto forms of access. In Europe, the public can access nearly all forest and other wooded land, and the area available for recreation is increasing.

6.11. Cultural and spiritual values

Numerous archaeological sites, natural monuments and other sites of cultural and spiritual value are found in forests, where they remain well protected.

Indicator 6.1. Forest holdings

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

The number of forest holdings is an important social indicator, especially for the sustainable development in rural areas due to significant changes during the last decades. Significant change in number of holdings was caused by political decisions on the restitution and privatization of forest land to former owners and their heirs in a number of countries in Central, South East Europe and the Baltic States. Data was collected through country reports to the MCPFE Enquiry on quantitative indicators as well as the Private Forest Ownership Enquiry[4].

Public ownership dominates (>70 percent of forest and other wooded land) in East Europe as well as the Czech Republic, Poland, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Moldova, Romania, Turkey and Malta. Private forests prevail (>70 percent) in Austria, Slovenia, Denmark, Norway, France, Portugal and Spain. In other countries, the share of each ownership category is between 30 and 70 percent. Figure 49 shows ownership differences at the country level.

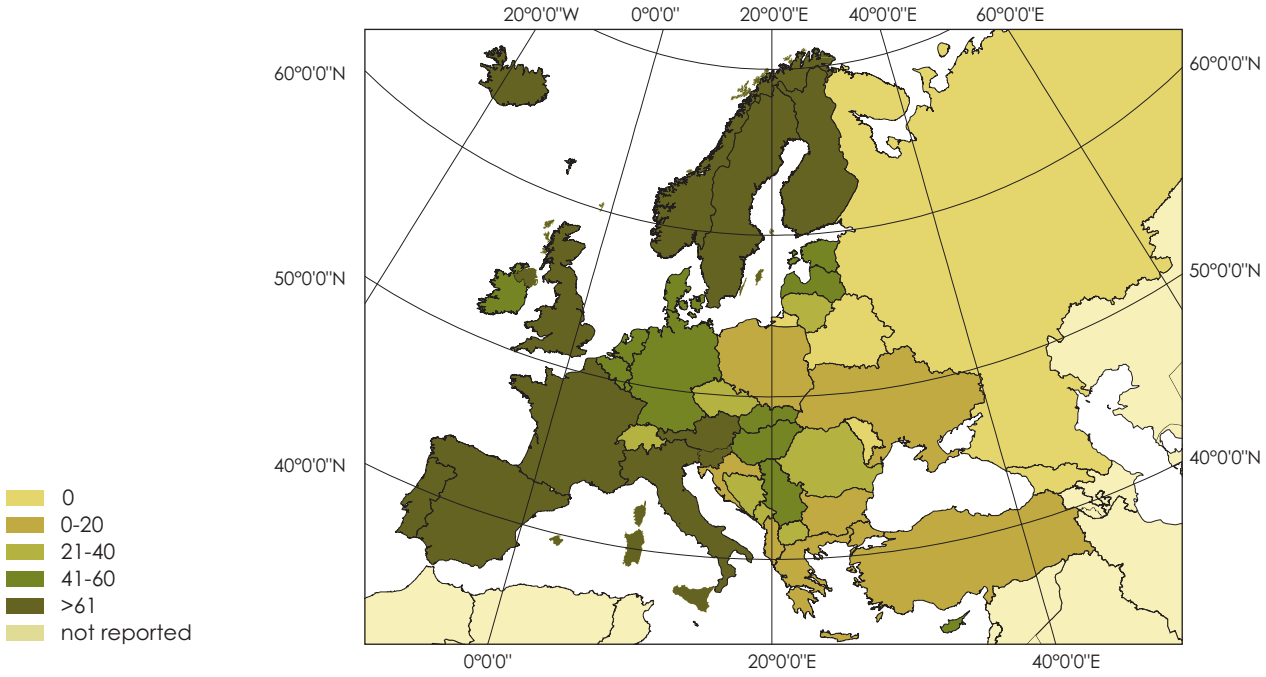


Figure 49. Area of privately owned forest and other wooded land (% of total), 2005

The aggregate picture of ownership only partly reflects the true picture, as the situation is often different on the country level. While in France, for example, a large number of public forest holdings are in communal and provincial ownership, most of public forests in the Nordic/Baltic countries are state-owned. According to the responses to the Private Forest Ownership Enquiry[5], the largest share (>80 percent) of private forests is owned by individuals and families; the rest is owned by private institutions and forest industries. The largest share of public forest is owned by the State (85%), the rest mainly by cities, townships, municipalities and provincial governments.

In MCPFE countries as a whole, the overall change in the ownership patterns has been slight since the 1990s. The estimated share of private forests rose from 9 to 10 percent between 1990 and 2005. However, this figure is highly influenced by the vast forest area in the Russian Federation, where

[4] A joint enquiry/questionnaire by UNECE/FAO, the MCPFE and CEPF was elaborated and addressed to 38 European countries with private forestry in 2006; 23 countries have participated by submitting national reports. Results are being published by UNECE/FAO.
[5] This is based on 11 countries that provided data.

there is only state ownership of forest and other wooded land. Excluding forest and other wooded land in Russian Federation, the expansion of private forests in MCPFE becomes more visible – the share of private forests increased from 44 percent in 1990 to 47 percent in 2000 and remained at 47 percent in 2005. Ownership other than public or private is insignificant in the MCPFE region (0.36 percent in 2005). Changes in the share of different forest ownership categories are presented in Figure 50.

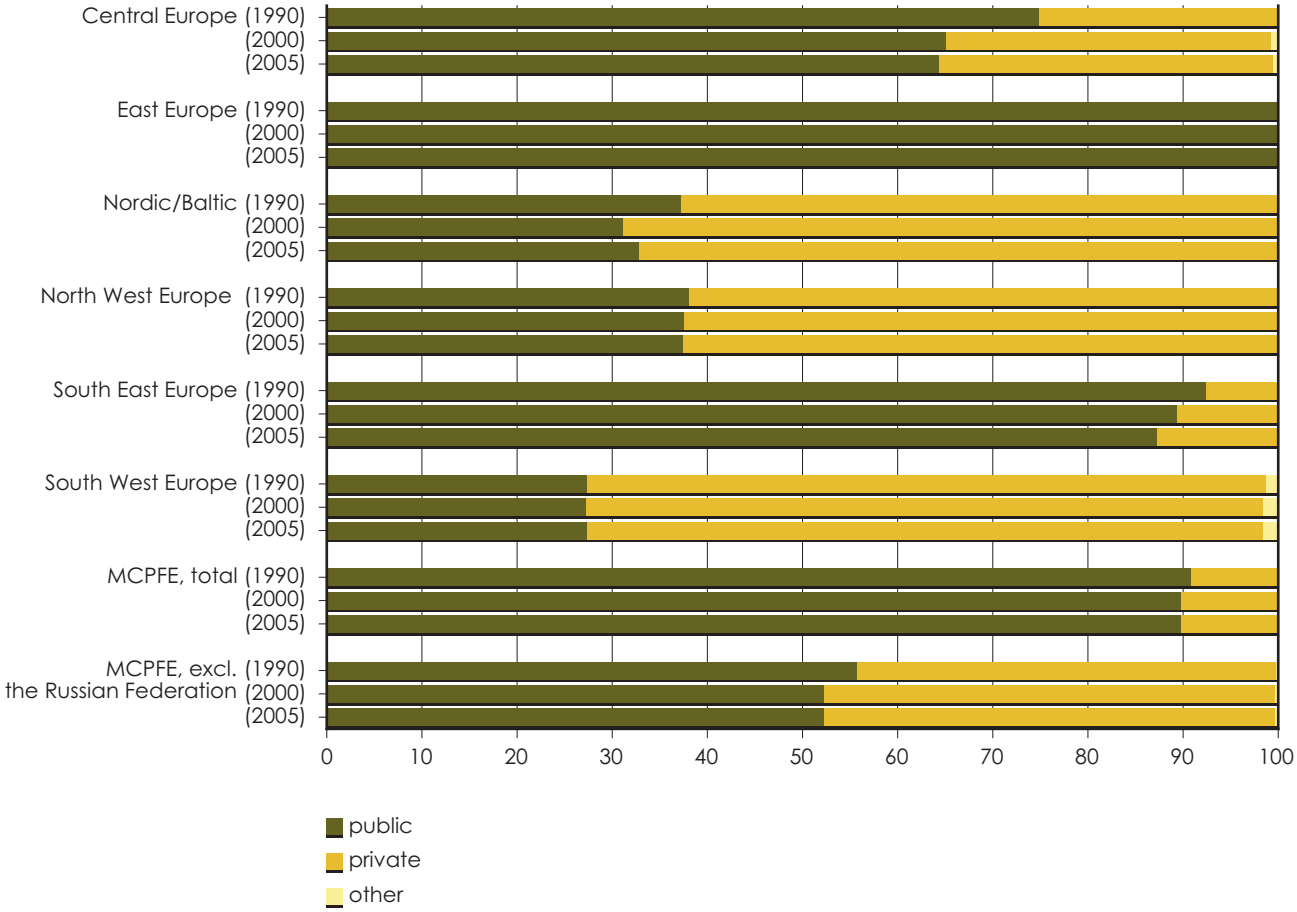


Figure 50. Changes in the share of ownership of forest and other wooded land (%), by region

Figure 50 shows that the most noticeable changes in forest ownership patterns in the MCPFE region occurred in the 1990s. The share of private forests increased in Central, South East Europe and Nordic/Baltic countries at the cost of public forests. Nevertheless, ownership patterns have stabilized since 2000, except in South East Europe, where forest restitution is still ongoing.

The area of forest and other wooded land in both public and private ownership has been consistently increasing in the last 15 years. According to available data, the area of publicly owned forest and other wooded land has expanded by nearly 0.5 million ha per year and the area in private ownership by over 0.2 million ha per year since 2000. Significant change in public ownership is highly influenced by the data from Sweden, where the state-owned forest company Sveaskog acquired all shares in the partly state-owned company AssiDomän in 2001. Prior to 2001, the state was a minority owner in AssiDomän, which owns 2.5 million ha of forest land.

In general, it seems that government policies had an impact in terms of consistent expansion of forest area through afforestation and rural development programmes in both public and private forests in Europe.

Due to different reporting on the country level, it is difficult to track the precise trends in absolute number of forest holdings, especially by holding size classes. Overall, the reported number of pub-

lic forest holdings was 64 000 (in 2005), down from 75 000 in 2000, while the reported number of private holdings increased from 10.5 to 11.2 million in the same period. Country figures are not directly comparable due to different definitions adopted by countries (especially for public forests) and to the exclusion of small holdings in reporting on private ownership. For example, Germany reported the number of holdings with an area of minimum 5 ha; Finland, with a minimum of 2 ha. Moreover, the number of holdings does not necessarily represent the number of owners, since some holdings are owned by several owners through joint ownership.

However, some general observations can be made regarding MCPFE countries:

- The average forest holding is about 15 000 ha in public ownership, while below 10 ha in private ownership;
- The number of public holdings is decreasing.
- The number of private holdings is growing.
- The average size of holding differs widely at the country level within MCPFE.

Reported changes in the number of holdings by different size classes are too different to draw overall conclusions regarding the trends at MCPFE and region levels. Data shows that even in neighbouring countries or countries that have undergone similar economic and political reforms, holding size structure differs widely. For example, small holdings (<5 ha) in Hungary and Slovakia account for less than 5 percent of total private forest area, while they account for 33 and 41 percent, respectively in the Czech Republic and Slovenia, and as high as 73 percent in Poland.

According to the data from the Private Forest Ownership Enquiry, small holdings account for a significant share of the number of private forest holdings (holdings < 3 ha for 70 percent); however, they account for a small share (7 percent) of the total area (data from 11 countries).

There is no direct link between the size of forest holdings and the level of sustainable management of forests at the country level, since the size and number of holdings as well as ownership patterns and land tenure traditions are very specific at the country level. However, fragmentation of properties and small-scale holdings often represent a problem for the sector and can hinder sustainable forest management.

The number of small private forest holdings (<10 ha) continues to grow, mainly due to ongoing restitution as well as to due to the division after inheritance of forest holdings in some countries (e.g. Belgium, Hungary, Slovenia). Growth in the number of private forest holdings is characteristic in countries where there is an ongoing restitution process, while in others, the consolidation of holdings, especially in public ownership, is being undertaken. The consolidation of private ownership is noticeable in some countries (Czech Republic, Slovakia and Austria).

Indicator 6.2. Contribution of forest sector to gross domestic product

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

The contribution of forestry and the manufacturing of wood and paper products to GDP indicates the forest sector's macroeconomic importance. It can also be used for the assessment of how forest management also contributes to overall sustainable development, more specifically to rural development, and whether this contribution is sustainable.

Data on gross value added (a component of GDP) by the forest sector were available from almost all MCPFE countries. For filling data gaps, the methodology in the FAO study (2004) was used to get a complete picture of the current situation and trends over the last 15 years.

It should be noted that the figures under this indicator (Table 21) reflect only direct contribution to GDP, i.e. value addition in forestry and logging, wood and paper industries. Presented figures do not, or only partly, capture the forest sector's indirect contribution to GDP through other sectors, for example, manufacturing of wood processing equipment and trade in forest products. Inclusion of indirect contribution would certainly increase the figures shown below; however, such figures are not available from national accounts statistics.

In 2005, the gross value added by forestry[6], wood industries[7], and pulp and paper industries[8] totalled EUR 114 billion in the MCPFE region and the sector's contribution to GDP was 1.0 percent. Forestry and logging activities account for 17 percent of the forest sector's (excluding furniture) gross value added; the remaining 83 percent are almost equally distributed between wood and paper industries.

The economic importance of the forest sector and the distribution of value added among three subsectors vary greatly among different regions. A summary of the current situation by region and subsector is shown in Table 21.

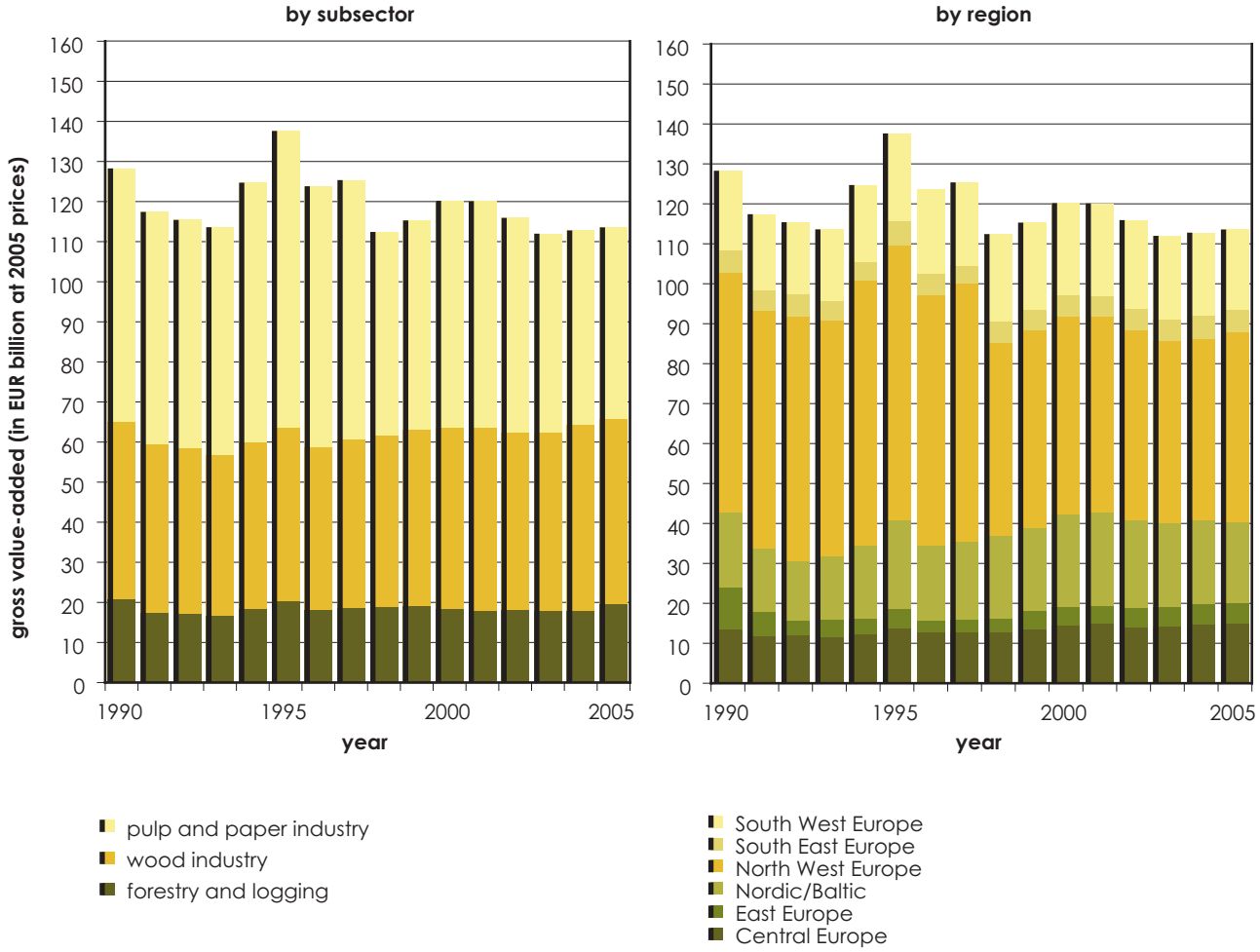
Table 21. Status of the forest sector gross value added and contribution to GDP, 2005

Region	Distribution of forest sector gross value added in 2005								Contribution to GDP (%)
	Forestry and logging (ISIC/NACE 02)		Wood industries (ISIC/NACE 20)		Pulp and paper industries (ISIC/NACE 21)		Total (ISIC/NACE 02, 20, 21)		
	EUR million	%	EUR million	%	EUR million	%	EUR million	%	
Central Europe	2 908	15	7 265	16	4 777	10	14 949	13	1.6
East Europe	1 110	6	2 168	5	1 797	4	5 075	4	0.8
Nordic/Baltic	5 746	29	6 208	13	8 306	17	20 260	18	2.4
North West Europe	6 099	31	18 520	40	22 739	48	47 358	42	0.8
South East Europe	1 797	9	2 621	6	1 436	3	5 853	5	1.0
South West Europe	1 941	10	9 538	21	8 596	18	20 075	18	0.9
MCPFE, total	19 601	100	46 319	100	47 650	100	113 570	100	1.0
MCPFE excl. the Russian Federation	18 906	96	44 698	96	46 147	97	109 751	97	1.0

[6] ISIC/NACE Division 02: Forestry, logging and related service activities.
[7] ISIC/NACE Division 20: Manufacture of wood and wood products.
[8] ISIC/NACE Division 21: Manufacture of pulp, paper and paper products.

In terms of value added within the sector, forestry and logging activities are more important in Nordic/Baltic countries and in East and South East Europe, while in other regions, value addition is more concentrated in forest industries. The forest sector is particularly important for the economies of Finland, all three Baltic States, Sweden and Romania (3 to 5 percent of GDP), and in Austria, Belarus, Czech Republic and Slovakia (2 to 3 percent of GDP).

Figure 51 shows the trend in gross value added in the forest sector over the 1990–2005 period. The total gross value added ranged from EUR 110 to 130 billion from 1990 to 2005, with an average value of EUR 119 billion per year (in real terms) and annual figures within 10 percent of this average.



Note: The changes in value added are changes in the real value (i.e. adjusted for inflation)

Figure 51. Trends in forest sectors' gross value added in the MCPFE region, 1990–2005

In the MCPFE region, value added in the forest sector declined by 11 percent (in real terms) from 1990 to 2005, but trends varied in different subsectors and do not correlate strongly with one another. Value added decreased by 5 percent in forestry, increased by 5 percent in the wood industry, and decreased by 25 percent in the pulp and paper industry. These trends suggest that the pulp and paper industry currently faces the biggest challenges. Other subsectors, possibly due to smaller scale and wider product mix (wood industries), adapt more easily to changes in market conditions and were able to increase the value added during the last ten years.

There are significant differences within MCPFE, in the trends in the forest sector's value added at the regional and country level from 1990 to 2005. The share of North West Europe gradually decreased from 47 to 42 percent and East Europe's share decreased from 8 to 4 percent (mainly due to the economic collapse in the early 1990s). The share of other regions increased, most noticeably

in Nordic/Baltic countries and Central Europe. However, since 2000, trends are changing: East Europe and South East Europe are increasing their share while the share of Nordic/Baltic countries is declining.

Figure 52 shows trends in the direct contribution of the forest sector (except furniture) to GDP in MCPFE by region. During the last 15 years, the contribution of the forestry sector to GDP has declined from just under 1.5 percent in 1990 to just over 1.0 percent in 2005. This decline has occurred because the economy has expanded (i.e. GDP in MCPFE has increased by 30 percent over the last 15 years) while the gross value added in the forest sector has decreased by 11 percent. This trend follows a global trend that other economic activities (services and trade, etc.) increasingly contribute to the national economies (GDP).

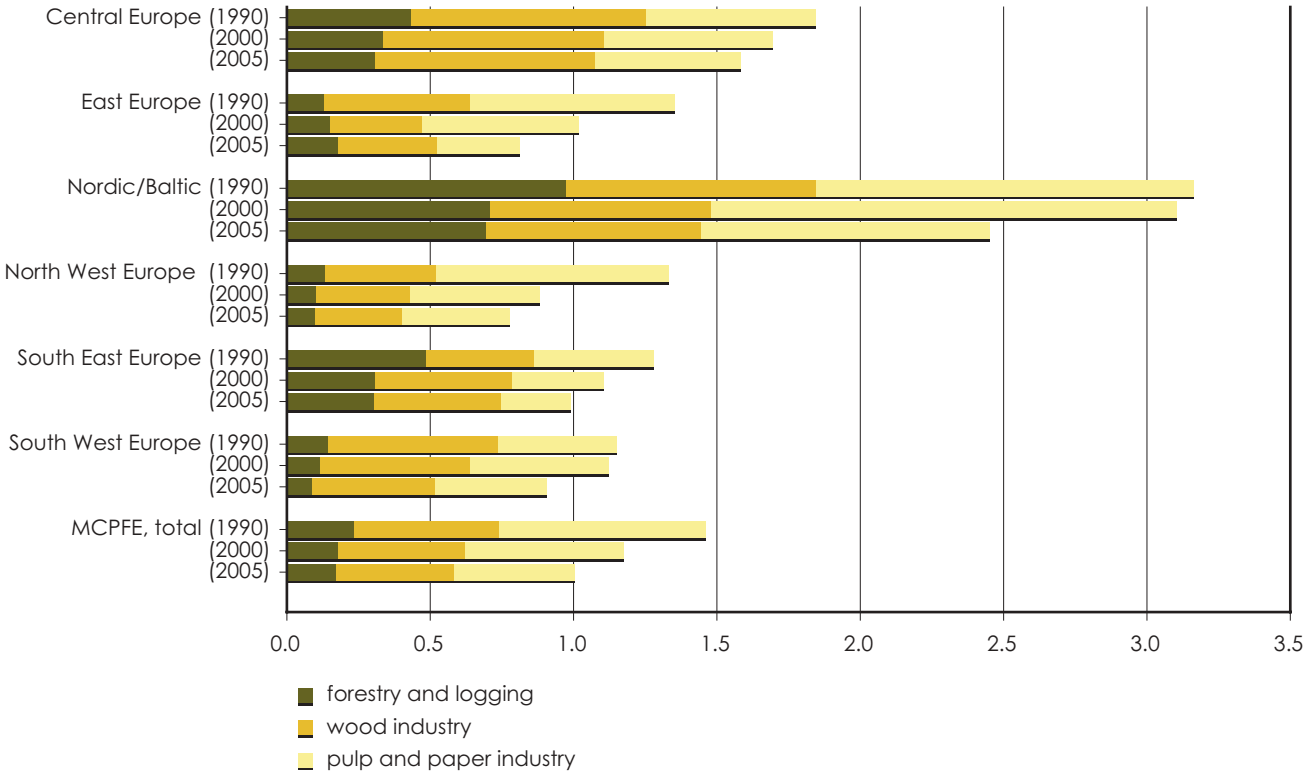


Figure 52. Trends in contribution of forest sector to GDP (%), by region

Since the whole forest sector is complex and trends in each subsector differ, it is more appropriate to compare changes in the value added of the subsectors with similar economic activities. Figure 53 presents real changes in gross value added in the forest sector and other economic activities within the MCPFE region.

It is clear from Figure 53 that, in the MCPFE region, forestry is performing much better than agriculture, while wood industries are performing similarly to other manufacturing industries. A strong raw material base (roundwood, wood processing residues), technological innovations, increasing trade liberalization and expansion of the EU single market have helped European wood industries maintain their growth and competitive position in global markets. Shifting production from West Europe to lower-cost Eastern European countries within MCPFE, and investments in replacement of labour with capital (machinery) helped increase productivity of the industries. Only the pulp and paper industry seems to be facing difficulties during the last ten years.

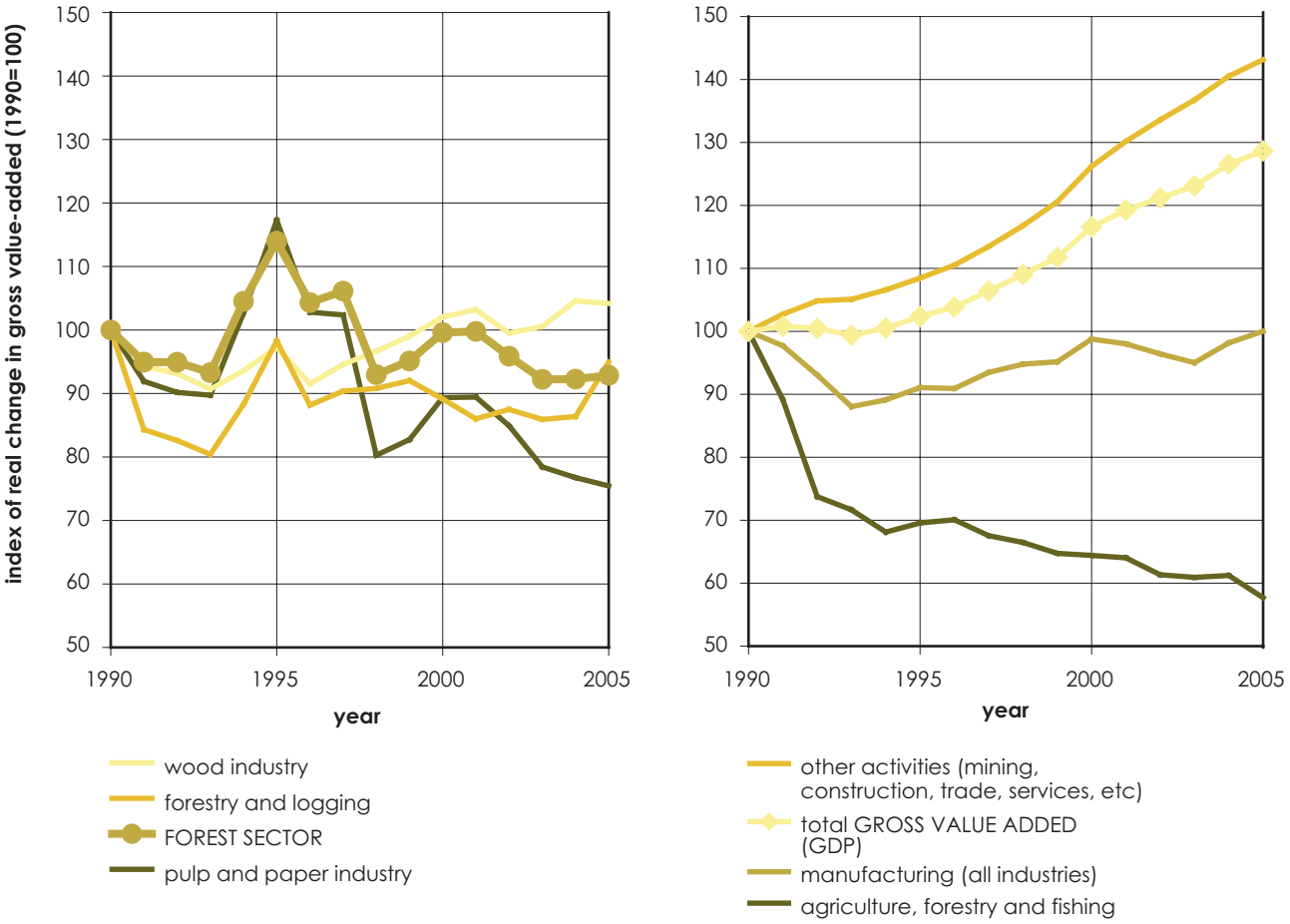


Figure 53. Real changes in gross value added by sector

Note: The changes in value added are changes in the real value (i.e. adjusted for inflation)

Indicator 6.3. Net revenue

Net revenue of forest enterprises

The level of net revenue of forest enterprises is an important indicator of the degree of economic sustainability of forest management. The net revenue of forest enterprises includes all sources of income of the forest owner directly related to forestry, including subsidies and excluding taxes. From the national viewpoint, increasing net revenue from forestry contributes to economic growth and to an increasing economic sustainability of forests.

The net value added at factor cost (factor income) of enterprises measures the remuneration of all factors of production (land, capital and labour) and represents the value generated by the forestry companies engaged in production activities. Net entrepreneurial income – obtained by adding the interest received by forestry companies to the net operating surplus and then deducting rent and interest payments – measures the compensation of labour, remuneration from land and the yield arising from the use of capital.

Statistics on the net revenue of forest enterprises were available from Eurostat's Economic accounts for forestry and covering 21 countries, mainly countries in Central, Nordic/Baltic, North West and South West Europe. Since net revenue of forest enterprises fluctuates year by year, average figures for several years are presented in order to show longer-term trends. Data availability and trends are presented in Table 22 and Table 23.

Table 22. Trends in net value added at factor cost (factor income) in forestry, 1990–2000 and 2000–05 (ISIC/NACE 02)

Region	Information availability			Net value added			Annual change rate			
	Countries reporting	Forest area, 2005 ('000 ha)	% of total forest area	1992*	2000**	2005	1992–2000		2000–05	
				EUR/ha of forest area			EUR/ha	%	EUR/ha	%
Central Europe	5	10 924	49	166	144	135	–2.8	–1.8	–1.8	–1.3
East Europe	–	–	–	–	–	–	–	–	–	–
Nordic/Baltic	5	63 798	95	63	73	71	1.3	1.9	–0.5	–0.7
North West Europe	6	30 594	98	158	166	135	1.0	0.6	–6.3	–4.1
South East Europe	2	7 377	22	34	21	19	–1.7	–5.9	–0.4	–2.2
South West Europe	3	31 677	100	72	73	58	0.1	0.2	–3.1	–4.6
MCPFE, total	21	144 370	14	–	–	–	–	–	–	–
MCPFE excl. the Russian Federation	21	144 370	70	92	96	84	0.5	0.5	-2.5	-2.5

– not available; * average 1990–94; ** average 1999–2001
Note: Net value added is presented at constant (2005) prices (i.e. adjusted for inflation)

Table 23. Trends in net entrepreneurial income of forest enterprises, 1990–2000 and 2000–05 (ISIC/NACE 02)

Region	Information availability			Net entrepreneurial income			Annual change rate			
	Countries reporting	Forest area, 2005 ('000 ha)	% of total forest area	1992*	2000**	2005	1992–2000		2000–05	
				EUR/ha of forest area			EUR/ha	%	EUR/ha	%
Central Europe	5	10 924	49	79	64	65	–2.0	–2.7	0.3	0.5
East Europe	–	–	–	–	–	–	–	–	–	–
Nordic/Baltic	5	63 798	95	48	55	55	0.8	1.6	0.1	0.2
North West Europe	6	30 594	98	60	89	64	3.6	5.0	–5.1	–6.5
South East Europe	1	3 625	11	–	–	5	–	–	–	–
South West Europe	2	21 698	68	56	65	51	1.1	1.8	–2.8	–4.7
MCPFE, total	19	130 639	13	–	–	–	–	–	–	–
MCPFE excl. the Russian Federation	19	130 639	64	54	65	56	1.3	2.2	-1.6	-2.6

– not available; * average 1990–94; ** average 1999–2001
Note: Net entrepreneurial income is presented at constant (2005) prices (i.e. adjusted for inflation)

The average net value added in countries where data are available is EUR 80–100/ha of forest, and net entrepreneurial income is EUR 50–70 /ha of forest. The highest net revenue is in Central Europe and North West Europe, followed by Nordic/Baltic countries. There is a large variation in annual figures due to market conditions (removals volume, prices). The difference in revenue is also a result of the intensity of management and investments made.

Overall, net value added in Central and North West Europe is twice that in other MCPFE regions because of higher growing stock volume and net annual increment, which result in a higher intensity of fellings and higher revenues per ha of forest. Fellings amount to 5–6 m^3 per ha of forest available for wood supply in North West and Central Europe, while only 2 to 3 m^3/ha in Nordic/Baltic countries and South West Europe.

Among 19 countries where data were available, there are three countries where net entrepreneurial income remained negative after 2000: the Netherlands, Switzerland and the UK. Other countries report positive net revenues of forest enterprises.

There is a slight downward trend in net revenue of forest enterprises per ha in reported countries. It should be noted, however, that this decline is partly influenced by an increased forest area. In countries for which net revenue data are available, the total forest area has expanded by 8 percent from 1990 to 2005. Management of newly established or young forests has a negative impact on

the net revenue of forest enterprises in most cases. Overall, net revenue in forestry, logging and related activities remains relatively stable and positive in most of the countries in Europe, according to available data. However, further data collection and analysis is needed in order to get a more complete and accurate picture in the MCPFE region.

Indicator 6.4. Expenditures for services

Total expenditures for long-term sustainable services from forests

Forest owners, both public and private, incur additional expenditures for producing a range of services that the public demands. These may include expenditures to maintain protective forests against natural hazards, prevent soil erosion or protect water quality as well as for social services. These services are an important contribution to the quality of life and human safety. It is essential to ensure that these services are maintained and that adequate public funding is provided to cover the necessary related expenditures. The total national expenditures for these services should provide quantitative information on countries' efforts to provide such services.

The MCPFE Enquiry distributed in 2006 was a first attempt to estimate public expenditures for recreational, environmental, protective and other long-term services provided by forests. Thirteen countries provided figures for some or all the mentioned service groups; however, most of the respondents cautioned that data were indicative only and not comparable over the years. In 2005, the total reported expenditures was EUR760 million (13 countries). Austria, Finland and France increased their public expenditures to long-term services from 2000 to 2005, while Italy, Greece, Slovenia and Slovakia reported a decrease during this period.

It is obvious that the few data obtained do not reflect the situation in the MCPFE region and further work on assessment methodology and definitions needs to be done in order to get a more complete picture of the status and trends of this indicator in future.

Indicator 6.5. The forest sector workforce

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

Employment provided by the forest sector is an important indicator of the social benefits generated by forests, especially for sustainable rural development. At the same time, an adequate workforce in terms of numbers and qualifications is a critical input to sustainable forest management. Data on forest sector employment were available from almost all MCPFE countries. For filling data gaps, the methodology in the FAO study (FAO, 2004) was used in order to get a complete picture of the current situation and trends over the last 15 years.

In 2005, employment in forestry, wood industries, and pulp and paper industries reached almost 4.3 million persons, accounting for 1.1 percent of total employment in the MCPFE region. Forestry and logging activities account for 29 percent of the forest sector's (excluding furniture) employment; wood industries, 48 percent; and pulp and paper industry, 23 percent. In addition, at least 1.3 million people were employed in the furniture industry in MCPFE countries in 2000 (FAO, 2004). However, the furniture industry is beyond the scope of this indicator and is therefore not included in the analysis below.

The importance of the forest sector in employment generation and the distribution among the three subsectors vary greatly among different regions. A summary of the current situation is shown in Table 24.

Table 24. Status of the forest sector work force, 2005

Region	Distribution of forest sector employment, 2005								Contribution to total employment (%)
	Forestry and logging (ISIC/NACE 02)		Wood industries (ISIC/NACE 20)		Pulp and paper industries (ISIC/NACE 21)		Total (ISIC/NACE 02, 20, 21)		
	1,000	%	1,000	%	1,000	%	1,000	%	
Central Europe	115	9	377	18	124	13	616	14	1.5
East Europe	411	33	519	25	169	17	1 100	26	1.0
Nordic/Baltic	98	8	170	8	91	9	358	8	2.2
North West Europe	91	7	379	18	366	38	836	19	0.8
South East Europe	446	36	283	14	74	8	803	19	1.2
South West Europe	79	6	353	17	147	15	578	13	1.2
MCPFE, total	1 241	100	2 081	100	970	100	4 292	100	1.1
MCPFE excl. the Russian Federation	993	80	1 723	83	826	85	3 541	83	0.9

Note: Employment figures are presented in full-time equivalents

In the MCPFE region, for every one job in forestry there are 1.7 jobs in the wood industry and 0.8 jobs in the pulp and paper industry. Within the forest sector, the forestry subsector creates more jobs in South East Europe and East Europe than in other MCPFE regions, where most of the jobs are created in forest industries, especially the wood industry.

Employment in the forest sector continues to decline in the MCPFE region, but the annual rate of loss of jobs slowed from 2.7 percent per year during the 1990s to 1.3 percent per year since 2000. Employment is decreasing in all three subsectors. Still, the figure in absolute terms is high (59 000 jobs lost every year). Trends in forest sector employment by region are presented in Table 25.

Table 25. Trends in employment in forest sector, 1990–2000 and 2000–05 (ISIC/NACE 02, 20, 21)

Region	Employment			Annual change rate			
	1990	2000	2005	1990–2000		2000–05	
	1 000			1 000	%	1 000	%
Central Europe	780	634	616	–15	–2.0	–4	–0.6
East Europe	2 108	1 221	1 100	–89	–5.3	–24	–2.1
Nordic/Baltic	412	357	358	–6	–1.4	0	0.1
North West Europe	1 180	938	836	–24	–2.3	–20	–2.3
South East Europe	1 013	832	803	–18	–2.0	–6	–0.7
South West Europe	552	604	578	5	0.9	–5	–0.8
MCPFE, total	6 044	4 585	4 292	–146	–2.7	–59	–1.3
MCPFE excl. the Russian Federation	4 284	3 675	3 541	–61	–1.5	–27	–0.7

All regions experience job loss in the forest sector, except Nordic/Baltic countries where employment has stabilized in recent years. The highest rate of decrease is observed in North West Europe and East Europe. There are only a few countries where employment in the forest sector increased from 2000 to 2005: Cyprus, Georgia, Hungary, Latvia, Lithuania, Moldova, The former Yugoslav Republic of Macedonia and Turkey.

In MCPFE countries, statistics on employment in the forestry subsector show a decline by 1.6 percent per year since 2000, a considerable slowdown in job loss compared to the 1990s (4.6 percent). In 2000–2005, employment in forestry and logging activities have slightly increased or stabilized in Nordic/Baltic countries, South West and South East Europe, while Central, East and North West Europe have continued to lose 2–3 percent of jobs in forestry and logging each year. The trends across the regions are presented in Table 26.

Table 26. Trends in employment in forestry and logging activities, 1990–2000 and 2000–05 (ISIC/NACE 02)

Region	Employment			Annual change rate			
	1990	2000	2005	1990–2000		2000–05	
	1 000			1 000	%	1 000	%
Central Europe	221	139	115	–8	–4.5	–5	–3.6
East Europe	1 006	490	411	–52	–6.9	–16	–3.5
Nordic/Baltic	117	85	98	–3	–3.1	2	2.7
North West Europe	153	102	91	–5	–4.0	–2	–2.2
South East Europe	583	453	446	–13	–2.5	–1	–0.3
South West Europe	87	76	79	–1	–1.4	1	0.8
MCPFE, total	2 167	1 346	1 241	–82	–4.6	–21	–1.6
MCPFE excl. the Russian Federation	1 246	976	993	–27	–2.4	3	0.3

In MCPFE countries, approximately one person is currently employed in forestry for every 1 000 ha of forest (a decrease from two persons in the early 1990s). Employment per area of forest varies greatly between regions and countries (Figure 54). It is lowest in Nordic countries and the Russian Federation (less than 1 person per 1 000 ha), while it is 3 to 6 persons per 1 000 ha in most of countries in North West and Central Europe. Turkey, Central and South East Europe have the highest forestry employment per area of forest.

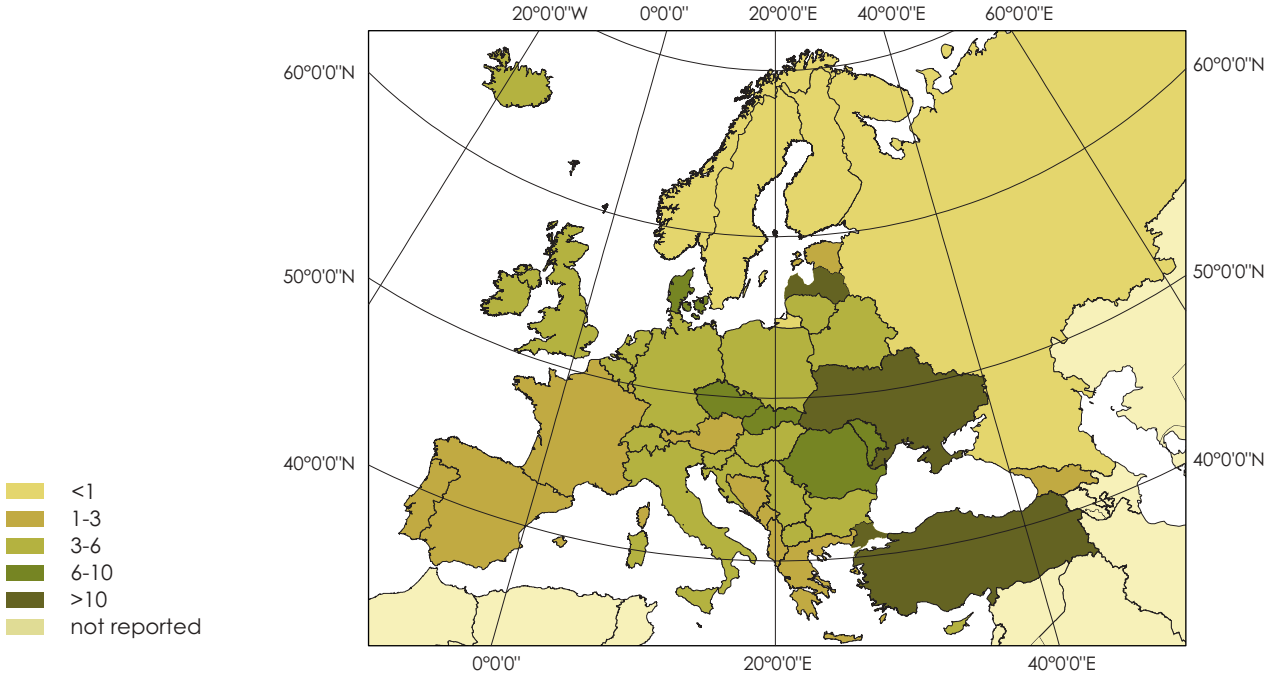


Figure 54. Employment in forestry and logging activities per area of forest (persons/1000 ha), 2005

Data on employment in forestry by gender were reported by 19 countries. Usually, women account for 10–15 percent of jobs in most of the countries. A larger share of women, 16–25 percent, is reported by Iceland, Poland, the Russian Federation, Spain, and Ukraine. In four countries, Estonia, Latvia, Switzerland and the UK, women account for less than 10 percent of jobs in forestry. An interesting feature is that all countries, except Italy, report a downward trend in the share of women employed in forestry and logging activities.

Distribution of forestry employment by age was reported by 21 countries. Employees aged 50 years or over account for about 15–30 percent; their share is much higher in Finland at 41 percent and Sweden at 49 percent, but less than 15 percent in Estonia, Poland, Romania, Spain and Ukraine.

Trends show that the forestry workforce is ageing in almost all countries in the MCPFE region; only Estonia, Romania and Spain reported an increased share of a younger workforce.

The breakdown of workforce by education categories (reported by three categories: primary and lower secondary, upper secondary and tertiary education) differs widely between countries. For example, employees with tertiary education account for 8–15 percent in the Czech Republic, Slovakia, Ukraine and Sweden, 28 percent in Belarus and 36 percent in Finland. The share of employees with primary and lower secondary education is highest in Liechtenstein (74 percent), Spain (61 percent) and Ukraine (49 percent). There are not many regional similarities, and the structure of the workforce by education is highly country-specific. However, there is a trend of an increasing share of employees with tertiary education in all countries that provided data. This suggests that those who suffer most from an overall job reduction in European forestry are the employees with the lowest qualifications.

Self-employed persons in forestry account for more than half of the forestry workforce in some West European countries (Austria, Belgium and the UK). In most other countries that provided data, salaried employees account for most employment (70–90 percent). However, an increasing share of self-employed persons in forestry can be observed in almost all countries.

In the MCPFE region, the downward trend in employment in forest industries since 2000 is similar to that in forestry and logging activities. The overall job loss in forest industries has slowed down from 1.8 percent per year in the 1990s to 1.2 percent after 2000. This slowdown occurred due to a less rapid decline in employment in wood industries, while the pulp and paper industry continues to lose jobs at the same rate as during the 1990s (2 percent per year). The absolute number of jobs lost in the wood and paper industries, 38 000. Trends in employment by industry and region are shown in Table 27 and Table 28.

Table 27. Trends in employment in wood industries, 1990–2000 and 2000–05 (ISIC/NACE 20)

Region	Employment			Annual change rate			
	1990	2000	2005	1990–2000		2000–05	
	1 000			1 000	%	1 000	%
Central Europe	411	367	377	–4	–1.1	2	0.5
East Europe	835	556	519	–28	–4.0	–7	–1.4
Nordic/Baltic	152	168	170	2	1.0	0	0.3
North West Europe	538	424	379	–11	–2.4	–9	–2.2
South East Europe	300	290	283	–1	–0.4	–1	–0.5
South West Europe	343	370	353	3	0.8	–3	–0.9
MCPFE, total	2 577	2 173	2 081	–40	–1.7	–18	–0.9
MCPFE excl. the Russian Federation	1 975	1 783	1 723	-19	–1.0	–12	–0.7

Table 28. Trends in employment in pulp and paper industry, 1990–2000 and 2000–05 (ISIC/NACE 21)

Region	Employment			Annual change rate			
	1990	2000	2005	1990–2000		2000–05	
	1 000			1 000	%	1 000	%
Central Europe	148	129	124	–2	–1.4	–1	–0.7
East Europe	267	174	169	–9	–4.2	–1	–0.6
Nordic/Baltic	143	103	91	–4	–3.2	–3	–2.6
North West Europe	489	413	366	–8	–1.7	–9	–2.3
South East Europe	130	89	74	–4	–3.7	–3	–3.7
South West Europe	122	158	147	4	2.6	–2	–1.5
MCPFE, total	1 300	1 066	970	–23	–2.0	–19	–1.9
MCPFE excl. the Russian Federation	1 063	916	826	–15	–1.5	–18	–2.1

From the statistics presented in the tables, there are some positive or stabilization signs in employment in several regions. Employment in wood industries has stabilized in Nordic/Baltic countries and Central Europe. From 2000, employment in the wood industry increased in Cyprus, Croatia, France, Georgia, Greece, Ireland, Hungary, Latvia, Lithuania, Moldova, Slovakia and Turkey. The number of employed workers in the pulp and paper industry increased in fewer countries: Austria, Portugal, Estonia, Hungary and Moldova.

Women account for 15–25 percent of the labour force in the wood industries and 20–30 percent in the pulp and paper industry in most countries. A larger percentage of women work in the wood industry in Denmark and Croatia (about 30 percent), and a smaller percentage in Belgium, Cyprus, Switzerland and the UK (less than 12 percent). In the pulp and paper industry, the largest share of women is reported in the Czech Republic and Hungary (more than 40 percent). Trends are very mixed in different countries and the unavailability of data for some large producer countries does not allow a general statement on overall trends at the MCPFE level.

Statistics from 22 countries clearly indicate an ageing workforce in the wood and paper industries. The number of employees aged 50 years or older has increased in most countries with few exceptions (Greece, Romania and Italy). The share of employees with the lowest qualifications (primary and lower secondary education) is declining in all countries, indicating an increasing trend of replacing labour with capital (machinery) in forest industries. The share of self-employed people in the wood industry ranges between 10 to 25 percent in most countries; it is above 30 percent in Italy and Greece only. In the pulp and paper industry, almost all the workforce is comprised of salaried employees.

A study on employment trends and prospects in Europe completed five years ago (UNECE/FAO, 2003) forecast that between 2000 and 2010, the forest sector would lose 270 000 jobs: 120 000 in forestry and logging activities, 60 000 in the wood industry and 90 000 in the pulp and paper industry. The real trends show that from 2000 to 2005, the forest sector had already lost almost 290 000 jobs, i.e. more than was forecast for the 2000–10 period. The rate of decline in number of employed significantly exceeded the forecast in all three subsectors (forestry and logging, wood industry, and the pulp and paper industry).

In conclusion, it seems that loss of jobs was inevitable for the European forest sector to maintain its productivity and competitive position in a globalizing world. Countries in transition had to reorient themselves to market conditions, which led to significant reductions in employment, particularly during the 1990s. Shifting production and investments from west to east Europe increased employment in some countries, often in rural areas. Other indicators (e.g. increasing productivity and net exports) show that, overall, the European forest industry is well positioned in global markets. The increasing demand for and prices of wood suggest that the current downward trend in forest sector employment will not accelerate in the near future.

Indicator 6.6. Occupational safety and health

Frequency of occupational accidents and occupational diseases in forestry

Forestry and logging continues to be one of the most hazardous sectors in terms of occupational safety and health in most European countries. The prevention of occupational accidents and diseases of the forestry workforce is an important social aspect of sustainable forest management.

Nineteen countries reported statistics on fatal occupational accidents in forestry, which represent about 40 percent of total forestry and logging employment in the MCPFE region. Countries with

available statistics mostly represent Central and East Europe and the Nordic/Baltic regions. Overall, there is a positive trend in countries that provided data: from 1990 to 2005, the number of fatal accidents declined from 37 to 31 per 100 000 employees. The decrease in absolute numbers is higher (300 deaths in 2000 and 168 in 2005) because employment in these countries was reduced by one-third during this period. Comparing 2000 and 2005, a further downward trend is observed in most countries.

The number of fatal accidents in 2005 was highest in Central Europe, at 60 per 100 000 employees, while only around 20 per 100 000 employees in East Europe and Nordic/Baltic countries. This difference could be explained by the fact that, in general, in terms of work safety, logging conditions in mountainous Central European countries are more dangerous than in other European countries.

Trends may not be positive in a number of countries; however, especially in those that have recently undergone transition, most of whose data on accidents were not reported in the MCPFE Enquiry. For example, a recent study in Slovenia (Medved and Klun, 2007) found that the number of fatal accidents in this country has increased since 2000.

Data on non-fatal occupational accidents were provided by a few countries; series were often incomplete and inconsistent in most cases. However, all countries where figures were available indicated that the number of non-fatal accidents in forestry has decreased significantly over the last 15 years. Statistics on occupational diseases were not available.

It seems that, overall, work safety conditions in forestry are consistently improving in MCPFE countries. Nevertheless, further data collection and analysis need to be done in order to get a more complete picture in the MCPFE region.

Indicator 6.7. Wood consumption

Consumption per head of wood and products derived from wood

Sound use of wood, a renewable and environmentally friendly raw material, is an essential part of sustainable development of the forest and forest products sector. Income from sales of wood and forest products is the most important element in the economic sustainability of the sector. The use of wood instead of non-renewable raw materials is an indicator of sustainable consumption patterns in a society.

The analysis below includes the consumption of wood used in the rough (e.g. round fencing) and energy wood, primary processed products (sawnwood, wood-based panels), and paper and paperboard. The figures do not include secondary processed products in order to avoid double counting due to problems with conversion factors. The figures used here for wood energy are taken from the Joint Forest Sector Questionnaire; the 2006 Joint Wood Energy Enquiry (JWEE) reported much larger quantities for some countries. All data are presented in underbark cubic metres (m^3) of wood equivalents (EQ) per capita (1 000 inhabitants) per year. Data for calculations were available for all countries in MCPFE (FAO, 2007; UN, 2007). Average conversion factors to EQ for each product were available for all countries in MCPFE from European Forest Sector Outlook Study (EFSOS) (UNECE/FAO, 2005[9]); these may not be the same as those used by countries for their national statistics.

Status and trends in wood consumption are shown in Figure 55 and Table 29. In 2005, wood consumption per inhabitant in the MCPFE region was at 1.10 m^3, but the difference across MCPFE

[9] Conversion factors are available at www.unece.org/trade/timber/efsos/data/conversion-factors.pdf.

regions was large. All regions except East and South East Europe consume larger volumes than the average, and Nordic/Baltic countries followed by North West Europe are the leading consumers of wood in the region.

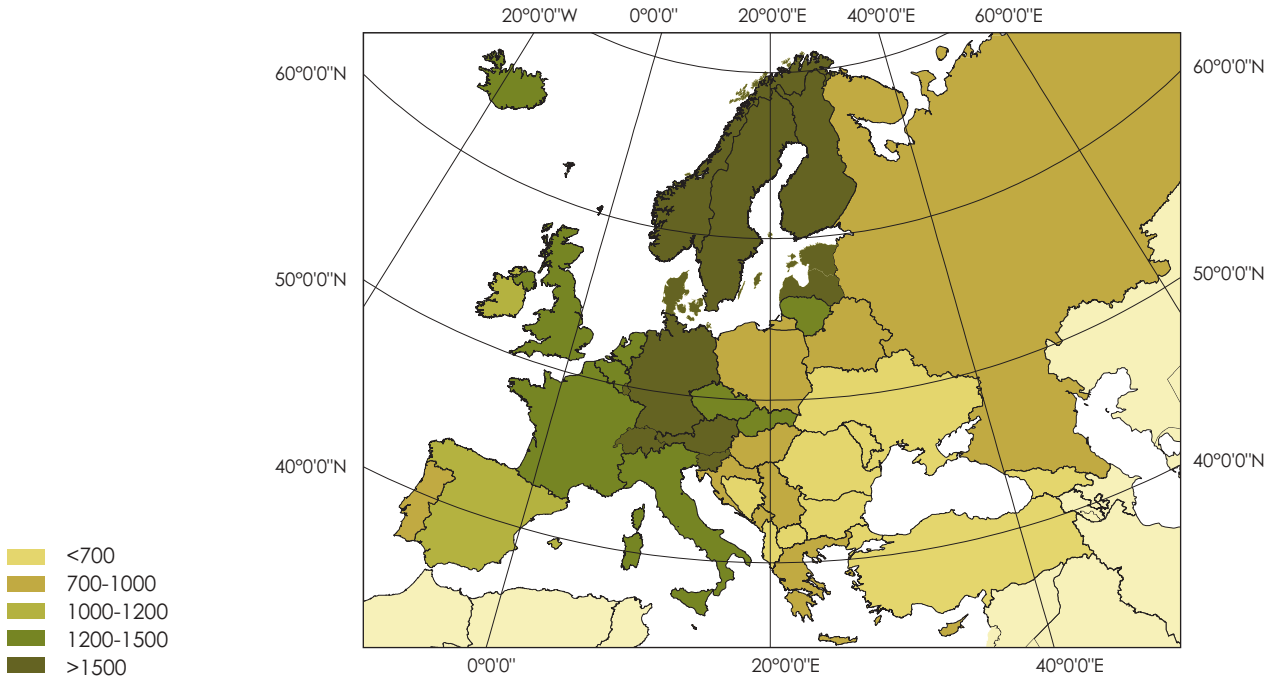


Figure 55. Wood consumption per capita (m^3 per 1000 inhabitants), 2005

Table 29. Trends in wood consumption per capita, 1990–2000 and 2000–05

Region	Wood consumption			Annual change rate	
	1990	2000	2005	1990–2000	2000–05
	m^3 EQ per 1 000 inhabitants			%	%
Central Europe	896	1 069	1 284	1.8	3.7
East Europe	1 430	566	655	–8.9	3.0
Nordic/Baltic	2 327	2 731	2 995	1.6	1.9
North West Europe	1 322	1 399	1 417	0.6	0.3
South East Europe	576	490	572	–1.6	3.1
South West Europe	867	1 225	1 234	3.5	0.1
MCPFE, total	1 165	1 020	1 099	–1.3	1.5
MCPFE excl. the Russian Federation	1 104	1 093	1 176	–0.1	1.5

Trends in consumption in the 1990s are largely influenced by changes in East Europe. Political and economic changes and reduced purchasing power of the population in the former USSR and in some countries in South East and Central Europe led to the sharp decline in wood consumption in the early 1990s (Figure 56). However, since the mid-1990s, the trend has reversed. Since 2000, wood consumption has been consistently increasing in all MCPFE regions. The fastest growth in relative terms (percent per year) is recorded in Central, South East and East Europe where the economic growth has been highest in recent years.

Positive trends in wood consumption in the MCPFE region illustrate favourable trends as the increasing use of wood from well-managed forests has positive environmental impacts by reducing global warming (trees and wood products act as carbon sinks). In addition, wood is recyclable and can be used as a sustainable energy source. Growing demand for wood has a very positive impact on the economic viability of both forest owners/managers and forest industries.

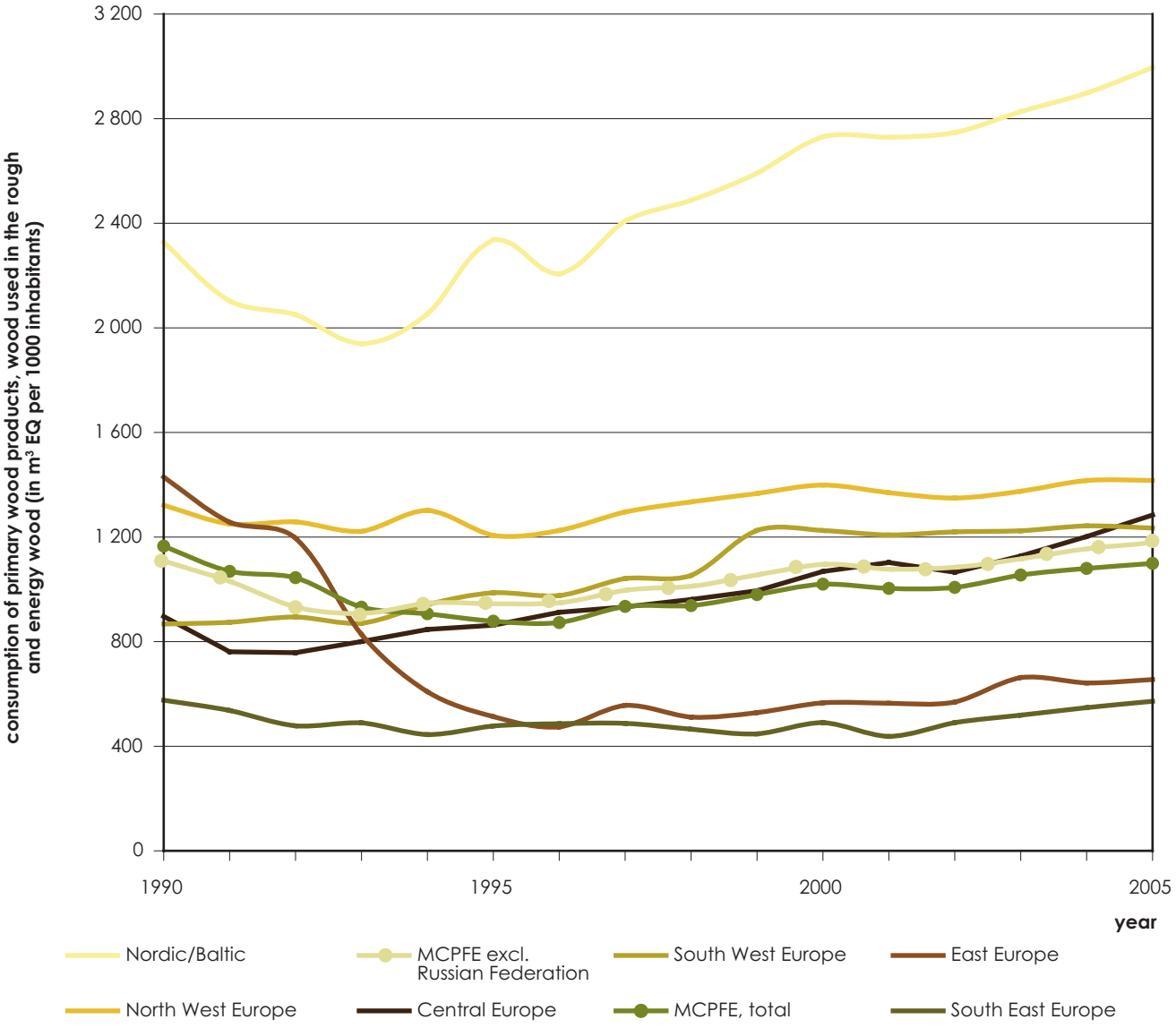


Figure 56. Annual changes in wood consumption, 1990–2005

Indicator 6.8. Trade in wood

Imports and exports of wood and products derived from wood

International trade plays an important role in supplying renewable products at competitive prices to consumers worldwide and helps to encourage the economic sustainability of the forest sector in many exporting countries.

Like data on consumption, data on trade of wood and wood products were available for all countries. The year 1992 was taken as starting point for analysis, because it is impossible to obtain data for intra-trade with several former countries that broke down into many separate countries in the early 1990s. Contrary to consumption, data presented on export and import underbark cubic metres (m^3) of wood equivalents (EQ) also include all intermediate wood products (industrial roundwood, wood chips and residues, recovered paper and pulp). To the extent that trade may include re-exports, absolute figures for this indicator are not directly comparable with those on consumption (Indicator 6.7), which avoids double counting. However, figures on trade represent the changing intensity of trade between countries and regions. All data presented are absolute figures in m^3 wood equivalents.

Trends in wood exports are presented in Table 30. Statistics show that since 1992, exports in the MCPFE region more than doubled, with almost 700 million m³ exported in 2005. Nordic/Baltic countries and North West Europe account for 60 percent of the export volume, followed by East and Central Europe, which account for another 30 percent. From 1992 to 2005, exports have increased in all MCPFE countries by 30 million m³ every year on average. The growth rate of export exceeds that of imports.

Table 30. Trends in exports of wood and wood products, 1992–2000 and 2000–05

Region	Export			Annual change rate			
	1992	2000	2005	1992–2000		2000–05	
	million m³ EQ			million m³ EQ /yr	%	million m³ EQ /yr	%
Central Europe	40	73	93	4.1	7.8	4.0	5.0
East Europe	27	71	112	5.4	12.6	8.3	9.7
Nordic/Baltic	111	179	191	8.4	6.1	2.4	1.3
North West Europe	101	175	229	9.3	7.1	10.8	5.5
South East Europe	5	12	19	1.0	13.4	1.3	9.0
South West Europe	22	35	46	1.6	5.9	2.3	5.8
MCPFE, total	306	544	690	29.8	7.5	29.1	4.9
MCPFE excl. the Russian Federation	279	479	589	25.0	7.0	22.1	4.2

Changes in imports are shown in Table 31. At the MCPFE level, imports also grew very rapidly but more slowly than exports. North West and South West Europe account for more than half of all imports of wood and wood products.

Table 31. Trends in imports of wood and wood products, 1990–2000 and 2000–05

Region	Imports			Annual change rate			
	1992	2000	2005	1992–2000		2000–05	
	million m³ EQ			million m³ EQ/yr	%	million m³ EQ/yr	%
Central Europe	30	61	75	3.8	9.2	3.0	4.5
East Europe	0.4	6	13	0.7	41.6	1.4	16.6
Nordic/Baltic	33	63	81	3.7	8.3	3.6	5.2
North West Europe	205	262	280	7.1	3.1	3.7	1.4
South East Europe	9	21	32	1.5	11.6	2.3	9.2
South West Europe	67	97	103	3.8	4.8	1.3	1.3
MCPFE, total	343	508	584	20.6	5.0	15.2	2.8
MCPFE excl. the Russian Federation	343	506	577	20.3	5.0	14.4	2.7

In 2005, most of the wood trade in the MCPFE region occurred between the countries within the region, i.e. about 85 percent of traded wood was consumed within MCPFE countries. However, the net trade surplus, i.e. shipments of wood and wood products to countries outside the region, is rapidly increasing. From the mid-1990s, the MCPFE region has become a net exporter of wood and wood products, with exports exceeding imports by 100 million m³ (Figure 57).

The MCPFE region is a net exporter of all wood product groups, i.e. wood raw materials, primary wood products, and pulp and paper. Net exports of raw materials (roundwood, wood residues and recovered paper) and wood products (sawnwood and wood-based panels) each totalled about 40 million m³, and pulp and paper accounted for the remainder. Shipments of wood from the Russian Federation to Asia account for a large share of MCPFE's net export, in addition, the increasing trade of sawnwood, recovered paper, pulp and paper from Nordic countries and North West Europe is also significant. In particular, countries in North West Europe improved their trade balance during the last few years, reducing the external trade gap by 35 million m³.

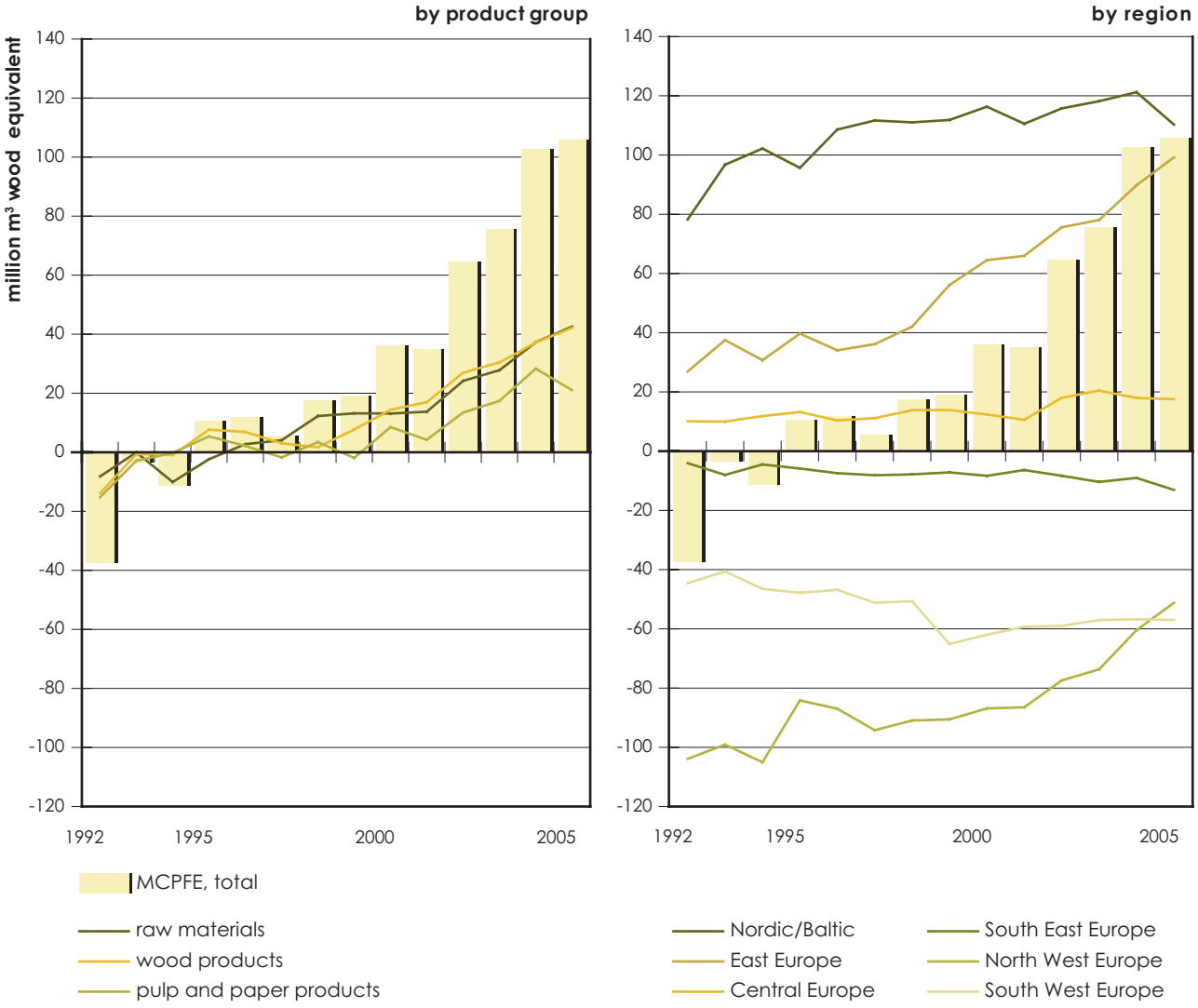


Figure 57. Trends in net trade of wood and wood products

Indicator 6.9. Energy from wood resources

Share of wood energy in total energy consumption, classified by origin of wood

Wood is one of the major sources of renewable energy and its importance is often underestimated, notably because of measurement problems. The objective of this indicator is to measure the relative importance of wood compared with other sources of energy. This also helps to assess the sustainability of the energy sector in countries.

Information on wood energy was reported by 25 countries. The importance of wood in energy generation in these countries is presented in Figure 58. More than 10 percent of consumed energy comes from wood in Latvia, Finland and Sweden. Wood as an energy source is also important in Albania, Austria, Lithuania, Estonia, Slovenia, Norway and Belarus (5 to 10 percent). Most countries (except Albania, Belgium, Turkey and the UK) reported an increasing share of wood energy in total energy consumption from 2000 to 2005.

Figure 59 shows the sources of wood energy in the countries listed in Figure 58. Wood directly from forests followed by wood processing residues remain the main sources of wood energy in the countries that provided data.

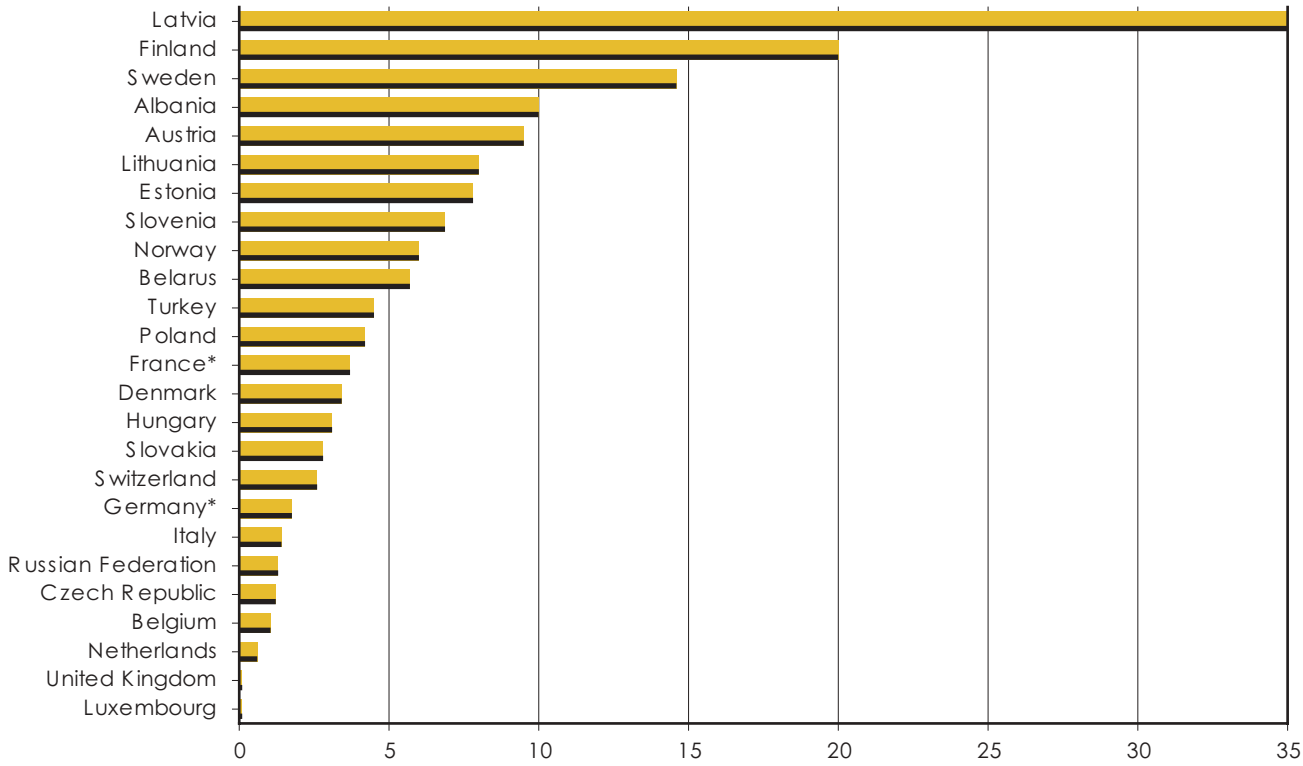


Figure 58. Share of wood energy in total energy consumption (%), 2005 (where data available)

Note: * 2000 values were used for France and Germany

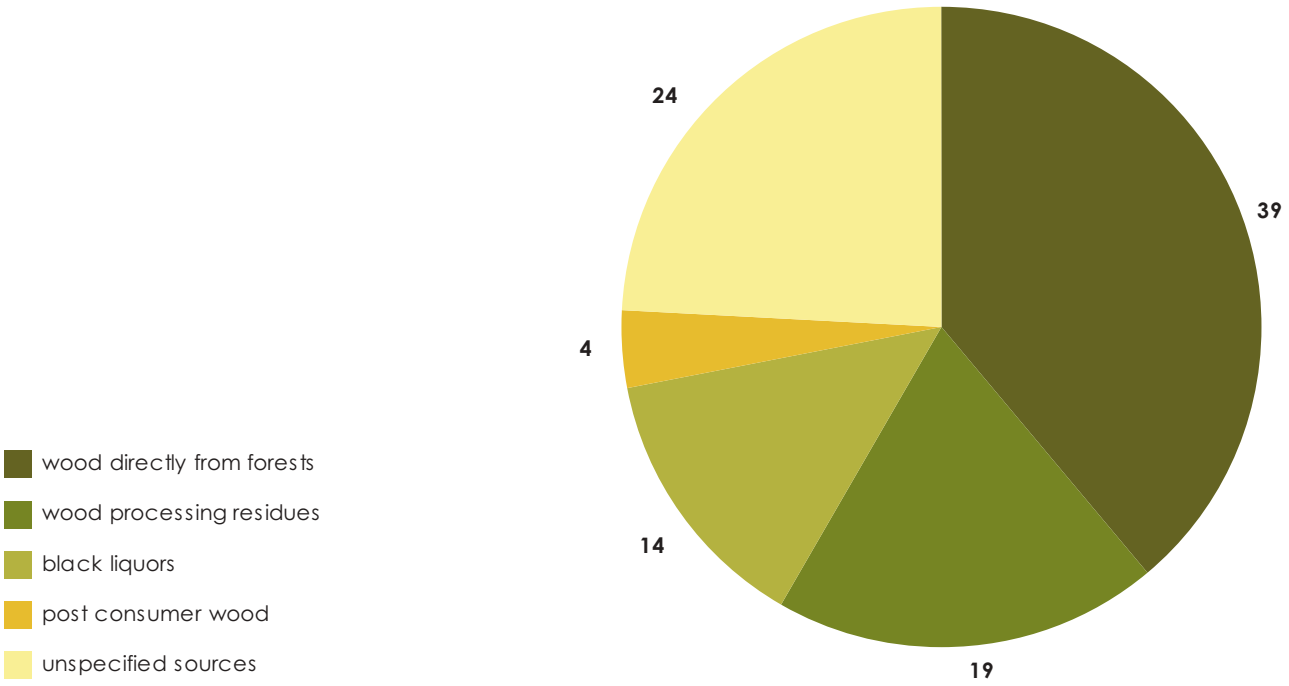


Figure 59. Sources of wood energy in percent of total wood energy, 2005 (where data available)

In recent years, wood energy has become a hot policy topic in Europe; in order to assess its situation, trends and potential, further reliable information is required. In 2006, the Joint Wood Energy Enquiry (JWEE) was carried out by four international organizations – UNECE, FAO, the International Energy Agency (IEA) and the EU – in order to assess sources, uses and importance of wood energy in national energy supply[10]. According to JWEE data, consumption of wood for energy generation in

[10] The findings of this study, which are based on data from 12 European and two North American countries (UNECE/FAO, 2007), are available online at: www.unece.org/trade/timber/docs/stats-sessions/stats-29/english/report-conclusions-2007–03.pdf.

12 European countries totalled 185 million m^3 wood equivalent; this volume corresponds to 49 percent of the total roundwood consumption in these countries.

Many countries in the region have policies aimed at increasing renewable energy in total energy consumption. An increased demand for wood for energy could create additional opportunities to increase revenues from forest management, which could contribute to economic viability of forestry.

Indicator 6.10. Accessibility for recreation

Area of forest and other wooded land where public has right of access for recreational purposes and indication of intensity of use

Ownership patterns and property rights affect public access to forests. Access to forests enables people to benefit from the recreational value of forests, which contributes to the quality of life. Many recreational services or opportunities are not marketable or are based on legal or effective rights of free access.

Forty countries reported on the area of forest and other wooded land available to the public for recreational purposes. Countries reported that the public can access on average 94 percent of forest and other wooded land for recreational purposes. In most reporting countries (30 countries reported), the public can access more than 90 percent of the area of forest and other wooded land. In three countries, France, Poland and Italy, the public has access to more than 70 percent of forest and other wooded land. Only Cyprus reported that the public has access for recreational purposes to less than half (41 percent) of forest and other wooded land.

The situation did change from 2000 to 2005. Six countries, Hungary, Poland, Slovenia, Ukraine, Estonia and Lithuania, reported a marginal (0.2 to 1.5 percentage point) reduction in the share of area of forest and other wooded land available to the public for recreational purposes. Three countries, Austria, Bulgaria and Cyprus, reported a marginal increase. The biggest change was in the UK, where the share of area of forest and other wooded land with available public access (legal right) increased to 73 percent in 2005 from 55 percent in 2000.

An increasing share of forest and other wooded land is being allocated for recreational purposes, ranging from about 1 percent in South West Europe to 12 percent in East Europe. Data on number of visits and visitors were reported by ten countries (see Table 32).

Table 32. Estimated no. of forest visits in selected countries

Country	Annual no. of visits (in million)	Annual no. of visits per person	Comments
Czech Republic	20.4	2.0	Compiled from 2 647 000 ha
Denmark	50.0	9.2	
Finland	1.8	0.2	Visits on state land only (896 000 ha).
France	441.0	7.3	Compiled from 15 400 000 ha
Germany	1 700.0	20.6	Estimated from the number of forest visitors and average visit frequency
Italy	150.0	2.6	Average of 100–200 million visits per year
Netherlands	270.0	16.6	Compiled from 360 000 ha
Sweden	339.0	37.5	75% of the population visit once a week
Switzerland	540.0	24.8	
United Kingdom	300.0	5.0	300 million day visits by adults to woodland from home, excluding visits made while staying away from home; visits by overseas tourists; visits by children (under 16) and visits not considered leisure (e.g. routine dog walking)
Total	3812.2	12.1	

Due to the use of different sources, methodologies and reference years, however, data are not comparable between countries and it is difficult to draw general conclusions. Estimates presented in Table 32 show an average of 12.1 visits to forests per person per year. If applying this frequency to the total population in MCPFE countries, this would translate into about 10 billion visits per year. However, this figure is highly speculative; further research and efforts are needed to quantify the role of forests in recreation.

Indicator 6.11. Cultural and spiritual values

The number of sites within forest and other wooded land designated as having cultural and spiritual values

Forests have many cultural and spiritual values for societies and individuals, notably for religious, aesthetic and historical reasons. Although frequently intangible and/or personal, these values are often manifested in particular sites that are increasingly being identified, listed and protected. The number of such sites officially designated is one rough indicator of the cultural and spiritual values assigned to its forests by society.

The Fourth Ministerial Conference (Vienna Summit, 2003) fully recognized the cultural values of forests and specified the means of preserving and enhancing the social and cultural dimensions of sustainable forest management (Resolution V3). Two international conferences organized by MCPFE and other international organizations, which were held in Sunne, Sweden (2005) and Florence, Italy (2006), addressed cultural heritage and sustainable forest management.

Sixteen countries reported on sites and monuments with cultural and spiritual values in forest and other wooded land. They indicated more than 1 million archaeological sites, almost 900 000 various designated nature monuments, and more than 1 000 other sites with recognized cultural and spiritual values. These figures are indicative only and perhaps vast underestimates. Clearly, additional efforts are needed to ensure that the information is objective, comparable and not simplified.

5th MCPFE

FORESTS FOR QUALITY OF LIFE

REPORT ON THE MCPFE QUALITATIVE INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT: POLICIES, INSTITUTIONS AND INSTRUMENTS

A. Overall policies, institutions and instruments for sustainable forest management

Public participation in decision-making related to forests is increasing, but challenges remain.

National forest programmes (NFPs) are increasingly widely acknowledged and used across Europe to govern the diversity of forest-related issues in a more open and adaptive manner, but challenges remain. These include better ways and means for cross-sectoral coordination and continued political commitment to further develop NFPs into an effective policy tool.

Forest-related institutions are changing.

Changes in institutional frameworks in Europe indicate an emphasis on further improving the efficiency and effectiveness of state forestry organizations as well as on reorganizing forest research. In addition, organizational structures for private forest owners are further developed. However, it seems that well-functioning coordination mechanisms between different levels of government and stakeholder groups (which are increasingly diverse) are still rare.

Sustainability is given prominence in forest laws and other policy instruments.

MCPFE countries are pursuing sustainable forest management (SFM) through creating new policy instruments and adjusting existing ones. This is done through integrating SFM more systematically into legal and regulatory frameworks when they are revised, through financial support measures addressing the different dimensions of SFM, through efforts to strengthen the forest-related information base, and by improving communication with the public.

Key findings by indicator

A1. National forest programmes or similar

Two-thirds of the reporting countries currently implement an NFP or equivalent, and in several others, national forest programmes are under development. Most of these are developed through specific formal or informal processes; only around one-third can be considered as "equivalents".

A2. Institutional framework

In more than two-thirds of the countries, forest policy is directed mainly by central government administrations. However, there is a noticeable trend towards involving more strongly regional and local levels as well as other public and private actors in policy development.

A3. Legal instruments

Since 2003, more than one-quarter of the reporting countries have adopted new forest laws. In almost all countries forest-related laws or regulations were amended, particularly in Central and Eastern European countries. Most countries have also signed or ratified the major regional and global forest-related commitments.

A4. Financial instruments/economic policy

The amount of financial support to forests and forestry differs strongly between countries, with particularly strong support for afforestation or for providing benefits to society. Only a few countries state that their economic policy is to develop forests as a source of economic growth and employment.

A5. Informational instruments

Informational instruments focus on improving available information and data systems. Most communication measures still concentrate on providing factual forestry information, but more countries are making efforts to develop better dialogue with stakeholders and the public.

Indicator A1. National forest programmes or similar

Building on the consensus achieved by the Intergovernmental Panel on Forests (IPF) and its successor, the Intergovernmental Forum on Forests (IFF), MCPFE has developed a common European approach to NFPs. MCPFE adopted Vienna Resolution 1[11] on NFPs in April 2003, whose Annex 1 specifies the "MCPFE Approach to National Forest Programmes in Europe". By organizing a platform for the exchange of experiences, MCPFE provided further support to the adoption and implementation of NFPs in Europe. In 2004, at least 20 of the then 44 MCPFE participating countries were formulating or implementing NFPs in line with the MCPFE approach (MCPFE, 2005). The EU Forest Action Plan (COM [2006] 302 final) identifies the NFP as a suitable framework for implementing international forest-related commitments in the context of the EU. Furthermore, 12 countries of the MCPFE participate in the FAO NFP facility, a funding mechanism and information initiative promoting NFPs.

Two-thirds of the reporting countries are currently implementing an NFP or equivalent, and several others NFPs are under development.

Of the 31 countries reporting on NFPs, 17 countries have classified their NFP or equivalent instrument as being in the phase of implementation. Five countries reported that they are implementing an NFP or equivalent that is currently under review, while six countries indicated their NFP to be currently in development. Three countries reported they are elaborating policies in a continuous process or through other means (Figure 60). Overall, the results show that NFPs have gained importance as a policy tool in many countries of the European region. More countries are implementing NFPs in 2007 than in 2003.

Of the six countries with NFPs under development, three have recently taken concrete steps to start a more formal process to develop an NFP or an equivalent, and the remaining three are actively collaborating with the FAO NFP facility. Those countries with NFPs under review have either developed the first NFP early (such as Finland), or have decided on comparatively short periods between reviews and updates of their NFPs. The countries using a continuous approach or other means for policy and strategy development without relying on formal NFP processes use characteristic policy development procedures to different degrees. For instance, Sweden reports that its forest policy processes almost completely meet the requirements of an NFP.

Most NFPs are formal or informal processes; only around one-third can be considered "equivalents".

In practice, NFPs designate a wide range of approaches to developing, programming and implementing forest policies in a country or a state. NFPs can be distinguished along a number of dimensions, including to what extent they are formal or informal governmental processes (i.e. not formally established processes of consultation following the MCPFE approach to NFPs) or whether the resulting documents are formally adopted or not. Other countries identify their national NFP as comprising a set of policies or strategies addressing sustainable forest management ("equivalents" to NFPs).

[11] MCPFE Vienna Resolution 1: "Strengthen Synergies for Sustainable Forest Management in Europe through Cross-Sectoral Co-operation and National Forest Programmes".

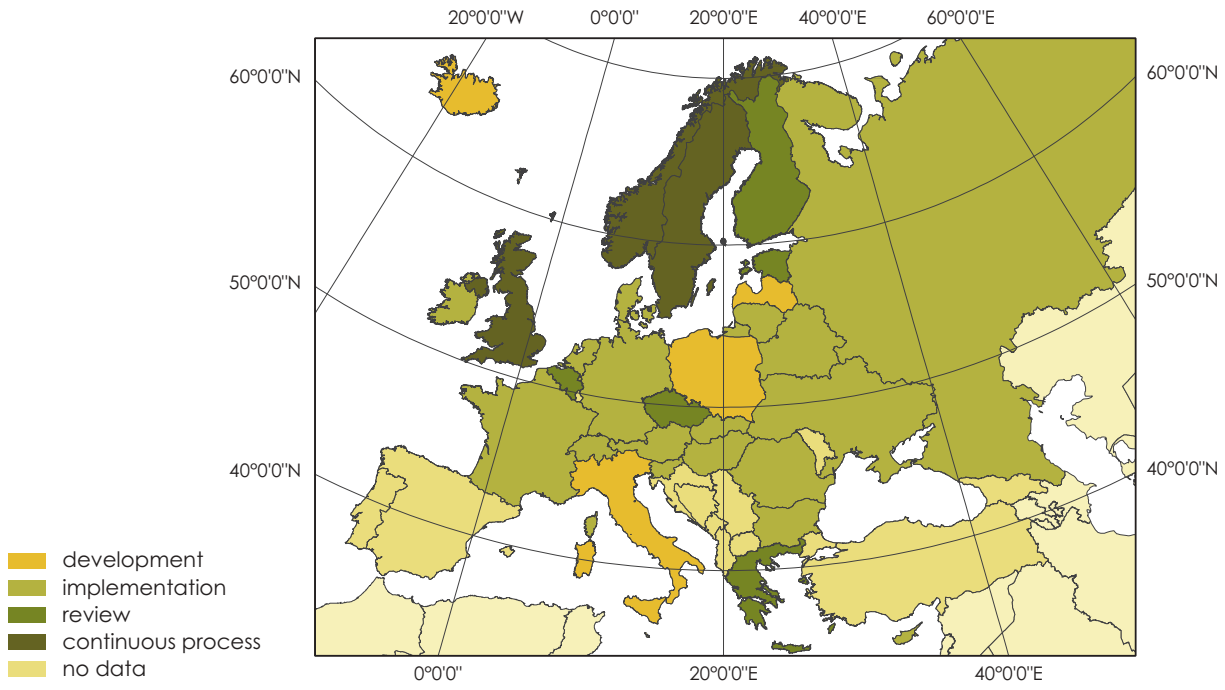


Figure 60. Status of national forest programmes in Europe in 2007

Of the 21 countries providing information on the characteristics of their respective NFPs, around one-third applied a formal process, around one-third applied some formal elements of an NFP process, while another one-third considered a number of specific policies and strategies taken together constituted an NFP. This shows that formal NFPs based on a formal political decision have not yet been considered appropriate or feasible in most MCPFE countries. Moreover, in a number of countries, NFP documents were elaborated in NFP processes, but these were subsequently not politically endorsed. However, most countries have taken steps to move beyond a largely symbolic "re-branding" of existing strategies as an "NFP". It should be noted that, given the diversity of the role of forests and forestry for society in different European countries, considerable differences in the interpretation and application of a general policy-making concept are to be expected. Most countries described their NFPs as following the spirit but not the letter of the concept and principles of NFPs.

BOX: 3. A formal NFP process – the Austrian Forest Dialogue

In April 2003, the Austrian Federal Minister of Agriculture, Forestry, Environment and Water Management launched the Austrian Forest Dialogue ("Walddialog")as a long-term oriented, participatory, cross-sectoral policy development process based on the pan-European understanding on NFPs. At the beginning, all Forest Dialogue participants jointly elaborated the rules of cooperation, the principles of process structure and procedure, and adopted them by consensus. These rules and principles form the basis for the result-oriented work in the Forest Dialogue.

The Forest Dialogue serves the purpose of strengthening sustainable management, managing and protecting Austrian forests, and addressing the economic, ecological and social aspects of forests as three equal pillars of sustainable forest management. The Austrian Forest Programme is structured into seven Action Areas, which are related to the six pan-European criteria for sustainable forest management identified by MCPFE. The seventh Action Area, "Austria's international responsibility for sustainable forest management", was added on request of the participants of the Forest Dialogue.

Three-quarters of the countries report that they have taken the MCPFE approach to NFPs into account, but key NFP elements are often new.

Ten out of 25 countries reporting on the issue stated that they have taken the MCPFE approach to NFPs fully into account. Some countries report that they take the MCPFE approach as a general guide, while others state they are following individual component specifications. Another nine countries report that they have partially taken the MCPFE approach into account, i.e. some of its most characteristic elements. The characteristic NFP elements most often mentioned as significant are:

- the broad concept of sustainable forest management;
- stakeholder participation;
- efforts to strengthen cross-sectoral coordination and collaboration.

From the responses, it is evident that the broad concept of sustainable forest management is generally accepted and widely used as a reference and framework for forest policies covering the economic, ecologic and social dimension of forestry. A range of countries explicitly refer to the criteria and indicators of sustainable forest management as a useful organizing framework for NFPs. Similarly, the awareness of the overall benefit of broader stakeholder participation in forest policy-making has visibly been strengthened through the application of NFPs. However, given the different contexts and political cultures leading to different forms of NFPs, the modalities and degree of participation of a wider range of stakeholders or the public at large vary considerably.

The most common form of participation is an exchange of information and consultation during the formulation process. Participation in the decision-making process is more prevalent in formal NFP processes than in those classified as "equivalents". Stakeholder participation and cross-sectoral coordination crucially depend on the willingness and ability of relevant user groups and other sectors to participate. In particular, efforts in cross-sectoral collaboration are impeded when political support for the NFP is weak, since other sectors often show limited interest for the NFP process. In countries with a federal state organization, NFP or equivalent processes are usually developed at the subnational or provincial, rather than federal level. NFPs also differ with respect to implementation plans or strategies. Several NFPs have explicit follow-up action plans, such as Slovakia, while others integrate strategies with follow-up actions, such as Finland. Only a few countries reported that they have an explicitly designed monitoring component, regularly informing on the implementation process of NFPs.

NFP processes have started at different points in time across Europe. About half of those NFP processes, for which a starting date has been indicated in international reporting[12], were in fact started before 2003, when the MCPFE approach to NFPs was agreed upon by European governments (Figure 61). For instance, the Lithuanian NFP development process started in 1996 and complied mainly with the principles agreed at IPF, which are consistent with those of MCPFE. Several of these early NFPs are now in the phase of review or undergoing revision for a new period. The validity period of NFPs varies on average between five and ten years. Note that in a number of countries, NFP processes have started and at times have completed their work, but the resulting programme was subsequently not politically endorsed.

[12] A formal starting date for NFPs was indicated by 18 countries, excluding those for which a number of policies and strategies of different years are collectively considered as "NFPs".

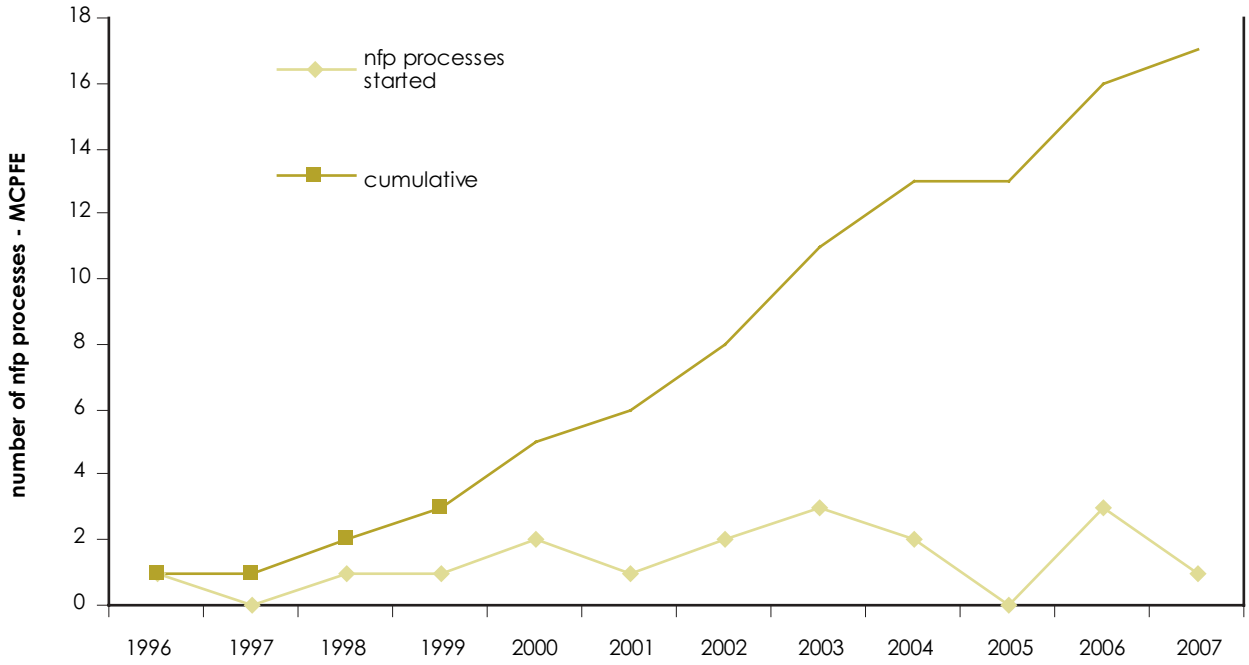


Figure 61. Official start date of NFP processes in MCPFE countries, based on country report information, 1996–2007

The progress in adopting and integrating new elements of policy-making as part of the NFP approach is impressive, but challenges remain.

Since NFPs have been developed as a new approach in forest policy-making only from the mid- to late 1990s, at the turn of the millennium, they were often interpreted as a metaphor for governmental forest policy-making in Europe (Zimmermann and Mauderli, 2002). However, over time, an increasing number of governments seem to have adopted and implemented them as an innovative and specific approach to develop public policy in the forestry sector. In some countries, this was driven by the aim to implement international commitments, in particular, the proposals for action of the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF).

For most countries, several of the characteristic NFP elements are new, in particular, the strong emphasis on broad stakeholder participation and the focus on cross-sectoral coordination. Given the often major differences from traditional approaches to forest policy-making, progress made in adopting and integrating some of these new elements in a short period of time seems impressive. On the other hand, most countries might agree that it takes time to experiment and learn how to use most appropriately the significant elements of NFPs and how best to integrate them into the prevailing national cultures and processes of public and private forest management. Despite limited information, it seems safe to assert that NFPs are thus influential in promoting a broad understanding of sustainable forest management and encouraging its further progress in Europe. As frequently stated in the available country reports, this refers first and foremost to sustainable forest management's multiple dimensions, its strong emphasis on stakeholder participation, and the stated need to improve cross-sectoral coordination among different public policy domains.

The real added value of the NFP approach accrues over time and with iterative NFP process cycles.

Both the NFP approach and the concept of sustainable forest management are long-term and process-oriented. NFPs aim at establishing a policy framework for sustainable forest management widely supported by stakeholders, which in turn should increase the efficiency and effectiveness of forest

policies. However, the feasibility of implementing formal NFP processes in countries depends on a range of factors, including: the willingness and capacity of governments and stakeholders to engage in the process; sufficient financial resources; and the necessary means to implement the outcomes. It also depends on, inter alia, the role of forests in society, their importance for the economy and on the degree to which major principles of an NFP are already applied or accepted among governments and stakeholders in a given region.

A number of countries made explicit reference to the usefulness of the criteria and indicators of sustainable forest management as a reference framework for organizing the NFP, as well as for monitoring progress in implementation. This underlines the strong links between developing NFPs, on the one hand, and respecting the criteria and indicators for sustainable forest management, on the other hand. To date, however, it seems that few countries have developed a coherent approach to monitoring the implementation of NFPs. Systematic monitoring would strengthen the emphasis on the implementation of programmes and goals, and further establish NFPs as a substantive rather than symbolic policy instrument. In sum, one may conclude that continuous, high-level political support and commitment to the NFP approach is a major prerequisite for supporting good forest governance that promotes sustainable forest management and to tapping the real strength and added value of the NFP approach, especially in the comparatively early stage of using NFPs as a new political instrument.

Indicator A2. Institutional frameworks

The "institutional framework" as understood here refers to the constitutional basis as well as to the organizational and administrative set-up of forest policy in a country. It comprises governmental actors, non-governmental organizations and citizens involved in public policy-making and implementation. It also comprises formal coordinating mechanisms between the public and private sector (including, for instance, the NFP). Institutional frameworks play a central role in organizing multiple and often divergent stakeholder interests in forests. They provide the structure for national, regional and local politics, and influence forest-related public policies. The prevailing institutional frameworks show how countries organize the protection and sustainable use of forests. Changes in these frameworks indicate important long-term changes in political goals and culture.

In more than two-thirds of countries, forest policy is directed mainly by central government administrations.

Many governmental organizations have administrative competencies for forests. Traditionally, forest matters were under the competency of the ministries responsible for agriculture or rural areas, indicating the importance of the economic role of forests. In half of all the MCPFE countries, forest matters are under the competency of ministries related to agriculture, forestry, rural development or natural resources. Ministries of the environment were established as separate organizations over the last two decades, signalling a heightened awareness and importance of environmental matters in national politics. Six countries reported that forest matters are under the authority of ministries for the environment, particularly in countries in transition. In countries with both ministries of agriculture/forestry and ministries of the environment, the latter usually have competency over protected areas and biodiversity conservation. In a few countries, environmental, agricultural and forestry or rural development matters have merged. Usually, forest policy matters within the competent ministry are dealt with by the forestry department. In nine MCPFE countries, forest administration is organized through forest offices, services or agencies. Forest policy competency has been transferred in some cases, for example, in Sweden, from the Ministry of Enterprise, Energy and Communications to the Ministry of Agriculture.

A number of countries are organized as federal states in which subnational regional parliaments and governments are the main authority dealing with forest policy matters. This is the case, for instance, in Belgium (three regions), the United Kingdom (four countries), Germany (16 federal states), Spain (17 autonomous communities) and Italy (21 regional administrations). In other countries, the central government shares responsibilities with regional governments in administering and implementing forest-related policy, e.g. in Austria (nine federal states) and Switzerland (23 cantons). Institutional frameworks usually develop slowly and often in line with larger changes in a country's constitution. No major changes have been reported since 2003 with respect to federal governmental structures; however, several countries reported having recently completed a restructuring of responsibilities between central and regional governments, usually through a process of devolution of power to regional levels (e.g. in the UK and Italy).

The implementation of national – or in the case of federal states, subnational – forest policies and law enforcement differs considerably between countries. In some countries, main implementation and control responsibilities are delegated to municipalities (Norway), the cantonal level (Switzerland) or to the federal state level (e.g. Austria and Germany). A number of countries have organized forest law enforcement centrally, e.g. through the environment inspectorate in Estonia or similar inspectorates in Ukraine. However, in most countries, enforcement of forest laws is the responsibility of state forest services, agencies or offices that are in turn organized in central, regional and district offices. These units are sometimes partly independent in status or are separate juridical bodies, such as the National Forestry Board in Bulgaria. In some countries, the ongoing revisions of forest laws may further affect the distribution of juridical and executive powers among different levels of government. Administrative re-organization of forest law enforcement has recently been undertaken in Hungary, where the State Forest Service has merged with the Office of Agricultural Administration.

State forests are increasingly managed by separate bodies, which is the current model used in about two-thirds of countries reporting.

In European countries, the state is not only the authority to set and implement forest legislation, but also the owner of forests. In some countries, such as Ukraine, integrated state forest and management administrations retain responsibilities for both forest policy and legislation, and forest management. In most of Germany, the federal states have a general forest administration in which the same organization is responsible for state forestry and legal supervision of privately owned forests. On the other hand, in 18 out of 29 countries for which information has been reported, public forest management organizations are separate from public forest administration. For example, in Sweden, most of the forest management on state land has been entrusted to Sveaskog AB, a 100 percent state-owned enterprise. In France, the Office National des Forêts, the state forest organization, is also responsible for the management of municipal forests. In the remaining 11 countries, forest policy administration and state forest management are integrated into one organization.

In recent years, the trend has continued to establish forest management organizations as public companies and/or to re-orient state forest management organizations towards separate or largely separate entities, often with the explicit aim to be self-financing or profit-oriented. For instance, in Hungary, most public forest estates are managed by state-owned joint stock companies under the control of the Hungarian Privatization and State Holding Company (APV Zrt). In Germany, several federal states have recently reorganized state forest administration into state forest enterprises (e.g. Bavaria).

Changes also continue in public forest research organizational structures.

Other reported changes refer to public bodies involved in forest research. Based on available evidence, reorganization of forest research is mainly undertaken with a view to create larger research units by merging institutions. For instance, in Slovakia, the National Forest Centre (NFC) was founded in 2006 by merging four forest-related research institutes. In Norway, the Norwegian Forest and Landscape Institute was established in 2006 as an autonomous unit by merging two former institutes. Similar mergers have recently occurred which created the following institutions: in Denmark – Forest and Landscape Denmark; in Belgium/Flanders – Instituut voor Natuur- en Bosonderzoek (INBO, The Research Institute for Nature and Forest); in Estonia – the Institute of Forestry and Rural Engineering; and in the Netherlands – Wageningen University and Research Centre. In Finland, the Finnish Forest Research Institute (METLA) reorganized its structure in 2006 and strengthened its emphasis on social and economic research. Switzerland reported major changes in forest education at the university level, in their BSc and MSc programmes, with forest education becoming part of the environmental sciences.

Coordination and consultation mechanisms are still rare.

A number of countries reported the establishment of new coordination or consultative mechanisms involving organizations across ministries or between the public and private sectors (e.g. with NGOs). Many of these mechanisms relate to NFPs, such as the Estonian or German "Forest Roundtable", the Czech "National Forest Committee", the Austrian "Forest Dialogue", or the forest-related "Councils" operating on national and regional levels in Finland and France. Some countries use consultative bodies to advise the government on forest matters. For instance, in Belgium, consultative bodies advise the respective governments of the three regions, e.g. in Wallonia, the Conseil Supérieur de la Foret et de la Filière-Bois. A few countries reported on relevant cross-sectoral platforms, such as the "Platform Wood in the Netherlands".

Coordination mechanisms usually aim to link different levels of administration and to coordinate among federal or regional forest administrations (e.g. the Conference of Cantonal Forestry Directors in Switzerland), and among different state forest administrative bodies. In particular, countries where responsibility for forest matters is at the sub-national level have established national-level coordination bodies or platforms, such as the Permanent Conference for the Relations among the State and the Regions in Italy, or the Forestry Ministers' Group and the "GB Board of Commissioners" in the UK. In a number of countries, committees, councils, advisory boards or other bodies with broader stakeholder membership provide policy advice to the ministry responsible for forest policy (e.g. France, Finland, Greece, Ireland, Latvia, Lithuania, Poland, Sweden and the UK). In most of these countries, such bodies were established before the last Ministerial Conference in 2003. In Latvia, the Advisory Council was formally established in 2006.

At least 260 000 persons work in forest-related public institutions in Europe (100 000 without the Russian Federation).

A comprehensive enquiry into staff and budget of forest administrations and other forest-related public bodies has not been undertaken and the available data are limited in terms of coverage and quality; the data presented here are therefore indicative at best. Information on staff and budget of the main public forest-related bodies was provided by 23 countries, representing more than 90 percent of Europe's forest area (Table 33). According to these data, in 2005, the number of forest-related staff in public institutions employed in these countries is around 270 000 persons in full-time equivalent employment (100 000 if excluding staff reported by the Russian Federation). Countries with federal systems, such as Germany, Italy, and Switzerland, reported forestry staff at the federal level only, and not staff in regional administrations. Some countries with centralized implementation and inspection also reported field staff.

Roughly three-quarters of the staff work in public forest agencies or state forest management organizations. About 10 percent of the staff is employed in forest administration, while around 6 percent are employed in forest research (excluding the Russian Federation).

The figures on public forest research include public forest research and training institutions, but not staff or budget from universities and forest education institutions, for which five countries provided figures. In countries where state forest management organizations are independent bodies, they have not been reported.

Table 33. Forest-related public institutions 2005 staff, reported by 23 countries

		Personnel 2005 Full-time equivalent (FTE)	% of total FTE	No. of reporting countries
Forest administration		21 511	8%	23
Public forest agencies	MCPFE	238 891	90%	14
	MCPFE excl. the Russian Federation	74 299	73%	13
Public forest research and training organizations excl. the Russian Federation		5 666	6%	18
Total reported:	MCPFE	266 090	100%	23
	MCPFE excl. the Russian Federation	101 248		22

By far, the three largest employers in 2005 were the Russian *Rosleskhoz* (Federal Agency of Forest Management), with around 164 600 staff, followed by the Romanian *Romsilva* (National Forest Administration), with around 25 700 staff and the French *Office National des Forêts*, with around 10 600 staff. Five of the top six countries in terms of public employment in forestry are located in Central and Eastern Europe and the Russian Federation. In these countries, state forest organizations manage large forest areas, as does the *Office National des Forets* in France. Dividing public forestry staff by the area of forests (excluding these three countries) shows an average of some 283 (public) personnel per million ha of forests (788 persons/million ha if the Russian Federation is excluded). However, this figure varies considerably, from more than 4 000 public personnel/million ha in Romania, to 53 staff/million ha in Sweden and 19 staff/million ha in Norway, depending on whether or not the forest is mainly in public ownership and state forest management is undertaken by an independent organization.

A total of 16 countries reported on budgets available for the different public forest organizations. These countries, representing about 30 percent of forest area in Europe (without the Russian Federation), reported a total of EUR 3 billion as forest-related budget for administrative bodies, state forest management bodies, public forest services or agencies and national forest research institutes in 2005[13]. While this is certainly not an accurate general figure, it indicates possible magnitudes. If calculated per ha of forests, it would theoretically amount to EUR3 3/ha/year of average budget for forest-related public bodies in these 16 countries.

The most important stakeholders in forest policy are forest owners, but the diversity of relevant stakeholders is increasing.

Private organizations, in particular representatives of forest owners, have long been recognized as the established and leading stakeholders in forest policy, as confirmed by the response of 28 reporting countries. Around 55 percent of the organizations were associations of forest owners, foresters, forest technicians, or of other groups active in forest management. Only a few countries reported hunting associations as relevant organizations.

[13] This figure includes government administrations, public forest agencies including state forest management organizations if they are integral parts of government administration (i.e. not partly or fully independent bodies), as well as federal research institute budgets, where reported. It excludes budgets reported by the federally organized countries, Germany, Italy and Switzerland, as well as forest-related budgets reported for universities and higher education institutions.

The most relevant group of stakeholders after forest owners and forest professionals are forest industry associations (Figure 62), followed by nature and environmental protection organizations. Many environmental NGOs were listed under "other", i.e. seen by many administrations as less relevant than forest owners or industry associations. Recreational organizations, reflecting a growing attention to recreational services of forests, were only reported by some Nordic countries. Culture-related organizations were reported only by one country (the Netherlands). Only two countries reported having no private interest groups or associations relevant to forest policy. Overall, the growing relevance of increasingly diverse stakeholders, representing the expanding diversity of forest uses and societal values attached to forests, seems to be gradually recognized. While no specific data is available on changes since 2003, it is evident that, especially in Central and Eastern Europe, significant efforts have been made to establish and strengthen the role and organizational structures of private forest owners and private associations, following the restitution of forests to private owners.

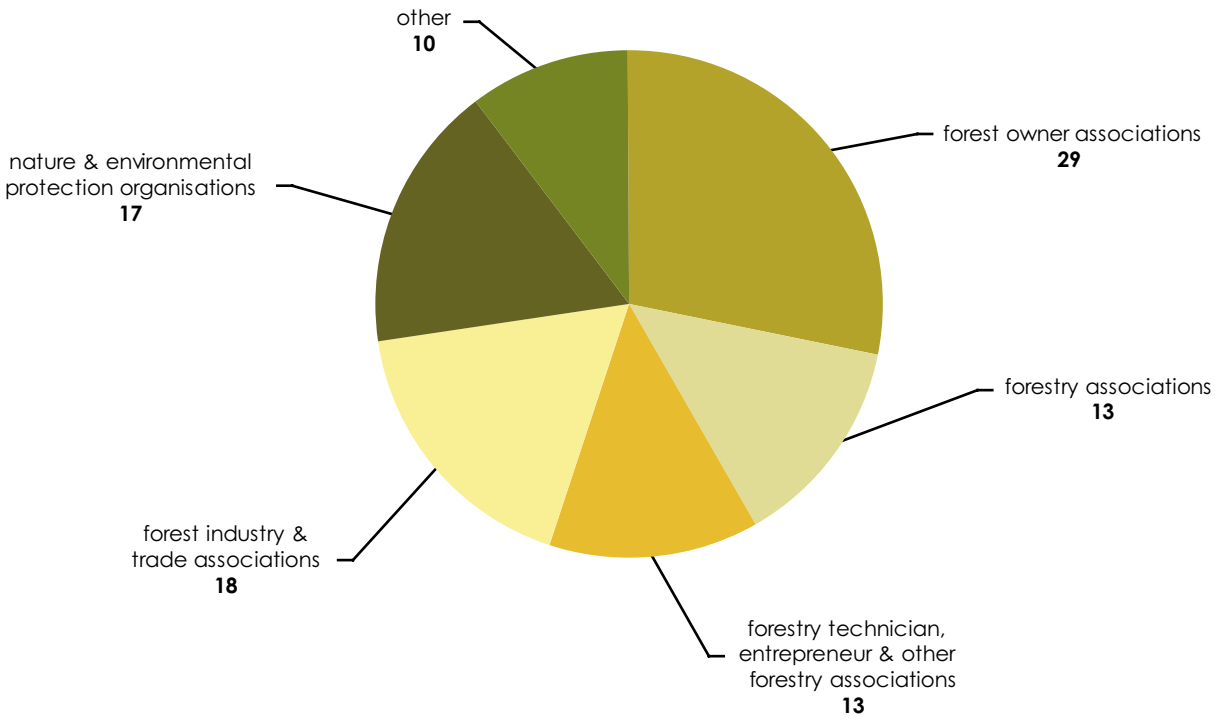


Figure 62. Main private organizations relevant in forest policy 2007, according to 28 country reports (% of all organizations reported)

Indicator A3. Legal/regulatory frameworks and international commitments

Over time, usually decades, forest-related laws have changed from local restrictions and usage rules to comprehensive provisions that organize and regulate sustainable wood production, and subsequently, sustainable forest management as defined by MCPFE in Helsinki Resolution H1. Many European countries therefore have long-standing experience in sustainable forestry based on legal and regulatory frameworks that have evolved over time. At the core of the legal/regulatory framework are the forest act and its complementary regulations, nature or forest protection regulations, hunting and wildlife management legislation as well as land use and related planning acts. Over the last decades, forest laws have increasingly expanded in scope in order to more consistently cover the incremental social, economic and political aspects of sustainable forest management as understood and defined by MCPFE.

Since 2003, more than one-quarter of the reporting countries have adopted new forest laws.

In many European countries, forest law amendments are periodically made in order to adjust the regulatory framework to new conditions and requirements. Countries evidently follow different practices concerning the naming of a forest law as a "new law". As Table 34 shows, many countries in Europe have revised their forest legislation, particularly over the last decade. Since 1990, the start of the MCPFE process, half of the countries that reported in 2007 have changed their main forest law. Since 2003, more than one-quarter of all countries reporting have adopted new forest laws. The most recent changes were a new Forest Act in Estonia and a new Forest Code in the Russian Federation, which were adopted in 2006 and came into force in January 2007. In seven countries, the forest law is currently under revision or under review (Belgium/Wallonia, Bulgaria, Cyprus, Czech Republic, Ireland, Lithuania, and Switzerland). The large number of forest laws adopted from 1990 to 2006 is a clear indication of the two major changes that have occurred during this period: the transition of Central and Eastern European countries to market economies, the broadening of the concept of sustainable forest management.

Table 34. Forest laws adopted in the 1990–2006 period in European countries (amendments not included[14])

1990	Belgium (Flanders), Croatia
1991	Liechtenstein, Poland, Switzerland, Serbia
1992	Albania
1993	Slovenia, Montenegro
1994	Lithuania
1995	Czech Republic
1996	Hungary, Romania
1997	Bulgaria, Finland, The former Yugoslav Republic of Macedonia
1998	Germany
1999	
2000	Belarus, Latvia
2001	France, Italy
2002	Bosnia and Herzegovina (Federation)
2003	Greece, Bosnia and Herzegovina (Republika Srpska)
2004	Denmark
2005	Norway, Slovakia
2006	Estonia, Russian Federation, Ukraine

In almost all countries, forest-related laws or regulations were amended, with many changes in particular in Central and Eastern European countries.

Forest legislation developments in Europe are even more dynamic with respect to amending forest-related laws. In almost all European countries, laws have been substantially amended in recent years or new forest laws have been enacted. Figure 63 shows that changes to forest legislations or regulations[15] are literally made almost on a weekly basis somewhere in Europe. Since 2000, there have been 12 new forest legislation and subsidiary texts such as regulations and parliamentary decrees adopted per year in the MCPFE region. There are around 35 changes per year in forest-related administrative regulations such as ministerial rules and orders (excluding mere amendments), according to FAOLEX data[16]. The figure also shows that the overall trend in new legislation was stable or slightly decreasing for new administrative regulations from 2001 to 2006. The peak in new regulations in 2001 is mainly an effect of the 19 new decrees and ordinances in Belarus and the 17 in Portugal. In some countries, forest laws are currently under review or discussion, as in the Netherlands.

[14] Dates for forest laws of Western Balkan countries were taken from Stanisic, Jovic and Nonic (2005).

[15] "Legislation" includes any act enacted by a legislative body (Act, Law, Commission/Council Regulation, Legislative Decree, Decree Law, Ordinance, etc., depending on the terminology used in the various national legal systems). "Administrative regulation" is a type of "delegated legislation" promulgated by a state, federal or local administrative agency given authority to do so by the appropriate legislature (Regulation, Decree, Resolution, Ordinance, etc., depending on the terminology used in the single national legal systems) (based on FAO-FAOLEX).

[16] Note that the FAOLEX database does not cover all forest-related legislation and regulations in all MCPFE countries. Nonetheless, it is the most comprehensive database on forest legislation. The data list documents with original dates of issuance and exclude multiple (sub-)entries of single documents.

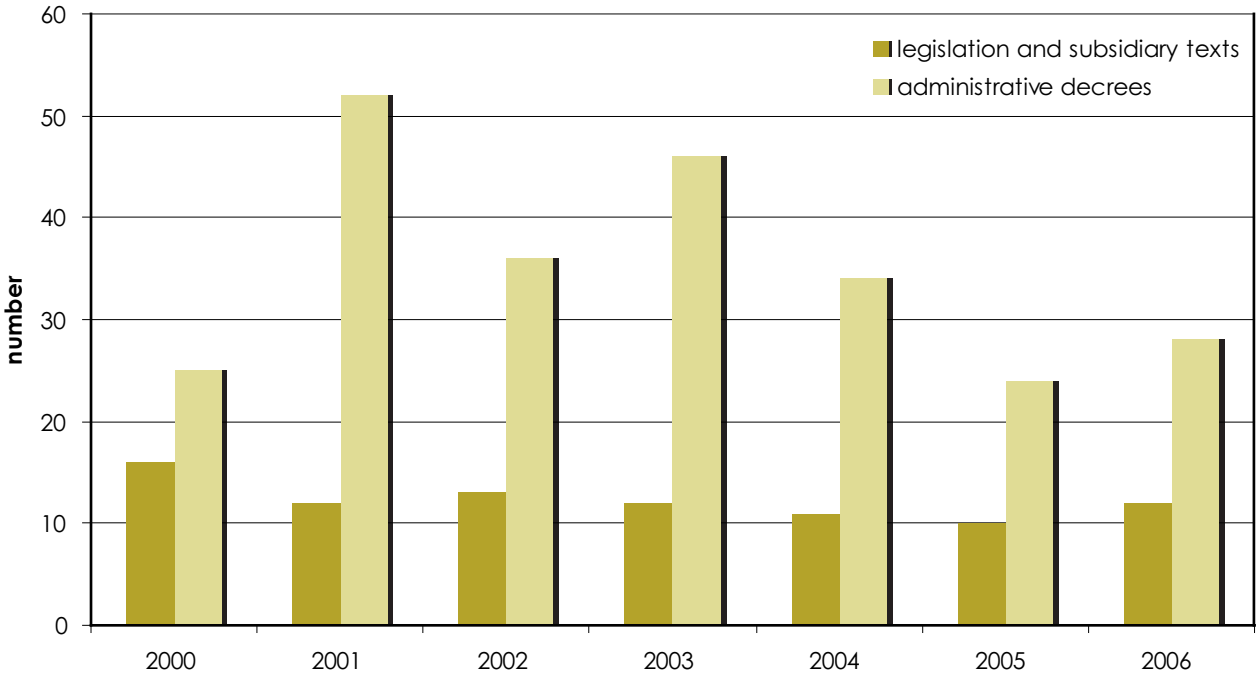


Figure 63. Number of changes in forest legislations and regulations in Europe, 2000–06

Source: Calculated based on FAOLEX data.

In most cases in Central and Eastern European countries, the development of new forest laws has been induced by constitutional changes in the transition process to market economies, which in turn have led to important land tenure reforms and privatization in the forest sector. The changes in legal and regulatory frameworks in these countries required the revision of the regulations pertaining to different kinds of forest ownership in order to manage the restitution processes and develop a regulatory framework to administer private ownership and private forest management, including forest law enforcement and the promotion of sustainable forest management through different policy instruments.

This occasionally resulted in a large number of specific regulations as well as periodic amendments within a short period of time. Some amendments are also driven by the accession of ten countries to the EU in 2004 and two countries in 2007. This accession required the compliance of legislative and regulatory frameworks with EU regulations, for instance, for forest reproductive material and environmental protection, as well as for funding of afforestation and other forestry measures in the context of the EU rural development regulation. Countries in western Europe reported changes to afforestation regulations, including on short-rotation forestry, as well as legislative changes to improve the system of forest reserves, in particular with regard to the EU Habitats Directive.

New and revised forest laws incorporate the principles of sustainable forest management as defined by MCPFE.

Many countries have incorporated the principles of sustainable forest management as defined by the MCPFE in new or amended forest laws since the mid-1990s. Several countries explicitly stated that amendments included the definition of sustainable forest management set out in Resolution H1 and/or made reference to the criteria and indicators for sustainable forest management (e.g. Lithuania, Poland, and Austria). This continues the trend in the revision of forest laws already initiated prior to 2003, for example, in Austria in 2002 and France in 2001. Another important aspect in amending forest legislation is exemplified by the Danish Forest Act of 2004, which clearly aims at promoting close-to-nature forestry and shifting from command-and-control public inter-

ventions to a more guidance-oriented approach. Further, it is evident that changes in national forest laws are mainly driven by national needs, addressing detailed administrative arrangements, such as changes in access and use rights, exploitation, financing of forest management, requirements for reproductive material and protection of biodiversity.

Most MCPFE countries have ratified or signed the major regional and global forest-related commitments.

Forestry-related international legal instruments, adopted in particular during and after the United Nations Conference on Environment and Development (UNCED) in 1992, have led to a substantial expansion of international conventions and multilateral agreements that influence national forest policies. Within Europe, MCPFE has adopted a total of 12 Resolutions in four Ministerial Conferences since 1990. Almost all MCPFE countries are actively participating in the main global forest-related processes. European states not only participate in MCPFE, but also in the United Nations Forum on Forests (UNFF), the UN Convention on Biological Diversity (UNCBD), the UN Framework Convention on Climate Change (UNFCCC) and the related Kyoto Protocol, the UN Convention to Combat Desertification, as well as many other topical or regional conventions and agreements related to forests, particularly the International Tropical Timber Agreement (ITTA), the Convention in International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) and the World Heritage Convention. EU Member States must comply with a number of regulations and directives related to forests. Within Europe, a number of further conventions and political processes relating to forests are addressing specific topics or regions, for example, the "Environment for Europe" process, the Convention on Long-Range Transboundary Air Pollution, the Alpine Convention, the Carparthian Convention and the European Landscape Convention.

Many, but not all countries periodically report on the implementation of commitments.

Regional and global forest-related processes or commitments usually require periodic reporting, in particular, on the implementation of the agreed commitments. MCPFE requested national reports on the implementation of individual commitment at the Ministerial Conference in 2003 and in 2007. On global level, since 2003, the United Nations Forum on Forests (UNFF) has requested three reports, for UNFF3, UNFF4 and UNFF5. Since that same year, the Convention on Biological Diversity (CBD) has invited countries to submit a comprehensive thematic report, the *Voluntary report on the implementation of CBD programme of work on forest biological diversity for the Committee on Forestry* (COP) 7 in 2004 and the third National Report containing information on the implementation on forest biological diversity in 2005. The UNFCCC requested its Annex I Parties to submit a fourth national communication to the secretariat by 2006. Annex I Parties to the Kyoto Protocol were requested to submit their Initial Reports by January 2007[17].

Since 2003, MCPFE countries have been requested to report to at least the nine international conventions or processes described above. Four countries (Finland, Poland, Sweden and the UK) reported to all of the nine global and regional forest-related processes and conventions. Further, six countries responded to eight out of the nine requests (Austria, Germany, Hungary, Lithuania, Norway and Switzerland). Two-thirds of all countries reported at least to half of the requesting processes or conventions[18]. For the UNFCCC's Fourth Report and the Kyoto Protocol

[17] According to Decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Protocol shall submit a report containing all information required for this purpose, as defined in the Annex to Decision 13/CMP.1, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later.

[18] Statistics in this section include the European Commission.

Initial Report, 90 percent of the reports submitted from countries are from MCPFE countries. Around 40 percent of all national reports submitted to the UNFF and around one-third submitted to CBD are from MCPFE countries. If the submission of reports on implementation is used as an indication of a country's commitment to international implementation, the MCPFE countries show an above-average level of performance. However, with regard to the commitment to report to the MCPFE itself, only slightly more than 50 percent of all countries submitted reports both in 2003 and 2007, while the other half either reported only once (ten countries) or not at all (11 countries). Nonetheless, for 2007, countries reporting to the MCPFE represented 96 percent of all European forests (80 percent excluding the Russian Federation).

Indicator A4. Financial instruments/economic policy

The indicator "Financial instruments/economic policy" addresses two separate areas. Financial instruments are applied to address a wide range of aspects related to sustainable forest management and to pursue a diversity of goals. These include increasing forest area through afforestation, promoting biodiversity protection, ensuring protective effects of forests and providing investment support to strengthen economic competitiveness. Such funding is distributed through budget allocation rules and legislation in the case of state forest agencies and through different forms of grants, subsidies or loans to private forest holdings. "Economic policy" addresses the promotion of the economic dimension of sustainable forest management more broadly. It is concerned with strengthening the economic viability of forestry and sustainable forest management, as well as with the competitiveness of both public and private forest holdings. Over the last decade, MCPFE Resolutions have repeatedly put emphasis on the economic viability of sustainable forest management. In particular, Vienna Resolution V2 focused specifically on the "economic viability of sustainable forest management". The following section will first address the broader aspect of "economic policy", and then deal with the more specific financial instruments.

Sustainable forest management and multiple-use forestry are the established basis for economic policies.

In general, in European countries, economic policies on forests are set within the scope of sustainable forest management and often explicitly with a view to reinforce the concept of multiple-use forestry. The reports submitted show that economic policies in Europe are usually focused on achieving a balanced production of the multiple goods and services from forests while striving towards the economic viability of sustainable forest management. These policies vary depending on whether the forests of a specific country are exclusively or to a large extent managed by state forest management organizations, or whether a significant part of the forests is in private ownership. Since there are both forms of ownership in most MCPFE countries, forest-related economic policies need to address both aspects by promoting goals that are relevant for different landowner categories. Not surprisingly given the very different situations of forestry and society needs across Europe, the approaches differ considerably from country to country, as do policy priorities and modes of implementation.

Only a few countries state that their economic policy is to develop forests as a source of economic growth and employment.

Surprisingly few countries explicitly state that the economic objective of the policies is to use forest assets efficiently in order to develop forests as a source of economic growth and employment. Nonetheless, many of the concrete economic policies reported indicate that forests are an important economic asset as well as a means to provide income and employment and to enhance the

well-being of society through the provision of forest goods and services throughout Europe. Some countries emphasize the need to strengthen competitiveness and to improve the social conditions of forestry sector workers.

A number of countries explicitly pursue policies to enhance the productive forest asset base through enlarging the area of forests by promoting reforestation and afforestation of degraded or marginal land for agricultural production (e.g. Iceland, Ireland, Denmark, Hungary, Romania and the UK). The large majority of eligible EU countries provide incentives to enhance afforestation and other forestry measures, especially through co-funding by the EU Rural Development Regulation 2000–2006.

Countries with private landowners promote the viability of sustainable forest management by strengthening the economic situation of private forest enterprises and the efficiency of private forestry production. Some countries set measures with the explicit goal to encourage private forest owners to remain active in forest management and to maintain multifunctional production and services. Several countries report that they support the formation and/or functioning of private forest owner associations in order to improve the efficiency of forest management (e.g. Belgium, Estonia). Such measures refer, for instance, to elaborating management plans (e.g. Greece, Italy), investing in infrastructure (e.g. road building in France), acquiring appropriate harvesting and transport equipment, and increasing availability of information technology. There are specific public funds to promote private investment in forestry (e.g. forestry savings funds in France and Norway) or entrepreneurship (Finland).

Several countries have adopted policies and measures to promote the demand for wood, such as "enhancing the sound use of wood" in France; "promoting renewable resources" in Belgium; fostering value-added production, e.g. bioenergy production in France; supporting small and medium-size enterprises in the forest wood-processing industry in the UK, France, Finland and Greece, or, more broadly, facilitating rural development in general. Many measures taken indicate an enlarging scope of forest-related economic policy towards more comprehensive value-added production chains within the overall context of rural development. In addition, a number of countries consider research and development as well as education and training as part of their economic or financial policies.

BOX: 4. Rural innovation – Finland

The Ministry of Trade and Industry, the Ministry of Agriculture and Forestry and the Ministry of Labour have combined their regional forces in Employment and Economic Development Centres (T&E Centres). The role of the T&E Centres in the forest sector is to support and advise small and medium-sized enterprises, promote technological development, implement regional labour policies, plan and organize forest training, and promote and develop rural enterprise activities.

Changes in economic policies tend to emphasize the economic viability of forestry, in particular in Central and Eastern European countries.

Over the last decade, the economic policy related to state forest management organizations has seen a trend towards more self-financing state forest management organizations. In particular, state forest organizations in Eastern European countries have, in general, adopted a profit-oriented model (e.g. Poland, Estonia and Lithuania). Usually, these organizations are not only expected to be self-financing, but also to contribute to the state budget through revenues from forest management (e.g. Austria, Estonia). Economic policies in fully integrated state forest administrations (see previous chapter) are financed through the state budget (e.g. Belarus, Ukraine, the Russian Federation),

but reforms are under way towards new systems of financing and more market-based economic policies. In a number of countries, self-financing of state forest management organizations is not necessarily the only public policy goal. For instance, in countries with high social demands for recreational, protection and landscape management services, the public sector contributes to financing multifunctional forestry through complementary budgetary support (e.g. the United Kingdom, Switzerland, the Netherlands). Similarly, in southern European countries where revenue streams from sales of wood are low, budget support of public entities in forestry may be considerable in order to maintain sustainability of forest management in public and private forests.

BOX: 5. Re-balancing the role of the state and markets in CEECs: Latvia

The economic goal of the Forest Policy is to ensure sustainable development and profitability of the forest sector, taking into account ecological and social requirements, and to generate the greatest possible increase in value added. One of the basic principles of development policy of the forest and related sectors is the development of a market economy. The free movement is promoted in the forest sector through the establishment of appropriate legislation and decreasing intervention of the state in economic activities.

An overall trend in terms of increasing or decreasing emphasis on economic policies and financial support is not discernible from the country reports. Some countries, such as Norway, indicate more supportive measures. Others, such as Slovakia, report decreasing support from public sources. In Central and Eastern European countries, the emphasis of economic policies is generally to decrease the influence of the state in economic affairs (Box: 5) Some countries report that they are pursuing an economic policy with a view to make sustainable forest management self-financing, e.g. Poland (Box: 6), Iceland, Lithuania or Sweden.

BOX: 6. Self-financing sustainable forest management: Poland

According to the Polish forest law, state forestry should be self-financing and an economically viable branch of the national economy through a rational and continuous use of the forest resources, increasing economic efficiency and forest productivity. Only a few activities (afforestation, protection against insect outbreaks and natural calamities, compensation of the air pollution effects on forests) are financed from state budgets. EU support for forestry (afforestation) has been significant for forestry development, especially for the private sector.

Overall, there seems to be a trend towards more flexible governmental economic and financial arrangements as well as an increasing reliance, or at least increased emphasis, on market-based or private commercial funding, rather than state budget-based funding in sustainable forest management in Europe. In 2005, for instance, the UK Forestry Commission, a public body, was empowered to enter into joint commercial ventures and to exploit its research commercially.

Financial instruments are used to promote all three main components of sustainable forest management: economic, ecological and social.

Countries reported the use of public funds to pursue a broad range of targets, including financing a range of forestry measures to promote rural development, to support afforestation and private forest owners, to provide protective services and extension services, to conduct research and innovation as well as to undertake biodiversity and habitat protection measures.

The modalities for funding measures supported through economic and other policies are different from country to country and for different measures. Common modalities are state subsidies and grants, as well as loans (e.g. Finland) or credits (e.g. Cyprus). Some countries reported tax exemp-

tion schemes (e.g. Finland, France, Lithuania, Sweden and the Netherlands). Only a few countries reported on financial instruments to promote private or communal investment in forestry, e.g. France (Box: 7). Some of the subsidies are governmental obligations specified in forest-related laws, while others are incentives set beyond legal obligations. The Netherlands base their financial instruments for forestry on the principle of payment for results.

BOX: 7. Promoting investment: the Forestry Savings Fund: France

The *Fonds d'épargne forestière* (the Forestry Savings Fund) constitutes a interest bearing, progressive savings fund that is exclusively intended for future forestry investments. A state premium equal to 85 percent of the capitalized acquired interests is paid when the community resorts to the loan in order to finance the investment project.

In addition to promoting the economic viability of sustainable forest management and innovation, complementary public financial instruments are employed to foster multifunctional aspects of sustainable forest management. Such instruments are used to promote and enhance the ecological and social components of sustainable forest management, in particular, forest protective services, special measures to maintain and increase forest biodiversity, and nature and landscape protection. The rationale for this kind of public financial contribution comes from the fact that many social and environmental services are not or not yet self-financing and thus cannot be paid for through market-based economic measures.

Several countries set economic incentives to promote the protection of ecosystems and biodiversity, for instance, the Forest Biodiversity Programme for Southern Finland (METSO) and the Nature Conservation Agreement in Sweden. Some countries emphasize close-to-nature forestry (e.g. Slovenia),support the use of indigenous tree species and/or nature conservation measures (Belgium, Cyprus, Poland), or financial contributions for improving degraded land. Financial support is also used to enhance and secure protective services such as avalanche and torrent control as well as measures against fire, pests and diseases. Furthermore, a considerable number of countries finance or co-finance research and development, advisory or extension services, education and training of forest owners and managers, as well as forest inventories and monitoring. Forest protection measures as well as forest inventory and monitoring tend to be major areas funded by the state budget.

Financial support per ha of forest differs strongly between countries. Support is particularly high for afforestation and for providing benefits to society.

According to the data reported by 21 countries on financial expenditures, around EUR 1.1 billion is spent annually by governments in these countries in the three main forest-related budgets of financial instruments[19]. Note that this figure is indicative of the magnitude of main financial instruments since only the three main forest-related budget lines in the respective country were available. No detailed data collection was feasible in the context of the Enquiry on the MCPFE qualitative indicators from which the data are drawn. However, assuming that this magnitude is correct, these countries, which represent around 50 percent of forest area in Europe, excluding the Russian Federation, would spend on average around EUR 27/ha/year through their main forest-related financial instruments.

The data reported by countries on main budgets for financial instruments show that there are huge differences in public budget spending for forestry in Europe, ranging from considerably more than

[19] excluding regular budgets and state forest management budgets as reported by countries – see section A2 on institutional frameworks. Note that figures are estimates derived from reports on the three main forest-related budget lines in the respective country. Figures were averaged to annual figures from reported programme periods.

EUR 100/ha/year in some countries (e.g. Ireland) to a few EUR/ha/year in others (e.g. Estonia, Lithuania, Norway). Financial expenditures are particularly high in countries with active afforestation policies, such as Ireland and Iceland, or in countries with high expenditures for public services such as protection (Switzerland) or recreation for urban societies (e.g. the Netherlands). The high level of variability of funding in forestry in Europe confirms earlier findings for the late 1990s (EFI, 2005).

Funding comes from a wide range of sources, including general funds to support sustainable forest management and the implementation of legal provisions, funds earmarked to address specific issues for a certain period of time, the EU and other sources. Most of the funds are from domestic sources. In particular, EU support to forestry has reportedly been significant for the development of forestry in many countries, especially Central, Eastern and Southern Europe (e.g. Czech Republic, Poland, Lithuania, Slovenia, Cyprus). Although the EU Treaties do not specifically cover forestry competencies, EU support to forestry has been financed as complementary measures within other policy domains, such as agriculture and the environment, but was comparatively minor until 1999. Since 2000, forestry measures have been financed by EU rural development funds.

For the 2000–2006 period, the EU contribution was set at EUR 4.7 billion (EUR 671 million annually), of which about half is allocated to co-fund afforestation measures and the other half for other forestry measures. Most of these funds were earmarked for Spain (EUR 1 500 million in 2000–2006), Italy (EUR 900 million) and Portugal (EUR 700 million), followed by Germany and Ireland, at around EUR 400 million each. Afforestation measures co-financed through the EU Rural Development regulation in Mediterranean countries support, *inter alia*, afforestation of agricultural and degraded land. Planting measures co-financed under the category "afforestation" in other countries such as Germany, Finland or Austria are often specifically oriented towards the planting of mixed stands and the use of indigenous tree species, contributing to a greater diversity of forest stands. From 2000 to 2003, a total of around 625 000 ha of forests were established in the EU-15 with EU support, according to EU rural development monitoring data. "Other forestry measures" include, *inter alia*, specific measures for fire protection in Mediterranean countries.

Indicator A5. Informational means

Informational means comprise a wide range of tools and approaches, such as research and development, education and training, advisory and extension services as well as regular monitoring and assessment systems informing on the state of forests and the effectiveness and efficiency of sustainable forest management practices. Informational means are essential to inform citizens and the public on the prevailing governmental policies, and to discuss and deliberate on policies. They also contribute to increasing the transparency of forest policy-making and to holding forest policy-makers accountable.

Improving current information and data systems and providing easier access to information are important objectives.

The information submitted in country reports indicates considerable efforts to update data collection and database systems by using advanced information technology and making data more easily accessible. This includes improvements in inventories and other data and information collection systems, including Geographic Information Systems (GIS) – based information on forest management planning data (e.g. Estonia and Hungary). This approach serves both the information needs of the public administration and those of forest owners, other concerned stakeholders and the public at large. Several countries report they have recently taken steps to improve the ease of access to such information (e.g. Lithuania, Norway, Poland, the Russian Federation and Ukraine).

Other countries report on improved systems to generate and distribute knowledge and information, on education, training and advisory services for forest owners and to people interested in particular forest aspects. Important efforts are being undertaken by Central and Eastern European countries to promote open information, to develop better databases, and decision support systems. This includes new strategies to support forest owners whose importance in forest policy-making and needs in better management information are increasingly recognized.

Most communication focuses on providing information, but increasingly more countries are making efforts to develop better dialogue.

Efforts are undertaken to better link forests and forest management with society through improved dialogue with and among stakeholders. The most commonly used type of communication reported by countries is informing forest owners, stakeholders and the public about forest policy issues through one-way communication in the form of web-sites, annual reports (e.g. Bulgaria, Czech Republic, the Russian Federation), flyers, professional journals (e.g. in the Czech Republic), forest management guidelines, information campaigns and press releases. The purposes of such measures, according to the reporting countries, are to: inform forest owners and stakeholders; educate the public on the many benefits of forests to society; report periodically on the activities of forest administrations; explain sustainable forest management-based criteria and indicators; and provide pertinent information on events.

A considerable number of countries report on the use of more advanced types of informational instruments enabling and facilitating two-way communication and interaction with or among policy-makers, stakeholders and the public. The tools used here range from internet portals for the forest and wood sector (e.g. Belgium), the organization of forest weeks (e.g. in Austria, Belgium, Germany) or forest days (Latvia); and educational events such as "forests in schools" (Czech Republic) to the organization of special conferences among policy-makers and increased involvement of the public in the process of adopting new regulations (e.g. Slovenia).

BOX: 8. Public consultation in the preparation of laws: Slovenia

In Slovenia, new law or sub-law proposals must be presented prior to governmental procedures on the website of the Ministry of Agriculture, Forestry and Food, or of other ministries according to their competence. Interested parties and the broad public have the right to send proposals and comments on these documents to a determined contact person via e-mail.

B. Policies, institutions and instruments by policy area

Forest policies are becoming more target-oriented, but further improvements are needed.

Several European countries pursue active and often target-oriented policies in a number of areas. In particular, some countries aim to enlarge forest area, increase the use of wood (material and energy use), improve biodiversity conservation and strengthen the economic viability of forestry. However, in other policy areas, including climate change, forest health and vitality, employment, and cultural and spiritual values, the policies at present seem to be less focused or less pro-actively pursued (and are often more dependent on decisions in other policy areas).

Key findings by indicator

B1. Land use and forest area

One-third of reporting countries currently aim to increase forest area.

B2. Carbon balance

Carbon-related policies are mainly focused on bio-energy promotion, and to a lesser degree, on carbon sequestration or adaptation of forests to climate change.

B3. Health and vitality

Monitoring damage and risk factors is currently a main goal, often focused on pests and diseases as well as on fire.

B4. Production and use of wood

One-third of reporting countries aim to increase the use of wood as a basis for a competitive and expanding forestry and wood processing sector and as well as an important basis for renewable energy use.

B5. Production and use of non-wood goods and services; provision of recreation

One-quarter of reporting countries aim to promote recreational services.

B6. Biodiversity

Main objectives of reporting countries are often to complete or maintain protected forest area networks and address threatened forest species and gene conservation.

B7. Protective services

Considerable emphasis is put on water quality in most countries as well as on the prevention of erosion and disastrous effects from natural calamities in mountainous areas.

B8. Economic viability

One-third of countries explicitly aim to strengthen the economic viability of forestry, with several countries focusing on more cost-efficient production.

B9. Employment (including safety and health)

Many Central and Eastern European countries focus on managing the difficult impacts of reduced forest employment due to necessary changes towards competitive market economies.

B10. Public awareness and public participation

The objective of most countries is information and awareness raising. Comparatively few countries have indicated increased efforts in improving dialogue with the public.

B11. Research, training and education

Two main objectives are more demand-oriented education and training, and internationally competitive and practice-relevant research.

B12. Cultural and spiritual values

Objectives in many countries are to preserve cultural and natural heritage and to raise awareness that forests and forestry are part of this heritage.

Indicator B1. Land use and forest area and other wooded land

The main legal basis for land use and forest area policies is the forest law.

In MCPFE countries, there are mainly of three kinds of principal legal documents used to regulate land use with regard to forests and forest area: forest laws, different types of general land use legislation, and in some cases, a constitution. Most of the countries reported forest laws as the main legal bases for forest land use (Figure 64). In several countries, land use is regulated mainly through general territorial land use and land use planning laws. In two countries, the main legal document on forest land use is their constitution (Greece, Poland). Several countries reported that policies related to forest land use and forest area are further specified and guided by NFPs, equivalent strategies or rural development plans. Policies to expand the forest area are usually based on policies rather than laws, except in Iceland, which regulates afforestation through the Regional Afforestation Projects Act.

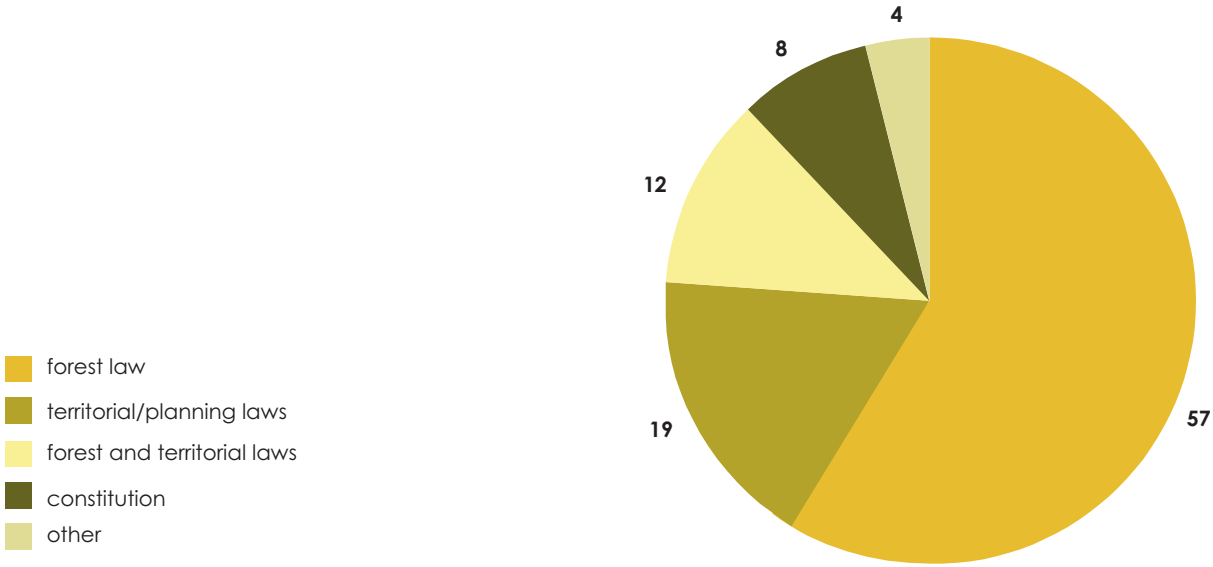


Figure 64. Main legal document regulating forest land use (% of total legal documents reported)

One-third of the reporting countries currently aim to increase forest area.

The current main objectives on forest land use, as reported by 26 countries, are very diverse, reflecting different conditions, traditions, societal needs and policy contexts. One general objective reported by many countries is to maintain and protect or preserve forests and to preserve

their productive capacity and ability to provide multiple goods and services, biodiversity and their protective functions. Several countries referred specifically to the issues of greenhouse gas policies, short-rotation forestry, close-to-nature forestry, improvement of biodiversity and protected area management, reduction of fragmentation, and measures to ensure the protection of infrastructure. In particular, in Central and Eastern European countries, one main forest land use-related objective is to ensure the safe and rightful restitution of property to private owners and the subsequent compliance of new private forest owners with current land use legislation, and land use in line with sustainable forest management.

In terms of changes in forest area, five countries reported the explicit goal to maintain forest area as it is. A further 11 countries, around 40 percent of all reporting countries, stated that the expansion of the forest area is one current main objective (Table 35). Some of the most frequently reported other current specific objectives are: the establishment of borders and categories of land use; improved mapping of forest land; and improvements in land use planning (improvements in procedures, inventory and database systems). Only a few countries reported changes since the last Ministerial Conference in 2003, including in the regulation of game populations (the Czech Republic) and in the definition of forest cover (Greece) as well as ongoing revisions of the forest law affecting forest land use (Switzerland), and stricter management in line with nature conservation legislation (Slovenia).

Table 35. MCPFE countries with explicit policies to enlarge the forest area: main objectives

Bulgaria	To enlarge the forest area in order to reduce green gas emissions.
Cyprus	To expand forest cover in the lowlands, particularly in marginal areas and on abandoned agricultural land, and to increase afforestation and restoration of degraded land.
Hungary	To increase the country's forest cover to 25%; currently around 10 000 ha/year.
Iceland	To attain 5% forest cover of lowlands by 2040 through afforestation on farms.
Ireland	To increase national forest cover from 7% (in 1996) to 17% in 2030 and to increase the (sustainable) annual timber cut to 10 million m^3 by 2035.
Italy	To afforest ex-agricultural land (also by means of specialized productive plantations (e.g. short-rotation stands)(regional).
Latvia	To facilitate afforestation.
Lithuania	To increase forest cover through the implementation of the Lithuanian Afforestation Programme.
Poland	To increase forest cover through the implementation of the Polish Country Programme of Increase of Forest Cover.
Romania	To increase the FOWL areas, mainly by afforestation on degraded land and land inappropriate for agriculture use.
United Kingdom	To protect and expand Britain's forests and woodlands.

The most relevant institutions to implement the forest land use legislation and related policies reported by countries correspond to the main legal documents. In most cases, the most relevant institutions are those responsible for forests, as reported in section A2 on "Institutional Frameworks". Main institutions implementing general land use legislation are national or regional land use planning departments or agencies, including national or regional cadastre services.

A combination of instruments is used to safeguard or enhance forest area, including economic incentives.

Countries reported they use a wide range of instruments in forest land use. Main legal instruments used to ensure the implementation of current objectives are clear legal restrictions and procedures for changing land use status and regulations on forest fellings and securing regeneration after felling. Several countries reported the use of economic instruments as their main instruments, in particular, subsidies and grants to maintain (regenerate) and enhance forest area, and support forest management planning. The informational instruments are mainly land use inventories and databases, planning documents, detailed forest management plans, official surveillance and advisory services.

Indicator B2. Carbon balance

Most carbon policies are based on recent legal acts, largely outside "traditional" forest policy.

The MCPFE countries refer to different documents as their main reference for carbon-related forest policies. For about half of the 25 countries that reported, the main reference documents are legal acts adopted by Parliament. For most others, the main reference documents are either national policies adopted by the government, such as national climate strategies adopted by the Council of Ministers, or national policies issued by the government, such as strategic plans on the reduction of greenhouse gases, the promotion of renewable energy or NFPs. For about one-third of all countries, the main reference documents are climate policies, while one-quarter of reporting countries base carbon-related forest policy on several main documents, including one specifying forest policy. Only three countries reported that the main reference documents for carbon policies are forest policy documents such as the forest law or NFPs. In the vast majority of cases, all or some of the main reference documents have been issued or adopted since 2003.

Objectives on forest and carbon are focused more on bio-energy promotion than on sequestration of carbon or adaptation of forests.

Several countries reported that since 2003 the attention paid to forest carbon issues has substantially increased. The main current objectives of MCPFE countries in relation to forests and carbon, according to the country reports, are clearly dominated by the potential contribution of forestry by substituting non-renewable energy (Figure 65). Almost half of all reporting countries stated this is a national objective. In addition, several other countries referred to promoting the use of wood as a pool for carbon. Around one-third of countries put explicit emphasis on preserving and maintaining the current carbon stock in forests and forest soils, and another third, on increasing the carbon stock in forests through afforestation and similar measures. Several countries, in particular in Eastern Europe, report they are currently focusing on improving inventory and data systems. In many countries, these policies need to be coordinated with ministries responsible for economic development or energy.

BOX: 9. Climate mitigation through sequestration or wood use? Sweden

The Swedish position is that forests contribute to long-term climate change mitigation more efficiently by providing biofuels and low energy-cost materials than [mitigating climate change] through active carbon sequestration. In Sweden, active carbon sequestration may reduce the potential for high and/or efficient biomass production. No policy for active sequestration has therefore been adopted.

Usually, a combination of instruments is used, comprising economic, informational and legal means.

Countries reported they use a wide range of instruments in relation to forests and carbon. This comprises economic incentives, for instance, to enhance carbon sequestration through afforestation or for bio-energy production. It includes efforts to increase the information base, including through research, and the improvement of monitoring systems, within a specified legislative frame.

With regard to the Kyoto Protocol, Article 3.4 provides the option to include activities of forest management, cropland management, grazing land management and revegetation in the accounting for the implementation of commitments for the first commitment period. Of the 30 countries of the MCPFE that, as Annex I countries, submitted reports to the UNFCCC on their decision regarding Article 3.4, two-thirds (19 countries) elected "forest management" as an activity, while one-third

(11 countries) excluded forest management as an activity in the accounting for the commitments for the first commitment period. A few countries only (Iceland and Romania) elected the category "revegetation" as an activity. Eleven MCPFE countries are not Annex I Parties under UNFCCC and have not committed themselves to a reduction commitment under Article 3.4.

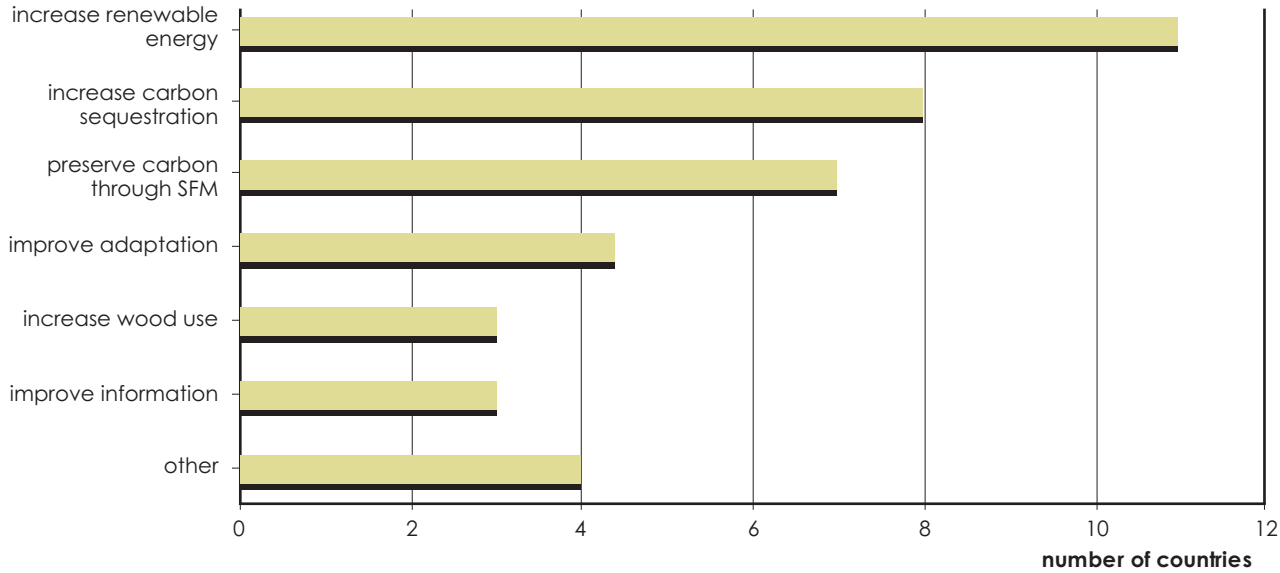


Figure 65. Main objectives and carbon balance related forest policies 2007 as reported by 25 countries

Indicator B3. Health and vitality

Health and vitality policies are mainly based on forest laws supported by sanitary regulations.

The main legal document in most MCPFE countries reporting on health and vitality policies and institutions is the forest law. In some countries, forest health and vitality policy is based on specific forest health-related acts or programmes, while in others, it is mainly based on sanitary or phytosanitary acts. In health and vitality, some countries refer to EC regulations as the main legal document, in particular, the EU Forest Focus Regulation[20] (expired in 2006), and the EC Plant Health Directive[21]. Only a few countries refer to air quality or emission control acts. Only one country refers to hunting acts. Around half of all legal or policy documents have been issued since 2003.

Monitoring damage factors is currently a main goal: the most frequent focus is on pests and diseases, and fire.

More than half of all countries reporting state their main current objectives only generally as, the preservation of forest health and vitality and of the functions that forests provide. Another third of all countries reported main objectives relate to the continuation of monitoring potentially damaging factors. The most frequently mentioned damaging factors are biotic agents such as pests and diseases, followed by abiotic factors, in particular fire. Only a few countries, such as Ireland, make direct reference to invasive species monitoring. Addressing air pollutants is mentioned only by a few countries, including mitigating long-term negative impacts of pollution through available silvicultural measures. Even fewer countries refer to the improvement of degraded forest soils.

[20]Regulation (EC) No 2152/2003 of the European Parliament and of the Council of 17 November 2003, concerning the monitoring of forests and environmental interactions in the Community (Forest Focus).

[21] EU Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community and the related European Commission Directive 2004/102/EC.

Accordingly, monitoring is the most frequently mentioned instrument.

More than half of all countries reported a main emphasis on maintaining or improving monitoring systems, including improving databases. These efforts are often linked to better forecasting and planning as well as education and training.

Indicator B4. Production and use of wood

The main legal basis or policy document for the production and use of wood is the forest law.

In almost all MCPFE countries, the forest law is the main legal and operational basis for policies on the production and use of wood. In about one-quarter of countries, these policies are supported by NFPs (e.g. Slovakia), forest sector development plans (e.g. Ireland, the UK) or other forest policy documents. Only a few countries use specific regulations on the production and use of wood (e.g. Bulgaria). About one-third of the main policy documents have been issued or adopted since 2003.

One-third of countries report aiming to increase the use of wood.

According to the 26 countries reporting on the indicator, the vast majority of countries pursue policies on ensuring sustainable forest management in a broader sense, in particular, to sustainably ensure the provision of the multiple uses of forests. More than one-third of reporting countries aim to increase the use of wood, primarily industrial roundwood for different types of value-added production but also for bioenergy, and within the framework of sustainable forest management (Table 36). In some other countries, wood mobilization is an issue, but has not been reported as a main current objective on production and use of wood, e.g. wood for bioenergy in Austria. Several countries report that a main current objective is to undertake measures to enhance the productivity of forests and the efficiency of its utilization, while others put specific emphasis on maintaining or increasing the diversity of uses.

Table 36. MCPFE countries with explicit policies to increase the use of wood

Finland	The objective of the NFP is to increase the annual harvesting of industrial roundwood so as to sustain the high level of silviculture and ecosystem management. The objectives stated in the Future review for the forest sector are: to utilize the felling potential of the forests in the entire country considering sustainability and economic aspects; to utilize wood in an increasingly versatile way for competitive and customer-oriented products and services; to enhance the use of wood-based energy; and to develop biorefinery plant technology.
France	The aim is to increase by 25 percent the wood market share in construction between 2007 and 2010 and to mobilize more wood to satisfy all uses, in particular wood energy (biocombustible plan) (Outline agreement on environment and timber).
Germany	By initiating a Wood Charter, the Federal Government, together with the directly affected stakeholders and interested groups, commit themselves to an increased use of wood for construction, housing and energy purposes.
Hungary	The main policy objectives include: increasing the production of quality wood; increasing and enhancing the processing of quality timber –sawnwood, laminated boards, etc. – domestically while reducing unnecessary export of logs; increasing industrial utilization of smaller size wood by developing the particleboard industry; establishing forest energy plantations, and utilizing non-industrial wood to establish a reasonable balance between the use of wood products, household firewood and firewood used in power plants.
Ireland	A core aim is to increase the (sustainable) annual timber cut to 10 million m^3 by 2035.
Italy	The aim is to enhance the productive role of the forest resources in the frame of sustainable forest management; Decree No. 79/1999, amended by further regulations, promotes the use of energy from renewable sources including wood fuel.
Latvia	–To increase the use of forest and wood products in public procurement for the State and municipalities of Latvia.
Norway	Within the framework of sustainable forest management, the aims include increasing timber harvesting (mobilization); and to increase the awareness and use of wood by stimulating innovation and market orientation [through] the Wood-based Innovation Scheme (2006)..
Slovenia	The aims include increasing the utilization of forest site potential and improving forest stand quality and use of wood.
Netherlands	The aims include promoting the use of wood and increasing its harvest.

The most important instruments are forest management and development plans.

The fundamental rules for the production and use of wood, in particular, for harvesting, thinning and regeneration, are set out in forest laws. These usually include either specific regulations for harvesting and reforestation or general rules as part of sustainable forest management and forest management planning. With respect to guiding the production and use of wood within the boundaries of the forest laws, most countries refer to forest management plans and/or regional development plans. In particular, in Central and Eastern European countries, forest management plans are a prerequisite for most forest management activities and a main instrument to ensure the "sound use of wood". Several countries reported the use of the MCPFE criteria and indicators for sustainable forest management or the related operational-level guidelines. One-third of all countries report using incentives in forest management, while three countries (France, Germany and Latvia) report promoting the use of wood by creating demand, including through public procurement.

Indicator B5. Production and use of non-wood goods and services, provision of recreation

Non-wood goods and services are mainly regulated through forest laws.

In 16 out of the 26 countries reporting on the indicator "non-wood goods and services" are mainly regulated by forest laws. In a range of countries, further legal acts are relevant, in particular environmental protection. Only a few countries report specific laws on non-wood goods and services other than hunting laws, such as on mushrooms, berries (e.g. Italy) or outdoor recreation (e.g. Norway, Finland). In some countries, the NFP or sector development plans are used as further reference for specific policies. While many of the legal regulations date from the 1990s, more than one-third of currently used main reference documents have been issued or adopted since 2003.

One-quarter of reporting countries aim to promote recreational services.

In many MCPFE countries, there seems to be no specific policies on non-wood goods and services from forests beyond the aim to maintain the diversity of uses of forests and to balance these multiple uses. However, about one-quarter of all reporting countries aim to promote recreational services (Table 37). Several countries also promote work on assessment methods to better determine the value of non-wood goods and services. For example, Lithuania reported on an assessment carried out by the State Forest Survey Service, which found that non-wood forest products (NWFPs) comprise about five percent of the total value of wood (value of forest services not included). The Netherlands submitted a report issued in 2006 on the value, costs and benefits of nature and landscape in the country, which concludes that each Dutch citizen gets a multitude of benefits in return for the EUR60 /person/year spent using public and private sources on nature and landscape. Despite the lack of information on NWFPs, few countries state as an objective to increase the information and planning for such goods and services. Similarly, only one country reported the development of approaches for payments for environmental services.

Several countries reported on regulations concerning public access rights, where free access is often recognized in forest laws, together with possible restrictions, e.g. for the use of motorized vehicles in forests or certain types of forests. A general rule conditioning access to forests often seems to be that the entitled visitors must avoid disturbance and damage.

Table 37. MCPFE countries reporting on policies to develop recreational services

Belgium	The recreational use of forests is generally promoted but limited to the "soft use" of forests.
Bulgaria	A main current objective is to develop recreational services.
Cyprus	The main objective is to increase economic and social benefits from the state forests and wider countryside, and to encourage appropriate development based on ecotourism.
Denmark	Recreational services are objectives in the Forest Act.
Estonia	The Forest Diversified Use Action Plan (2006) sets objectives for the production of non-wood goods, cultural heritage and recreation. Recreational objectives aim at strengthening capacity of sustainable nature tourism, including enhancement of the diversity and quality of services and the sustainable management of recreational areas.
Finland	The objective is to consider the multiple needs of outdoor and recreational use as well as game management in silviculture and forestry. Hiking routes are constructed and maintained in such a way that recreational use of the forests continues to grow and can be directed in areas reserved for outdoor use.
Ireland	Recreation is included in the National Forest Plan (Growing for the future) and in the 2000 Irish National Forest Standard, in the form of national indicators under Criterion 6. The government-commissioned Review and appraisal of Ireland's forestry development strategy (2004) highlighted the importance of non-wood goods and services, including recreation. Using various instruments, the Forest Service promotes recreation as a key non-wood function, vis-à-vis outdoor activity, public health, environmental education and related enterprises and tourism. This mirrors an increased focus on wider countryside recreation in recent years, with various organizations involved.

Most countries use traditional instruments and approaches to provide services.

In many countries, collection and use of non-wood forest products and services are largely free of charge. Nowadays, such activities are undertaken for recreation and amenity rather than for subsistence needs. However, there is considerable variation between countries in terms of rights, restrictions and obligations to collect and use non-wood forest products, usually specified in forest laws. Close to half of all countries report to use economic incentives, usually subsidies, to promote the provision of infrastructure for recreational use, or such infrastructure is provided by state forest organizations as part of their obligations. These recreational infrastructures are often provided free of charge, whereby they increase the value of forests to society but they do not necessarily contribute to forest owners' incomes. Very few countries report that they undertake efforts to increase the information base or explicitly promote more entrepreneurial or innovative approaches to increase benefits from non-wood goods and services for consumers or forest owners. A few countries only report collaborating with tourism or outdoor recreation organizations (e.g. Denmark).

While awareness of the actual value or potential of non-wood goods and services is frequently expressed, it is evident that national attention and action is currently elsewhere, such as in the enhanced use of wood for bioenergy. Diversification seems to be an issue in rural development in a number of countries. However, most European countries' long history and tradition of allowing society free access to non-wood goods and services obviously results in limited efforts to develop alternative conceptual models on how to respond to demands from society and increase benefits from forests through other than free access alone.

Indicator B6. Biodiversity

Biodiversity at ecosystem, species and genetic levels is regulated through a multitude of laws.

In almost all MCPFE countries that reported, biodiversity at the ecosystem level is regulated through specific nature protection or conservation legislation in coordination with forest laws. Frequent reference is made to respective EU regulations, in particular, the EU Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. Several countries base their policies on biodiversity action plans (e.g. Ireland) or CBD implementation strategies (e.g. Austria). With regard to biodiversity on the species level, most countries report the same legal basis as for the ecosystem level, since the legal bases are often comprehensive legal acts regulating nature conservation in a broader sense. In addition, some countries refer to wildlife acts, hunting laws and specific

programmes for protection of species, including those listed in IUCN Red Lists. For biodiversity protection at the genetic level, most countries of the EU-27 list the Directive 1999/105/CE on the marketing of forest reproductive material or the respective national legislation as a main reference document. Several countries, such as Germany and Austria, report that the legal responsibility for biodiversity or nature protection matters rests with the federal state.

Main objectives often aim to complete or maintain protected forest area networks and address threatened forest species and gene conservation.

Countries reported a multitude of general objectives on biodiversity. They expressed the general aim, to secure the conservation, and where possible the enhancement and sustainable use, of biological diversity and to contribute to the conservation and sustainable use of biodiversity measures. Countries reporting on more concrete objectives with regard to ecosystems clearly focus on the establishment of protected area networks, often in order to comply with the EU Natura 2000 regulation. Several countries outside the EU-27 reported on similar objectives. Several countries also reported on efforts to preserve valuable habitats and ecosystems outside such protection networks (e.g. Latvia's *Microreserve policy* or the METSO programme in Finland).

With respect to species diversity, the focus of policy objectives is on threatened forest species, which is specifically mentioned by one-quarter of all reporting countries. Some countries also refer to measures such as close-to-nature forestry and the promotion of natural regeneration and other means to maintain and enhance the diversity of indigenous species. Few reporting countries focus on alien invasive species (e.g. Belgium–Flanders). With regard to genetic diversity, the most frequently reported objective relates to the production and trade of reproductive material as well as *in situ* and *ex situ* measures to preserve the genetic diversity of forest reproductive material. In recent years, several new EU member states reported an increased emphasis on the integration of gene conservation principles into sustainable forest management.

In general, only a few countries specified measurable targets with respect to given biodiversity objectives. These include: biodiversity targets set in the Netherlands (Box: 10); protected forest areas (e.g. Estonia); targets to stop forest species decline in Finland); restoration plans for protected species in France; and biodiversity decline to be halted by 2010 in Norway.

BOX: 10. Measurable biodiversity targets – the Netherlands

The Netherlands reports biodiversity targets as follows:

(i) the establishment of a Ecologische Hoofdstructuur (EHS, National Ecological Network) of approximately 750 000 ha (land area) by 2018;

(ii) "By 2020 conditions will be in place for the long-term conservation of all species and populations native to the Netherlands occurring in 1982".

In addition, the national Structure Plan for the Rural Areas (SGR-1) includes quality targets for the EHS (i.e. a national "nature targets map") in terms of habitat types and species. Further national targets are set under the EU Birds Directive and the EU Habitats Directive.

Many countries report on strategies and plans to further maintain and increase biodiversity, in particular through protected areas, gene conservation programmes and reproductive material production and use.

Measures reported by countries on biological diversity differ considerably, reflecting the different status of biodiversity, biodiversity protection and related issues in different countries. Regarding

ecosystem biodiversity, countries mainly rely on nature conservation and other legal acts and related strategies and plans, such as those listed in Table 38. Several countries refer to EU regulations, in particular, Natura 2000, the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC). Some countries specify concrete goals for the establishment of further protected areas, while others report on recently established protected areas (e.g. Cyprus). While several countries set specific incentives for private forest owners, the main instrument used in ecosystem and habitat protection is not economic or informational, but legal.

Table 38. MCPFE countries reporting on specific biodiversity programmes, action plans and strategies

Estonia	Estonian Nature Conservation Development Programme 2035
Finland	National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity in Finland 2006–2016; National Genetic Resources Programme
France	Forest Action Plan from the National Biodiversity Strategy, adopted in September 2006
Italy	National strategic plan for biodiversity observation and protection of agricultural and forest ecosystems of high naturalistic value
Lithuania	Programme on Oak Regeneration in State Forests 2006–2021; Programme on Forest Genetic Resources Conservation and Tree Breeding 2004–2014
Poland	"Country Strategy of Biodiversity Protection" with a component on "Forest Biodiversity Protection"
Russian Federation	Federal Target Programme "Ecology and Natural Resources of Russia (2002–2010), sub-programme "Forests"
Slovakia	Action Plan for Implementation of the National Biodiversity Strategy for 2003–2010
Sweden	Swedish Forest Gene Conservation Programme
UK	UK Biodiversity Action Plan 1992

Many countries report continued and reinforced activities in the conservation of genetic resources and controlled production and use of genetic resources, in particular, in Central and Eastern European countries. In several countries, genetic resources continue to be inventoried and gene banks established. Several countries also refer to the activities in the context of the European Forest Genetic Resources Programme (EUFORGEN).

Indicator B7. Protective services

Protective services are mainly regulated through forest laws.

In roughly three-quarters of the 27 MCPFE countries reporting on the indicator "protective services", the main legal document is the forest law. In several countries, nature or environmental protection laws or specific legislation on protective forests complements forest laws. Only a few countries reported specific water- or land-related legislation as main reference documents, together with others. One country made reference to the EU Water Framework Directive. Many of the documents reported as the main legal or reference documents for this topic are new: almost half of them were issued or adopted since 2003.

The main emphasis of protective services is on water quality.

In more than half of the countries reporting on this indicator, the main objectives in regard to protective forests are water-related. Important issues addressed are the quality of water, riparian protection as well as protection from adverse events (floods). In almost half the countries, the protection of soils, in particular against soil erosion, plays an important role. Many of the protective measures are also set with a view to protect damage to human life and infrastructure.

BOX: 11. Forest protective services related to water: Estonia

Protective belts are established around objects and territories that are significant from the point of view of environment and nature resources protection and rational use. Their main objective is to minimize or prevent negative anthropogenic influence on objects for which protective belts are established. Protective belts in forests include: the protective belt of the Baltic Sea and Riga Bay coastline; protective belts around groundwater objects; cultural monuments; bogs; and protective belts in forest around cities.

Specific management plans are the main instrument for ensuring protective services.

Most of the reporting countries state using planning instruments in accordance with related legislation, from zoning plans to, in particular, detailed forest management plans to ensure protective services. In areas owned by private forest owners, the owner is often required to manage and permit his or her forest to be managed so as not to endanger the protective service of the forest.

Indicator B8. Economic viability

One-third of the countries base policies on economic viability on specific economic development strategies.

Most of the 27 countries reporting on this indicator, base their main policies regarding the economic viability of forestry on the forest law. Only about one-third of countries report using economic development plans or strategies as their main reference documents. These are specific forest sector development strategies, NFPs and rural development programmes.

Table 39. MCPFE countries reporting on specific economic development strategies

Austria	Austrian National Forest Programme 2005
Bulgaria	Strategic Action Plan for the Development of the Forest Sector 2007–2011; Strategy for development of Bulgarian timber processing and furniture industry, 2006–2013
Cyprus	National Forest Programme 2000; Strategic Economic Development Plan 2004; Rural Development Plan 2004
France	Adoption of a "Sawmill Plan" comprising measures aimed at stimulating sawmill investments to encourage modernization and to better respond to the requests of the markets
Finland	National Forest Programme; Future Review for the Forest Sector
Ireland	National Forest Plan "Growing for the Future — a Strategic Plan for the Development of the Forestry Sector in Ireland" (1996); "Forestry: A Growth Industry in Ireland" (2003)
Italy	Decree of the Government No 227/2001 on Modernization of the Forest Sector
Latvia	Policy Baselines of Forest and Related Sectors Development 2006
Slovakia	Slovak Republic National Forest Programme (2007)
Switzerland	Swiss National Forest Programme (2003)
UK	Country Forestry Strategies for England (2001), Scotland (2006) and Wales (2001)

One-third of countries explicitly aim to strengthen the economic viability of forestry, and several countries focus on more cost-efficient production.

On average, countries reported objectives in their policies that touch on two issues. The most common objective is to enhance economic viability or profitability, followed by enhancing cost-efficiency of production. Many of the objectives reported are specific, whereby several countries focus on technological innovation and related research and development, enhancement of competitiveness, or increased raw material supply. Several countries also indicate not pursuing an active policy. Other countries report aiming to increase the sector contribution to GDP or value-added production, while others focus on specific measures, such as strengthening forest owner associations or producer co-operation. No country reports promoting entrepreneurship as a main objective.

BOX: 12. Re-orienting forestry in CEECs towards economically viable models: Lithuania

Overall forest policy, especially on the newly emerged management of private forests, is oriented towards creating enabling conditions for sound economic forestry activities. The NFP includes a range of objectives aiming at strengthening economic viability, such as: optimizing management of the state forest system; increasing efficiency of enterprises implementing commercial forest activities; developing technologies of forest logging operations; increasing the rational use of small-sized wood and felling residues as an alternative forestry activity; and creating the legal and economic preconditions promoting the merging of small-sized forest holdings, association and co-operation of forest owners.

While several countries refer to the role of forestry in promoting local and rural development, there are obvious difficulties in managing cross-sectoral coordination and collaboration, as expressed by the response by the Czech Republic, which observes that "forestry started to be more perceived not only as a part of industry, but above all, as an integral part of rural development. Nevertheless a collaborative cross-sectoral approach to forestry problems is lacking – some of the issues related to forests are solved separately by other sectors. Thus integrative solutions are needed".

The most frequently used instrument is economic support.

Not surprisingly, the most often used instrument in strengthening the economic viability of forestry is financial support, followed by providing advice and training to forest owners. Most countries employ instruments to support forestry measures that are deemed useful in enhancing economic viability, competitiveness and/or rural development. These often comprise investment support measures to promote innovation, upgrade technology or support forest owner co-operation. EU member states often report using the EU rural development programme as a co-financing instrument. Several countries also use tax as a steering instrument, either through tax breaks or by increasing taxes when selling standing timber in state forests (e.g. the Russian Federation or Ukraine). In general, countries' current support seems to focus more on cost-reduction measures and less on new opportunities to increase value-added production and exploit new income streams.

Indicator B9. Employment (including safety and health)

In most countries, the main legal reference is labour legislation.

Employment, safety and health issues are, unlike most other areas in forest policy, regulated by general legislation covering labour relations, occupational safety and health, and social insurance. In around eight of the 27 countries reporting on the indicator, the forest law is an important additional legal reference basis. Several countries, including Austria, Italy, Latvia and the Russian Federation, report specific labour-related legislation for forest workers.

Many Central and Eastern European countries focus on managing the impacts on forest employment due to changes towards competitive market economies.

Most reporting countries focus employment policy efforts on improving work conditions, including safety and health at work. In particular, Central and Eastern European countries continue to manage the employment implications of the transition from planned to competitive market economies. This has led to restructuring state forest enterprises, laying off workers and outsourcing forest operations to private contractors. Overall, this resulted in changes in the number of people employed in forestry, but also in a major reorientation in terms of job requirements. These changes and their

implications are still a major issue in many countries. For instance, from 2003 to 2007 in Lithuania, the number of employees working in the forestry sector has been constantly decreasing, while the share of forest operations carried out by contractors has been increasing. Similar developments are reported in the Czech Republic and Poland. For many former employees and people involved in forest education, this has implied changes in qualification requirements by foresters and jobs outside forestry. Also, a range of countries outside the Central and Eastern European region have reported adjustments in education systems to better meet current and future demands in forest labour qualifications.

BOX: 13. Adjusting education to meet changing demand in labour qualifications: Estonia

In the Estonian Forestry Development Plan to 2010, the objectives regarding the development of the education system are to: ensure the development of educational institutions within integrated framework (to set up a co-coordinating chamber from relevant stakeholders); increase competition among masters and doctoral students; and support participation in international training programmes. The preparation of qualified loggers – chainsaw and forest machinery operators – will be emphasized within the vocational education field.

Countries aim to increase employment support measures for bioenergy, tourism and value-added production.

One-third of countries report as a main objective to increase employment through forestry and the forest sector, in particular, in the context of rural development. In fact, employment currently shows a decreasing trend in most countries. However, policies promoting increased harvesting of wood for energy and enhanced value added in the wood product industry are expected to have positive effects on employment in several countries, including Finland, France and Estonia. In some countries, positive employment effects are also expected from tourism and products other than wood, with the corresponding measures to promote them. For instance, in Finland, improvement of nature tourism and recreational services in rural areas have had a positive impact on employment; the Programme for Developing Recreation and Nature Travel (VILMAT) was set up to enhance employment in nature tourism and contribute to the vitality of the rural areas. In several countries, including in Central and Eastern Europe, instruments are provided to support and encourage private forest entrepreneurs and small and medium-sized enterprises (SMEs) to invest. For example, in Poland, private forest services organizations (ZUL) can buy new modern forest machinery facilitated by the State Forest Holding through credits. In addition, Slovakia runs several programmes to support small and medium-sized entrepreneurs and entrepreneurial activities in tourism.

Most countries, however, focus on implementing and monitoring labour as well as safety and health-related regulations. Several countries report they have set up measures to improve workplace safety and health monitoring and control systems, including workplace certification.

Indicator B10. Public awareness and public participation

There are specific policies on public awareness in almost half of all countries.

In many of the 26 countries reporting on this indicator, the main reference document for public awareness policies is the forest law or other acts, particularly those related to the access of information to the public, such as the "Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (the "Aarhus Convention"). However,

in almost half of the countries, there are documents that further specify public awarness policies in forestry, including in national forest policies. Some countries have issued specific programmes on public awareness and communication, including the Estonian Communication Strategy of the Forest Sector, the Lithuanian Public Awareness and Forest Specialists Qualification Raising Programme (2006), and the UK Science & Innovation Strategy for British Forestry (2005), which puts a specific emphasis on communication. The main reference document on public awareness in almost half of the countries dates from before 2000. Several countries reported they did not have a main reference document for this policy area.

The objective of most countries is information and awareness raising; comparatively few countries focus on improved dialogue.

The main objective in public relations in most of the countries is to increase the general population's level of information and awareness on forest matters as well as understanding of forest measures. Some countries express the fear that, despite forests being essential to society in their countries, their economic and ecological importance is decreasingly understood. A few countries report to have more active interaction, dialogue and involvement of the public as their main objective. For instance, the objective of the UK Forestry Commission is to be "committed to listening and working with stakeholders, such as local communities and regional and national organizations. It aims to ensure that their needs and concerns are accounted for in forest policy." For another group of countries, the main objective is to reach private individuals as stakeholders in forestry issues and inform them on programmes that may be relevant to them, e.g. in Norway on the national strategy aimed to increase timber harvesting or programmes such as the Wood-based Innovation Scheme or the Bioenergy Programme.

Many measures were reported, which indicates that the importance of communication is better acknowledged today.

Many countries reported on measures that include increased information through the media (TV, radio, newspapers and magazines, professional journals, leaflets) and factual reports. Almost one-quarter of countries reported on forest weeks or forest days as a means to reach a wider audience. Similarly, forest events in schools seem to be an increasingly frequent means employed by countries to reach out to the younger generation. Several countries also reported measures to ensure more and better access to data and information through the web. Many other countries reported standard procedures, including obligatory rules, to enable public participation in the development of forest management or forest planning documents (e.g. France, Slovenia, Ukraine). Particularly notable are the efforts and achievements in strengthening communication with the public in many Central and Eastern European countries over the last decade.

BOX: 14. Enhancing efforts in communication in Central and Eastern European countries: Slovakia

Communication with the public was done on a voluntary basis. In 2003–2007, pilot projects on public relations were implemented (Forest Information Bureaus, Tree Days, events for kids). Many of these events were organized in cooperation with local elementary schools.

Indicator B11. Research, training and education

Forest research, training and education policies are often based on specific policy documents.

In many MCPFE countries, research, training and education policies are in principle based on forest laws as well as general legislation on training and education. In most countries, concrete policies within this general legal framework are further specified either through general forest policy documents, including NFPs, or specific policies on forest-related research, training and education. This includes: the Swedish National Research Agenda, the UK Science and Innovation Strategy for British Forestry (2005), the German Research Plan (2002) containing research objectives on sustainable forest management, and the Lithuanian Private Forest Owners Training Programme (2006).

More demand-oriented education and training as well as internationally competitive and practice-relevant research are main objectives.

Many countries report the objective to strengthen research, education and training, while in reality they seem to be faced with decreasing capacities. With regard to research, several countries in Central and Eastern Europe aim to strengthen national research capacities towards international benchmarks as well as towards better integration in international research networks. In several other countries, the policy objective is to promote more demand-oriented research and to strengthen links, in particular, between science and policy, and between practice and research. The latter should promote more research, better knowledge transfer and better collaboration between research institutes and companies in innovation and technological development, thereby strengthening competitiveness. Faster development and technological transfer is also behind the efforts in some countries to establish new knowledge centres (e.g. France) or adjust the research infrastructure (e.g. Finland, Slovakia). Some countries, such as Norway, also emphasize the need for more cross-sectoral research.

BOX: 15. Systemic approach to policies on research, education and training: Finland

According to the Future review for the forest sector, Finland's objective is to promote high-quality education, increase business know-how and take care of the continuous development of workers' skills. The objective is also to strengthen the expertise and innovation system of the forest cluster in such a way that research and development, training, administration and business activities operate in close cooperation, and to improve communication between researchers and operators in practice throughout the research and development processes, from research planning to the utilization of the results.

Several countries report that their objective is to adjust and adapt education and training towards more demand-oriented approaches in order to better and more flexibly address the diverse and changing needs of the sector and to ensure the availability and delivery of suitable programmes of education and training. Some Central and Eastern European countries (e.g. Lithuania) report adjustments in educational curricula to strengthen ecological and economic education. This includes carrying out university, high-school, and professional training school programmes to respond to changing demands and to include market economy basics, sustainable forest management principles, the application of modern technologies and the use of machinery, in addition to other urgent forest education areas.

Financing or co-financing research, education and training is the most frequent instrument.

Financing or co-financing research, education and training are well-established mechanisms in most, if not all, countries. These instruments, among others, continue to be applied. There are few mechanisms reported as newly introduced, with the possible exception of an increasing use of consultative bodies or platforms to establish research priorities, as well as competitive calls for research proposals. Similarly, several consultative or coordinative bodies were reported in the context of completed or ongoing revisions of education and training programmes.

Indicator B12. Cultural and spiritual values

Policies on cultural and spiritual values are based on general cultural and natural heritage legislation.

Most MCPFE countries reported that their policies on cultural and spiritual values of forests are mainly based on either nature protection laws, such as on natural monuments, or on cultural heritage protection laws. In several countries, the forest law nonetheless provides an important reference document, while in others, general forest policy documents are used. No country reported a specific reference document on forest-related cultural and spiritual values, whereas several explicitly stated they do not have a specific reference document for their policies.

Many countries aim to preserve their cultural and natural heritage, and to raise awareness that forests and forestry are part of it.

MCPFE countries pursue different objectives for recognized objects, sites, historical monuments and landscapes of national significance. One objective is to establish inventories and ensure their effective protection and preservation. Another is to raise awareness among forest owners on cultural, landscape and heritage values inside the forests, so that these values are appropriately considered in forest management planning and practice. Equally important is the broader objective, stated by many countries, to raise society's awareness that forests and forest management constitute an integrated and versatile cultural and natural heritage worthy of maintaining and utilizing, including related traditions that evolve over time.

Recognized cultural and natural heritage is protected by law.

The most important and nationally recognized cultural and natural heritage is regulated by specific legal instruments, either through cultural heritage laws or nature protection laws that regulate natural monuments and sites protection. With regard to the broader role of forests and forestry in the cultural landscape, a multitude of informational and educational measures are used to communicate with different stakeholder groups and the public. Furthermore, in some countries, efforts are made to address cultural and spiritual values and respective measures in NFPs, and also to adequately consider them in forest management plans, e.g. through specific guidelines for related forest management planning. Economic incentives are used to maintain and preserve specific values, such as traditional forest-related knowledge.

5th MCPFE

FORESTS FOR QUALITY OF LIFE

SUSTAINABLE FOREST MANAGEMENT IN EUROPE

Overview and conclusions

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State of Europe's Forests 2007 is the most comprehensive and up to date report ever prepared on the situation of European forests and their management, and on forest related policies. The report is based on the work of hundreds of national correspondents, experts and scientists who collected and compiled data according to an agreed international framework of MCPFE criteria and indicators of sustainable forest management. Data and information provided in the report is well documented as regards sources, methods and data quality. Despite this, mainly because of the complex and diverse situation of forests and their management, many of the key findings still require further reflection. Is the overall situation of forests in Europe improving? Has Europe and its regions made progress towards sustainable forest management? What are possible consequences of current trends? What are emerging issues and possible future implications? These and other issues will be taken up in this chapter, based on data and information contained in the report. However, interpretations presented are necessarily subjective, and should be taken as an invitation to think further about implications of current status and trends, but not as an objective assessment.

Status and trends in sustainable forest management

The status and trends in individual criteria and indicators for sustainable forest management have been described in detail in the main body of the text. It is possible to draw a few broad conclusions on the basis of the mass of detailed information contained in this report and summarised in the "key messages" presented in the chapters.

Forest resources are expanding

Forest resources in Europe, over 1 billion hectares of forests, covering 44% of the European land area, continue to expand in most parts of the region. The expansion of forest area far outweighs the loss of forest land to infrastructure and urban uses. This trend, starting in the 1950s (and earlier in some countries), is driven by a range of factors. Agricultural land use continues to intensify. Today, several countries are expanding their forest cover by plantation programmes to reoccupy available but underutilized former agricultural land. This positive development in forest resources sets Europe apart from most regions in the world, where deforestation and degradation continues to decrease forest resources. However, in a very few countries in Europe, overcutting and uncontrolled grazing are also leading to severe forest deterioration.

Many factors contribute to a strong accumulation of growing stock to record heights, currently at 112 billion cubic meters. This includes factors outside forestry leading to reduced utilization, such as a decades-long shift towards the production and use of goods from other material than wood and the service economy, availability of comparatively cheap substitute materials and energy sources as well as more technological innovations by other industries. Forests being a symbol for "nature" for an increasingly urbanized society, the importance of biodiversity conservation and the recreational value of forests have also increased.

As a result of the extension in area and the accumulation of growing stock Europe's forest resources are higher than in the last decades or even centuries. Forests are not only a major but also increasing carbon sink – since 1990 more than 2 billion tonnes of carbon were sequestered in forest biomass and deadwood. As a result of this build up of forest resources, policy makers now have a wide range of sustainable options: from considerable intensification of wood harvesting for raw material and energy to continued accumulation of growing stock for carbon. The consequences of each of these options also affect – positively or negatively – other benefits that forests provide to society.

Risks for forest health and vitality seem on the increase

A major negative influence on Europe's forests – sulphur depositions – has been significantly reduced over the last decades through determined national and concerted international action. However the health and vitality of Europe's forests are also vulnerable to other types of pollution and to other types of damage, including storms, which are apparently more frequent and severe, as well as insect attacks. Fires remain a major problem, especially in Southern Europe. This report shows that fire suppression has become more effective in several countries, limiting the area burnt per fire. But the summer of 2007 has seen most devastating forest fires in many countries.

The risk of fires and storms have been linked to climate change. Should this link exist, and climate change develop as forecasts predict, this would lead to higher vulnerability of forests, more frequent and more severe damages. This would affect forest health and vitality and, consequently larger calamities, including through insects. Such damages directly affect the economy, mainly through effects on raw material supply and prices. They also affect society through increases in infrastructure damage and human loss.

If society is to maintain the possibility to choose among sustainable options, as mentioned above, the necessary measures to prevent damage and minimise its consequences must be put in place and receive the required political and financial support: this would involve reducing depositions, practicing appropriate silviculture, improved fire management and action on climate change.

The potential for enhancing productive functions of forests exists

European forests produce a wide range of goods and services. Some, notably wood, are well recognized and monitored, others, such as most non-wood goods and services, are rather difficult to quantify and thus not well recognized, by practitioners or policy makers. This report shows that the total volume of goods and services produced has been increasing. At the same time, the capacity of the forest to supply wood – estimated on the basis of net annual increment – has been increasing. This apparent increase may be due to changes in site productivity by eutrophication, more intensive silviculture as well as the fact that harvest remains well below increment. It is clear that European forests are physically capable of making an even larger contribution to Europe's total welfare in the future than they have done in the past, by producing more wood, more non-wood forest products and more services. Given that nearly all European forests are under a management plan or equivalent, and forest owners are supported and guided by well established institutions in most countries, some of this potential could be utilized without the risk of over-exploitation of the resource.

Forest biological diversity measures have increased, but what is "appropriate"?

Europe's forests are the result of millennia of human activity, which, while fluctuating over time, caused a decline in overall forest cover and changed forest ecosystems. While forests again expand, vast expanses of forest undisturbed by man are only to be found in the Russian Federation – in total over a quarter of Europe's forests. Most forests in the region are classified as "semi-natural" – less intensively managed than plantations but certainly not undisturbed. The area of plantations, which are often poor in biodiversity, is minor but has been expanding in some countries as a result of policies to increase wood supply and protect against soil erosion, but only about 4% of forest area (excluding the Russian Federation) is dominated by introduced species.

Since forest ecosystems constitute an essential component of terrestrial biodiversity in Europe, considerable attention is focused on their conservation and protection. Many measures have been taken in this regard, although their effects can only be evaluated over the longer term. The area

of forest protected for biodiversity has increased by 1 million ha over the past five years and now amounts to 8.2% of forest area in Europe, excluding the Russian Federation (18.3% if forest for landscape protection is also included). This area is larger than that of plantations. By far most measures to maintain and promote biodiversity are applied in forests not specifically protected for biodiversity. There is evidence that management practices are changing to favour techniques promoting biodiversity such as natural regeneration, mixed forests, leaving more dead wood in forests and protecting small "key habitats" in managed forests.

This improvement in biodiversity conservation has taken place simultaneously with the increase in the production capacity of these forests. This has been made possible by the development of balanced, site specific strategies to combine, rather than oppose, production and conservation. Whether European forests have achieved a desirable minimum level of biodiversity conservation is essentially a political, not a scientific or technical, question, and must be based on a society's values and priorities.

Protective benefits of forests are not a given

Forests perform major protective functions, often simply by existing. In particular they protect soil, infrastructure and settlements from erosion and avalanches or landslides in mountainous regions as well as catchments for water supply all over the continent. Currently, more than one fifth of all forests play a major protective role. The protective benefits of forest, ensured through strict legal measures in many cases, have not been very visible in the policy debate, as the benefits are usually very site specific and often, it must be said, taken for granted.

Ensuring protective benefits as well as more environmentally friendly management of forests come at a cost to forest owners in Europe. If sustainable forest management is to be self-financing, new ways need to be explored to match benefits and costs, including the potential of payment for ecosystem services. Protective functions of forests are also at a risk, and come at higher costs, should forest health and vitality deteriorate.

Overall, socio-economic conditions are good

Almost half of Europe's forests (excluding the Russian Federation, where all forests belong to the state) are privately owned and millions of people depend on the forest, as owners or as workers in the sector. The number of owners is increasing, mainly through restitution of forest land, but the number of workers is falling steadily as productivity increases. Although the net revenue of forestry activities has remained stable, the contribution of the forest sector to GDP has declined as other sectors have grown faster.

Overall, the forest sector has maintained or improved its competitiveness on world markets: Europe has become a significant net exporter of forest products to other regions. To the extent that European exports are based on sustainably managed forests, this helps reduce pressure on threatened forest resources in other regions. Europe has not only increased exports of many forest products, also domestic wood consumption per head has risen.

Large volumes of wood are used for energy and the demand is increasing under the influence of high oil prices and policies in favour of renewable energies. Indeed, at the time of writing, demand for wood raw material and for energy wood is strong and prices are rising –leading to an animated debate on how to mobilise wood supplies while maintaining other functions and staying within the limits of sustainability. The present emphasis on managing strong demand contrasts strongly with the concerns of some decades ago, which focused on developing markets to absorb raw material surpluses.

At the same time, forests provide highly valued areas for recreation and are an integral part of the cultural heritage. Given the long tradition of high demand to access forests across all sections of society, almost all forests in Europe are open to the public – which usually respects the rules and provisions to limit disturbances and damages.

Forest policies and institutions adjust to new circumstances

This report shows that policies and institutions have adapted to changed ideas of what constitutes sustainable forest management and often embraced participative approaches to decision making. This has largely defused the political tension apparent in the 1990s, when advocates of conservation and producer representatives often clashed. Consensus forming mechanisms, such as national forest programmes, and tools to enhance accountability and transparency, such as criteria and indicators, have been increasingly adopted in forest policy making and are being further developed. Although relatively new and untested, and despite many challenges remaining, the changed institutional mechanisms put the sector into a stronger position than in the past to achieve consensus on the strategic choices it faces: whether and how to increase supply of wood to meet the strong demand for raw material by a globally competitive forest industry and for renewable energy, while preserving biodiversity, ensuring protective services and providing amenities for recreation for an increasingly urbanized society.

Progress towards sustainable forest management in the MCPFE and by region

While the concept of sustainable forest management as formulated by the MCPFE is rather clear[22], measuring changes in SFM as a whole or in different components is rather complex. The core aspect of sustainable forest management is proper balance between different and often conflicting interests in individual criteria by different stakeholders. To determine sustainable forest management, all indicators (or at least criteria) should be at a level, or move in a direction, that is deemed desirable as established by political consensus in a country or region. Given that different interests of various stakeholders vary over time and with changing contexts, sustainable forest management is a process of continuous adaptation rather than a fixed objective.

In the absence of a detailed political consensus on the desirable status or rate of change in individual dimensions of SFM (criteria or indicators), judgements on progress towards SFM are necessarily subjective. Notwithstanding, the following section attempts to determine progress towards – or away from – sustainable forest management in Europe as a whole, and in different regions. The judgement is based on the widely shared understanding that all six criteria should be given equal consideration and in most cases the desirable direction of change is implicit in the indicator. In some, however, the desirable direction of change is less obvious while, in others, stakeholders have very different and opposing interests. The chapter should thus be understood as an invitation to readers to analyse and judge by themselves, rather than an objective assessment by the authors.

Table 40 brings together at the sub-regional level a subset of the indicators concentrating on the direction and degree of change between 2000 and 2005. It has to be seen as a screening tool and colour codes the trend data as "positive" (green), "stable" (yellow) or "negative" (red), using this measurement applied in a standard way to all sub-regions, and accompanied by information on data availability and coverage. If all the trend indicators in a sub-region were coded "green", the region

[22] See definition of SFM (Helsinki Resolution H1, 1993) and its subsequent operationalization through the criteria and indicators for SFM (Lisbon Resolution L2, 1998, Vienna Declaration, 2003).

might be considered to be progressing towards sustainable forest management and vice versa for "red". As no sub-region is entirely "green" or entirely "red", it is for the reader to decide whether Europe or a sub-region is in fact progressing towards sustainable forest management or not, judging the current status and significance of trends in individual sub-classes of indicators[23]. As the method is new and relatively complex, some important background points need to be stressed:

- The indicator subset was chosen on the grounds of data availability and to achieve a rough balance between criteria. It may be considered representative of the full set, but is not identical to it.
- Almost all of the indicators chosen measure change between 2000 and 2005, although two indicators (3.1 and 3.5) measure status.
- The data quality for each regional trend is specified[24], and nothing is shown if the quality is so low as to make the figure meaningless or misleading. In fact well over half the cells are based on usable data for over 75% of the forest area, and two thirds on data for over 50% of the forest area.

The text summarises the main trends, and draws attention to areas where the data presented may be misleading, because of the diversity of national and regional circumstances, and because of external events. An example is the large windblow in December 1999 in North West Europe, which brought fellings in 2000 to an exceptionally high level: as a result, in those countries, fellings showed a severe decline between 2000 and 2005. This sharp decline from an exceptionally high level should not be interpreted as a structural decline.

For the **MCPFE region** Table 40 shows good data coverage (reporting countries represent 75% of total forest area or more) for almost all indicator subclasses. Data is insufficient to determine trends in a few aspects only: defoliation and deposition damage, natural regeneration, introduced tree species and total energy from wood. The trends in by far most indicators show that the situation is either stable or improving. Upward trends are particularly marked in indicators on the productive functions of forests and wood consumption, but also in the area of protected forests. Between 2000–2005 also the damage by fire or insects saw a positive development downwards. In many other areas the situation is stable, including in forest resources[25] and the area of protective forests. There are only two areas marked as "red": the decrease in forest sector workforce (an effect of increasing productivity) and an increase in the area of plantations, in principle an indicator for decreasing biodiversity. In the large majority of cases, the latter do not replace natural forests and have widely been regarded as a rather positive development, contributing to wood supply and soil erosion protection on abandoned agricultural land.

[23] Note, also, that simple addition of "green" and "red" cells can lead to very misleading judgements. It would imply that the selected set of indicator sub-classes are a suitable substitute for all MCPFE indicators (rather, they are a chosen sub-set for which data availability is comparatively high). It would also imply that all sub-indicators are equally important, values directly comparable across the board, and that trends are more important than the absolute level. For instance, 1% change in total forest area would concern large areas of forests (around 10 mil. ha), while 1% of change in protective forests for infrastructure protection is only a fraction of this area (around 1 mil. ha). It would treat 1% of change in forest area as equal with 1% change in the value of non-wood forest products.

[24] « High » indicates comparable reliable data available for countries covering more than 75% of the forest area of that region, « medium" 50–75%, and "low" 25–50%. If data are available for countries covering les than 25% of the region, nothing is shown. Because of the size of the Russian forest area, the figure for the Russian Federation largely determines the MCPFE region total, so one column shows also "MCPFE excluding the Russian Federation", as trends in that country are often different from those elsewhere in the region.

[25] Note that, given the large existing forest area, a 0.5% increase required to show forest area as "green" would require 5 mil. ha of new forests per year. This is larger than the area of Switzerland.

Table 40. Direction and degree of change of indicators between 2000 and 2005

Criteria	Indicator number	Indicator / sub-class	Trend or status	Unit	Central Europe		East Europe		Nordic / Baltic		North West Europe		South East Europe		South West Europe		MCPFE		MCPFE excl. Russian Federation	
C1	1,1	Area of forest	T	% annual change	+0,29	H	-0,01	H	+0,12	H	+0,21	H	+0,36	H	+1,46	H	+0,07	H	+0,40	H
	1,1	Forest area available for wood supply	T	% annual change	+0,14	H	-0,12	H	-0,08	H	+0,23	M	+0,44	H	+1,10	L	-0,05	H	+0,09	H
	1,1	Area of other wooded land	T	% annual change	+0,26	M	+0,40	H	+0,20	H	-1,15	M	-0,28	H	-1,12	H	+0,11	H	-0,48	H
	1,2	Total growing stock of FAWS	T	% annual change	+1,26	H	-0,24	H	+0,78	H	+1,68	M	+0,85	H	+2,27	H	+0,20	H	+1,20	H
	1,4	Forest carbon stock of woody biomass	T	% annual change	+1,41	H	+0,12	H	+0,94	H	+1,61	H	+0,69	H	+2,27	H	+0,38	H	+1,38	H
C2	2,1	Deposition of air pollutants per hectare – sulphate	T	% annual change	Data derived from sample based measurement by ICP Forest, which do not permit making trend analysis at the national or sub-regional level.												n.a.	n.a.	-6,01	n.a.
	2,3	Proportion of trees with defoliation above 25%[4]	T	% annual change													n.a.	n.a.	+1,07	n.a.
	2,4	Area of forest primarily damaged by fire	T	% annual change	-3,53	H	-10,40	H	+0,61	H	+0,30	H	-23,26	H	+1,95	H	-7,28	H	-1,79	H
	2,4	Area of forest primarily damaged by insects & disease	T	% annual change	-0,28	H	-5,30	H	+12,93	H		-		-	+3,21	L	-3,60	H	-0,18	M
C3	3,1	Ratio fellings/net annual increment[1]	S	%	61,27	H	35,77	H	71,71	H	52,73	H	44,86	M	26,37	L	48,24	H	58,34	H
	3,2	Volume of marketed roundwood	T	% annual change	+1,26	H	+0,80	H	+4,64	H	-1,43	M	+1,61	H	-1,59	L	+1,95	H	+2,48	M
	3,3	Value of NWFP removals[2]	T	% annual change	+0,28	n.a.		-	+3,09	n.a.	+5,42	n.a.	+7,49	n.a.	+3,21	n.a.	+3,79	n.a.	+3,79	n.a.
	3,5	Proportion of forest under management plan or equivalent[1]	S	%	96,17	H	100,00	H	93,83	H	77,90	H	98,20	M	96,00	L	98,73	H	92,57	H
C4	4,1	Proportion of forest predominantly broadleaved or mixed	T	% annual change		-	+0,19	H	+0,47	H	+0,12	H	+0,07	M	±0,00	L	+0,20	H	+0,24	H
	4,2	Area of FOWL with natural regeneration	T	% annual change	+2,66	L		-	+0,35	H		-	-1,34	L		-		-	+0,42	L
	4,3	Area of forest classified as undisturbed by man	T	% annual change	+3,32	H	-0,21	H	+0,90	H	±0,00	M	+1,84	H	+1,30	H	-0,16	H	+1,06	H
	4,3	Area of forest classified as plantations	T	% annual change	+0,78	H	+1,94	H	+0,55	H	+0,36	M	+1,66	H	+1,94	H	+1,60	H	+1,17	H
	4,4	Area of forest dominated by introduced tree species	T	% annual change	+1,73	M		-	+0,67	H	+0,29	M		-		-		-	+0,76	M
	4,5	Volume of dead wood per hectare in forest	T	% annual change	-4,18	L	-0,10	H	+1,28	H		-		-	+2,33	L	-0,08	H	-0,03	L
	4,9	Total area of forest MCPFE Classes: 1.1, 1.2, 1.3, & 2	T	% annual change	+0,90	H	+0,66	H	-3,82	H	+2,16	H		-		-	+0,77	H	+0,85	M
C5	5,1	Area of protective forest for soil and other ecosystem functions	T	% annual change	+1,12	H	+0,16	H	+0,05	H	+4,30	H	-0,03	M	+0,38	H	+0,37	H	+1,35	H
	5,2	Area of protective forests for infrastr. and managed natural res.	T	% annual change	-2,76	H	-0,24	H	+11,10	H		-		-	±0,00	M	-0,31	H	-4,21	M
C6	6,1	Area of FOWL forest holdings under private ownership	T	% annual change	+1,23	H	-[3]	H	-0,35	H	+0,18	M	+0,35	L	+1,10	L	-0,01	H	-0,01	M
	6,2	Contribution of forest sector to GDP	T	% annual change	-0,01	H	-0,04	H	-0,05	H	-0,02	H	-0,02	H	-0,04	H	-0,03	H	-0,03	H
	6,5	Forest sector workforce	T	% annual change	-0,58	H	-2,07	H	+0,10	H	-2,27	H	-0,70	H	-0,85	H	-1,31	H	-0,74	H
	6,7	Wood consumption per capita	T	% annual change	+3,75	H	+2,96	H	+1,87	H	+0,25	H	+3,12	H	+0,15	H	+1,51	H	+1,47	H
	6,9	Total energy from wood	T	% annual change	+3,86	L		-	+0,48	M	-0,72	M	-4,03	L	+4,29	L		-	+0,11	L
	6,10	Area of FOWL with legal right to access	T	% annual change	+0,35	M	+0,03	H	+0,08	H		-	+0,39	L		-	+0,08	H	+0,49	M

[1] Figures refer to status 2005
Threshold values for Ratio fellings / net annual increment: <80 (green); 80–90 (yellow); >90 (red)
Threshold values for Proportion of forest under management plan or equivalent: <75 (red); 75–90 (yellow); >90 (green)

[2] There are 13 separate classes of NWFP, most of which occur in well defined regions, and not elsewhere. The data here are % changes of the total value in € of all reported NWFPs in each country, and categories not reported have been assumed to be zero. Data availability can not be calculated for this aggregate of NWFPs and the corresponding cells have been set to "n.a.".

[3] Annual change rate (%) for East Europe not given (infinity value)

[4] Numbers are based on countries with continuous data submission from 1997 to 2005

	Positive change (generally greater than 0.5% per year)
	No major change (between -0.5 and 0–5% per year)
	Negative change (generally less than -0.5% per year)
	Insufficient data to determine trend
H	High (reporting countries represent 75–100% of total forest area)
M	Medium (reporting countries represent 50–75% of total forest area)
L	Low (reporting countries represent 25–50% of total forest area)
-	Insufficient (reporting countries represent less than 25% of total forest area)
n.a.	Not applicable

An assessment of trends in the MCPFE region excluding the Russian Federation shows good or very good data coverage and quality in many indicator subclasses except natural regeneration, dead wood, and energy from wood. The overall picture is comparable with the assessment for the whole MCPFE region, but a few aspects become more and some less positive. Growing stock, and thereby also carbon stock, has increased more in the MCPFE region excluding Russian Federation. Also forests classified as "undisturbed by man" have increased more, as have protective forests. The former is largely an effect of increasing areas under protection. The latter is possibly an effect of reclassification, given that protective forests for infrastructure protection have decreased by about the same absolute amount of area[26]. In this sub-region the available data also shows a positive development in considerable decreases in air pollutant (sulphates) deposition. However, developments are less positive compared to the whole MCPFE with regard to some other health issues: defoliation of trees has increased and areas reported to be damaged by insects and diseases are stable and not decreasing. From a biodiversity point of view it is also considered negative that the area of forests dominated by introduced species has increased.

In **Central Europe**[27], data coverage and quality are good with the exception of indicators on regeneration method, tree species composition, deadwood and wood energy. Most of the indicators are moving in a positive direction: area and growing stock are increasing, more carbon is being stored and the area of forest damaged by fire is decreasing. Pollutant depositions have dropped, but crown condition surveys indicate vulnerability[28]. The volume and value of products supplied by the forest is increasing but the fellings remain well below increment. Most forests are under a management plan or equivalent. The area of natural regeneration, the area of forest protected for biodiversity, of protective forests and the area of plantations are all growing, as is the area dominated by introduced tree species (although the sub-regional total area under introduced species remains marginal, except in Hungary). The area of privately owned forest has increased in some countries, notably as a result of the restitution process in former centrally planned countries. This development may also underlie the increase in area with legal right of access. However, the employment provided by the forest sector workforce is shrinking.

In **Eastern Europe**[29], the trends are dominated by the situation in the sub-region's largest country, the Russian Federation. Data coverage is satisfactory, although many countries in the region, including the Russian Federation, are considering replacing traditional stand-wise inventories with more effective and economic sample-based methods. The region shows stability in forest area, with accumulation of growing stock and carbon as fellings remain at about a third of increment. Nevertheless, the growing stock per hectare on forest available for wood supply is falling. Forest fire remains a serious concern as the fall recorded between 2000 and 2005 is from an exceptionally high level in 2000, and there are marked annual fluctuations. According to data for the European part of the region, (no data are available for non-European part of the Russian Federation crown condition) pollutant depositions have dropped, but crown condition surveys indicate vulnerability. The volume of marketed roundwood is increasing, although the forest sector's contribution to GDP is falling. Wood consumption is increasing strongly. Virtually all forests are publicly owned and have a management plan (no data for Georgia). The area with legal right of access is roughly stable. The area of undisturbed forest is falling, but species composition is stable. The area of plantations and of forests protected for biodiversity conservation is increasing. The forest workforce is declining.

[26] Note that the percentage change shows a marked difference, which is due to the comparatively small area of forests in the latter category. In absolute figures the area of protective forests for soil and other ecosystem functions increased by some 315.000 ha, while the area of protective forests for infrastructure and managed natural resources decreased by close to 300.000 ha.
[27] Austria, Czech Republic, Hungary, Liechtenstein, Poland, Slovakia, Slovenia, Switzerland.
[28] This is a summary of the general conclusions of ICP Forest, applicable to the region as a whole, but not attributable, for methodological reasons (sampling structure) to particular countries or sub-regions.
[29] Belarus, Georgia, Russian Federation, Ukraine.

In the **Nordic/Baltic**[30] region, data quality and coverage are generally very satisfactory with weaknesses only for fire damage. The area of forest and of other wooded land is growing as is growing stock on forest available for wood supply, although the area of forest available for wood supply has been shrinking as the area of protected forest increases. The ratio between fellings and increment is just over 70%, the highest of any region, but still below the physical potential of the forest. The volume of marketed roundwood is growing, but note that the 2005 figure was exceptionally high because of storms, especially in Sweden. The value of marketed non-wood forest products is steadily increasing, chiefly due to a near doubling of the reported value of the harvest of berries in Finland between 2000 and 2005 (for reasons which are not explained). Nearly 94% of the forest is managed according to a management plan or equivalent. The area of natural regeneration is stable or expanding, with faster growth in the three Baltic countries. The area of forest classified as "undisturbed by man" is increasing[31]. The proportion of broadleaved or mixed forests is increasing steadily. The area under introduced species is also expanding, although the areas concerned are small. Iceland shows very rapid growth in introduced species because of its afforestation programme. The volume of deadwood in forest is increasing, as is the area of plantations. The apparent fall in area of forest protected for biodiversity is due to a change in measurement systems and concepts in both Finland and Sweden: the data for 2005 are more precise than for earlier years, but not comparable over time. The area of protective forest is stable. The share of private ownership fell, essentially because of the creation of Sveaskog in Sweden, where previously privatised forest land was brought back to state ownership. The share of private forest increased in all other countries, especially in Estonia and Lithuania[32]. The contribution of the sector to GDP fell in this region as in all others, but employment stabilised. Wood consumption per caput increased steadily, and recorded wood energy consumption rose, even though this may be an underestimate. Almost all forests in the region have a legal right of access: this area grew slightly.

In **North West Europe**[33], data quality is generally adequate, with weaknesses for carbon storage, fire, regeneration method, deadwood and access. Forest area is increasing. The area of other wooded land fell in France, probably as it transformed to forest, but increased elsewhere. Growing stock increased as fellings are about half of increment. Insufficient data were provided to measure carbon flows. The area of fire damage was reported to have fallen. Pollutant depositions have dropped, but crown condition surveys indicate vulnerability. The volume of marketed roundwood fell sharply between 2000 and 2005, but this is not surprising in view of the very large volumes felled in 2000 after the windblow in late 1999. The value of non-wood forest products marketed increased steadily. Just under 80% of forests are under a management plan, due to the many small scale forest owners in the region. The share of predominantly broadleaved and mixed forest is increasing and the area under introduced species is falling in Belgium, Netherlands and the UK, but rising in France. The plantation area is increasing. A increase in area of forest protected for biodiversity is reported but this is due to the fact that Germany has reported over 2.6 million ha of forest under Landschaftschutz (forest managed for protection of the landscape) under MCPFE class 1.3 for 2005. Belgium and France also report increases in area of protected forest. The reported area of protective forest (soil and water) has increased in Belgium and France and above all Germany, although it is unclear whether the data are comparable over time. The area of forest in private ownership has increased. Although wood consumption per head has increased, the forest sector's share of GDP has fallen as other sectors grew faster. The workforce is declining at a rate of over 2.2 % per year. The data supplied for this report indicate a drop in wood energy consumption (a notoriously difficult activity to

[30] Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden.
[31] This is possible as forests formerly considered semi-natural recover the characteristics of undisturbed forest if no silvicultural actions are undertaken for a long time and natural processes are re-established.
[32] Note that private or public ownership as such is no indication for the degree of sustainable forest management.
[33] Belgium, France, Germany, Ireland, Luxembourg, Netherlands, UK.

monitor), but a more recent survey among energy specialists indicates that in reality, wood energy consumption is significantly higher than previously believed, and growing fast.

In **South East Europe**[34] there are concerns about data quality in all six criteria, although the report is able to make a general description. The area of forest is increasing, but that of other wooded land decreasing. Growing stock is also increasing as less than half the increment is felled in the subregion. In Albania, however, it is reported that fellings were 3 times the net annual increment in 2000 and 5.5 times in 2005[35]. Increment per hectare in the country is also very low, indicating the presence of degraded forests. For the subregion, insufficient data are available to describe carbon stock changes. Pollutant depositions have dropped, but crown condition surveys indicate vulnerability. Growth in volume of marketed roundwood has been steady and that of marketed non-wood forest products fast, led by mushrooms and ornamental foliage. As regards damage by fire, a major issue in the region, only Albania, Bulgaria and Romania reported, showing a significant reduction in the area damaged by fire. Plantations are expanding, especially in Turkey, and play an important role in Cyprus, which did not report on this indicator. Only Albania, Bulgaria and Serbia reported on ownership, showing an increase in privately owned forest. The area of designated protective forest decreased, because of developments in Turkey. The contribution of the forest sector to GDP decreased, as did the forest workforce, although less fast than in other regions. Wood consumption per caput is expanding rapidly. Area of forest with legal access is roughly stable. Consumption of wood energy is reported to be falling, but, as mentioned above, other studies indicate a revival of the use of wood for energy.

In **South West Europe**[36], data coverage is only adequate for forest area and some economic parameters (collected from public sources, not through this enquiry). Little information is therefore available on which to build a regional picture. Forest area is growing; in Spain through a mix of afforestation and natural expansion of forests, in Italy primarily through natural expansion of forest on abandoned agricultural land and in Portugal primarily due to afforestation efforts. On the other hand, other wooded land is reported to be shrinking in Spain: it is estimated that such wooded land is being transformed to forest. Area of forest available for wood supply is growing in Italy. Growing stock is increasing as fellings are only a quarter of increment. The volume of marketed roundwood is falling in Italy, but no information was supplied for Portugal and Spain. Likewise, almost all Italian forests are reported as being under a management plan or equivalent, but no information was supplied for Portugal or Spain. Plantations are expanding strongly, because of trends for Portugal and Spain. The area of private forest is expanding rapidly in Italy, possibly because of expansion of forest on former agricultural land. The forest sector contribution to GDP is falling, and the size of the workforce is shrinking. Wood energy is reported to be expanding strongly.

Information for policy makers

The main value of this report lies in the presentation of a wide range of internationally comparable and well documented data on the situation and trends for sustainable forest management in the region, covering all six criteria and the qualitative indicators. The overview section has described progress towards sustainable forest management, by criterion and by sub-region.

This information is designed to be used by stakeholders and the research community, for a wide variety of purposes. However, the primary purpose of the MCPFE itself and this report is to

[34] Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Greece, Moldova, Montenegro, Romania, Serbia, The former Yugoslav Republic of Macedonia, Turkey.
[35] Note that this might partly be an effect of a low net annual increment and/or data for fellings that include wood from areas classified as "other wooded land" or "trees outside forests".
[36] Andorra, Holy See, Italy, Malta, Monaco, Portugal, Spain.

improve policy formulation by providing governments with relevant and accurate information on politically important indicators. This section briefly lists a few major policy issues for which the information in this report may provide useful input.

Accumulation of wood and carbon in growing stock gives options to policy makers

The report shows that Europe's forests have expanded in area and growing stock volume, while fellings have stayed well below increment in nearly all countries. As a result, the stock of wood and carbon in Europe's forests is higher than ever before. This provides decision makers with a range of options in the productive area: to maintain fellings at their present level, increase them up to the level of increment or even to exceed this limit temporarily to supply a large volume in the short term, "drawing down" the capital accumulated over the past 50 years. What would be the consequences of each of these options for other functions, such as biodiversity conservation, recreation or protection? If the decision were to be to raise felling levels – whether to supply raw material or energy – how could this be achieved effectively and efficiently from the economic and social point of view? This report may help decision makers to approach these issues with more relevant and reliable information than in the past, not only on stocks and flows of wood/carbon, but also on the other functions which would be affected by such a decision.

The forest sector, climate change and energy

The forest sector can contribute to mitigating climate change in several ways, including replacement of non-renewable energy and raw material by sustainably produced wood, storage of carbon in the forest ecosystem or in finished products or supply of insulation material for energy conservation. These approaches are complementary, but choices must still be made on priorities, volumes and safeguards. As negotiations start for the second commitment period under the Kyoto Protocol, governments should clearly define their strategies in view of the trade-offs inherent in this complex exercise. This report provides part of the information required for this strategic exercise, which in many countries is progressing without the informed participation of the forest sector.

Sustainable forest management as part of sustainable development

Sustainable forest management, although desirable, is not an end in itself, and is relatively meaningless outside the context of sustainable development of a country or region. The importance of the various aspects of sustainable forest management varies according to circumstances in some countries, the biodiversity function has the highest priority, in others the production or protection function, employment or recreation. This report has provided objective information on the sector's contribution to GDP, employment, biodiversity conservation and so on. Policy makers and the main stakeholders in the sector are now better placed to determine whether or not the pattern pursued in the past was the optimum or not.

Forest sector policies respond to changing circumstances

The report's section on qualitative indicators has shown that the sector's policies and institutions have responded to changing demands from society through changes in priorities, new legal and regulatory instruments and better consensus forming through national forest programmes. On the basis of this international and structured information base, countries may assess their own situation in a wider context, learn from the experience of others and identify possibilities to improve their policies. In the forest sector, it may take years, even decades, before policy changes are reflected in developments on the ground. The information on policies and institutions provided by this report can make it clear to governments and stakeholders which actions have already been taken (even though they may not yet have achieved their objectives).

Forests remain vulnerable to pollution, fire, storms and other damage

This report has demonstrated that despite generally positive trends as regards area, increment, growing stock and biodiversity conservation, the forests in the MCPFE region remain vulnerable. Although depositions, especially of sulphur, have fallen, the forests remain vulnerable to acidification and defoliation, fires cause extensive damage every year and there are frequent major storms, felling millions of cubic metres of wood. This report presents objective information to quantify and localise the damage and to justify the necessary protective and precautionary measures.

In some countries the forest sector is in a critical situation

In many MCPFE countries, most dimensions of forest management are sustainable. In a few countries, however, in the south and east of the region, forest sector problems are more serious and need urgent attention at the policy level: forest damage, degradation, and overcutting, weak institutions, inability to monitor even broad trends. In some countries, the potential of the forest sector, for instance as a basis for export led rural development, as in the Baltic countries, has not been understood at the policy level. These countries may use the information in this report to give higher policy priority to forest sector issues.

Monitoring sustainable forest management

This report represents a major improvement on earlier reports in data quality and coverage (by indicator and by country) as well as in documentation of the "pedigree" of each observation. The report has been able to address complex and sensitive issues in an objective way, according to the internationally agreed structure of the MCPFE criteria and indicators. Nevertheless, there are still many aspects which can and should be improved, including the measurement methods for certain indicators, the comparability of data, between countries and over time, and the geographic coverage (countries which do not supply data or only a few observations). Some countries are still only able to provide the most basic information on a few indicators and some indicators are very badly covered. To improve the situation requires concerted action from the scientific community, international organisations and most important, governments and funding agencies, who should give themselves the instruments necessary to monitor accurately progress towards sustainable forest management. In the medium term, stability of concepts and methods is more important than improving the actual set of criteria and indicators.

Concluding remark

The MCPFE *State of Europe's Forests 2007* report shows that, in general, European forests are in a comparatively good state. Most data on trends over the last five years show a stable situation or indeed progress towards sustainable forest management. This is a quite positive message, particularly if compared to other regions in the world. There are many factors that have contributed to the current situation, including political commitment to sustainable forest management and action to address threats to forests and weaknesses in forest management. However, not all of these developments have or can be effectively governed by forest policy. In fact, many of the upcoming challenges require even more effective and efficient policies and action. These need to address the likely increasing risks to forests as well as the increasing demands on forests. Not only are these demands increasing, they are also becoming more diverse, with more sectors and more actors as stakeholders in forest matters.

5th MCPFE

FORESTS FOR QUALITY OF LIFE

ANNEXES

Annex 1. Material and methods

This MCPFE *State of Europe's Forests 2007* report is based on the six pan-European criteria and 35 quantitative as well as the 17 qualitative indicators for sustainable forest management (SFM).

Data for the analysis of pan-European quantitative indicators for SFM were made available from different sources. For 23 of the 35 indicators, data were provided directly by countries through a common questionnaire developed jointly by the UNECE/ FAO and MCPFE (Annex table 1 – A). A major reason to use data collected and assessed at the national level and to combine these with data from other sources was to capitalize on the experience and utilize investments into national forest resources assessments to the maximum extent.

Annex table 1 – A. MCPFE quantitative indicators covered by the National Data Reporting Forms

No.	Indicator
1.1	Forest area
1.2	Growing stock
1.3	Age structure and/or diameter distribution
1.4	Carbon stock
2.4	Forest damage
3.1	Increment and fellings
3.2	Roundwood
3.3	Non-wood goods

No.	Indicator
3.4	Services
3.5	Forests under management plans
4.1	Tree species composition
4.2	Regeneration
4.3	Naturalness
4.4	Introduced tree species
4.5	Deadwood
4.8	Threatened forest species

No.	Indicator
4.9	Protected forests
5.1	Protective forests – soil, water and other ecosystem functions
5.2	Protective forests – infrastructure and managed natural resources
6.1	Forest holdings
6.9	Energy from wood resources
6.10	Accessibility for recreation
6.11	Cultural and spiritual values

For nine MCPFE quantitative indicators not covered by the reporting forms of the MCPFE--UNECE/FAO Enquiry, data for this report were requested from international data providers These nine indicators are listed in Annex table 1 – B.

Annex table 1 – B. MCPFE quantitative indicators: data made available by International Data Providers

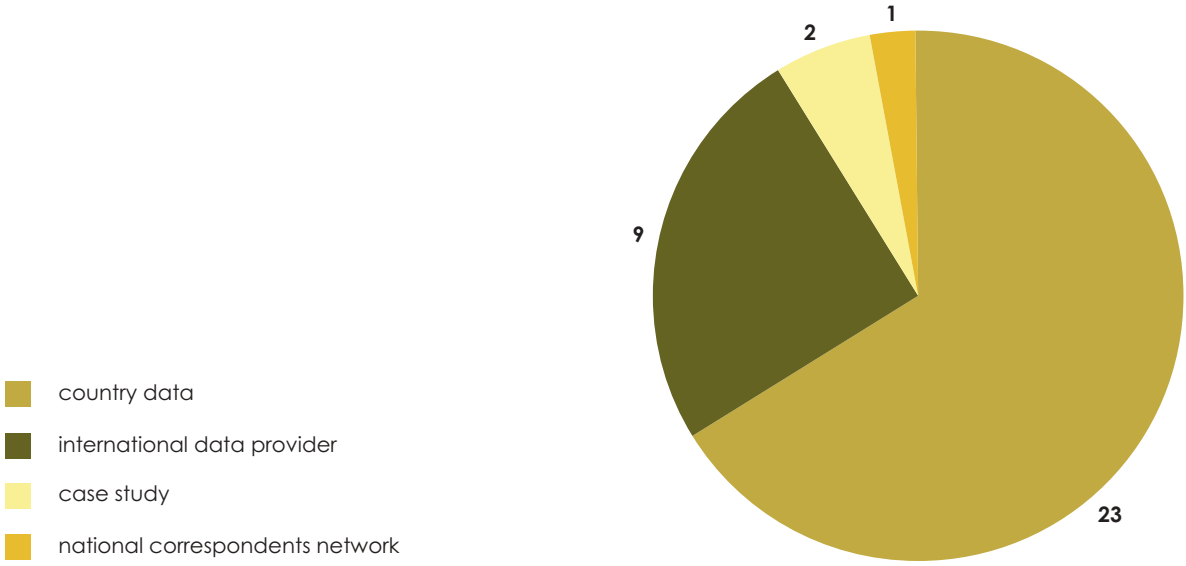
No.	Indicator	International data provider specified
2.1	Deposition of air pollutants	ICP Forests EC-JRC
2.2	Soil condition	ICP Forests EC-JRC
2.3	Defoliation	ICP Forests EC-JRC
4.6	Genetic resources	EUFORGEN
6.2	Contribution of forest sector to GDP	EUROSTAT (Economic Accounts/Forestry accounts), UNIDO, UN Statistics Division, National Statistical Offices
6.3	Net revenue	EUROSTAT (Economic Statistics/Forestry account)
6.5	Forest sector workforce	EUROSTAT (Economic Statistics/Forestry account), UNIDO, UN Statistics Division, ILO, National Statistical Offices
6.7	Wood consumption	UNECE/ FAO
6.8	Trade in wood	UNECE/ FAO

For the indicator 4.7 "landscape pattern" and indicator 6.4 "expenditures for services", data are unavailable from both countries and international data providers. University of Hamburg therefore contributed a study on expenditures for services and EC-JRC, in collaboration with European Environment Agency (EEA), provided a case study on landscape pattern. Data on forest ownership was also taken from a joint enquiry/questionnaire by UNECE/FAO, the MCPFE and CEPF that was addressed to 38 European countries with private forestry in 2006; 24 countries participated by submitting national reports. Data on indicator 6.6 "occupational safety and health" were made available through national correspondents networks. Other additional data sources from which information on criterion 6 was obtained are listed in Annex table 1 – C.

Annex table 1 – C. Additional data sources for criterion 6

Country	Source
Austria	Statistics Austria. 2007. Statistisches jahrbuch österreichs 2007. Vienna, Austria.
Belarus	Ministry of Statistics and Analysis. 2004, 2005, 2006. Statistical yearbook of the Republic of Belarus (2004, 2005, 2006 editions). Minsk, Belarus.
Bosnia and Herzegovina	Federal Office of Statistics. 1999. Statistical yearbook 1999. Sarajevo, Bosnia and Herzegovina.
Croatia	CROSTAT. 2004, 2006. Statistical yearbook (2004, 2006 editions). Central Bureau of Statistics, Zagreb, Croatia.
Cyprus	CYSTAT. 2006. Key figures: MANUFACTURING. Statistical Service, Ministry of Finance, Nicosia, Cyprus. Available at: www.mof.gov.cy/mof/cystat/statistics.nsf CYSTAT. 2007. Agricultural statistics 2003–2004. AP./No.35&36. Statistical Service, Ministry of Finance, Nicosia, Cyprus.
Czech Republic	Czech Statistical Office. 2006. Statistical yearbook of the Czech Republic 2006. Prague, Czech Republic.
Denmark	Statistics Denmark. 2007. Statbank database. Copenhagen, Denmark. Available at: www.statbank.dk
Estonia	Centre of Forest Protection and Silviculture. 2006. Yearbook forest 2005. Tartu, Estonia. Statistical Office of Estonia. 2007. Statistical database. Tallinn, Estonia. Available at: pub.stat.ee
Finland	Statistics Finland. 2007. Statfin database. Helsinki, Finland. Available at: pxweb2.stat.fi
Georgia	Department for Statistics. 2006a. Industry in Georgia 2006. Ministry of Economic Development, Tbilisi, Georgia. Forestry Department. 2006b. Georgian statistical yearbook of forestry 2006. Ministry of Environment Protection and Natural Resources, Tbilisi, Georgia.
Greece	National Statistical Service. 2007. Statistical data/national accounts/employment. Athens, Greece. Available at: www.statistics.gr/table_menu_per_year_eng.asp
Hungary	Central Statistical Office. 2006. Structural business statistics data, 2004. Budapest, Hungary. Central Statistical Office. 2007. STADAT database. Budapest, Hungary. Available at: portal.ksh.hu
Iceland	Statistics Iceland. 2007. Online statistics. Reykjavik, Iceland. Available at: www.statice.is
Italy	ISTAT. 2007. Online data tables. National Institute of Statistics, Rome, Italy. Available at: www.istat.it/dati/dataset
Latvia	Central Statistical Bureau. 2007. Statistical Database. Riga, Latvia. Available at: data.csb.gov.lv
Lithuania	Statistics Lithuania. 2007. Database of indicators. Vilnius, Lithuania. Available at: db.stat.gov.lt/sips/dialog/statfile1.asp State Forest Survey Service. 2006. Lithuanian Statistical Yearbook of Forestry 2006. Kaunas, Lithuania.
Luxembourg	STATEC. 2007. Le portail des statistiques du Luxembourg. Luxembourg. Available at: www.statistiques.public.lu
Malta	National Statistics Office. 2007. Statistical database – manufacturing survey. Valletta, Malta. Available at: www.nso.gov.mt/statbase/data_table_catalogue.aspx
Montenegro	MONSTAT. 2006. Statistical yearbook 2006. Statistical Office of Montenegro, Podgorica, Montenegro.

Country	Source
Netherlands	Statistics Netherlands. 2007. StatLine database. Voorburg/Heerlen, Netherlands. Available at: statline.cbs.nl/StatWeb
Norway	Statistics Norway. 2007. StatBank database. Oslo, Norway. Available at: www3.ssb.no/statistikkbanken
Poland	Central Statistical Office. 2003, 2004, 2005. Statistical yearbook of the Republic of Poland (2003, 2004 and 2005 editions). Warsaw, Poland. Central Statistical Office. 2006. Forestry 2006 (in Polish). Warsaw, Poland.
Portugal	Statistics Portugal. 2006. Statistical yearbook of Portugal 2005. Lisbon, Portugal.
Romania	National Institute of Statistics. 2005. Romanian statistical yearbook 2005. Bucharest, Romania.
Russian Federation	GOSKOMSTAT. 1998. Agriculture in Russia (in Russian). State Committee of Statistics, Moscow, Russian Federation. ROSSTAT. 2004. Agriculture, hunting and forestry in Russia 2004 (in Russian). Federal State Statistics Service, Moscow, Russian Federation. ROSSTAT. 2006a. Russia in figures 2006: statistical handbook. Federal State Statistics Service, Moscow, Russian Federation. ROSSTAT. 2006b. Russian statistical yearbook 2006 (in Russian). Federal State Statistics Service, Moscow, Russian Federation.
Serbia	Statistical Office. 2006a. Statistical yearbook of Serbia 2006. Belgrade, Serbia. Statistical Office. 2006b. System of national accounts of the Republic of Serbia 1997–2004. Belgrade, Serbia. Statistical Office. 2007. Employment and earnings statistics. Belgrade, Serbia. Available at: webrzs.statserb.sr.gov.yu/axd/en/drugastrana.php?Sifra=0014&izbor=odel&tab=151
Slovakia	Statistical Office. 2007. SLOV STAT on- line database. Bratislava, Slovakia. Available at: www.statistics.sk/pls/elisw/vbd
Slovenia	Statistical Office. Statistical yearbook (1996–2006 editions). Ljubljana, Slovenia.
Spain	National Institute of Statistics. 2007. INEbase database. Madrid, Spain. Available at: www.ine.es/en/inebmenu/indice_en.htm
Sweden	Swedish Forest Agency. 2007. Forestry statistics. Jönköping, Sweden. Available at: www.svo.se/minskog/Templates/EPFileListing.asp?id=16887 Statistics Sweden. 2007. Statistical database. Stockholm, Sweden. Available at: www.ssd.scb.se/databaser/makro/start.asp?lang=2
The former Yugoslav Republic of Macedonia	State Statistical Office. 2005, 2006. Results from The Labour Force Survey (2004, 2005). Skopje, TFYR Macedonia.
Turkey	FAO. 2005. Turkey country report. FAO Global Forest Resources Assessment 2005 Country Report 095. Rome, Italy. Available at: www.fao.org/forestry/site/28699/en TURKSTAT. 2006a. Turkey's Statistical Yearbook 2005. Turkish Statistical Institute, Ankara, Turkey. TURKSTAT. 2006b. Statistical indicators 1923–2005. Turkish Statistical Institute, Ankara, Turkey. TURKSTAT. 2007. Statistics online. Turkish Statistical Institute, Ankara, Turkey. Available at: www.turkstat.gov.tr/VeriBilgi.do
Ukraine	State Statistics Committee. 2006. Statistical Yearbook of Ukraine for 2005. Kyiv, Ukraine.



Annex figure 1 – A. Number of indicators covered by different data providers

The MCPFE set of indicators furthermore comprises 17 qualitative indicators for SFM (Annex table 1 – D). Data on these indicators was covered through a separate MCPFE-UNECE/FAO Enquiry on qualitative indicators addressed to national representatives to the MCPFE, sent to MCPFE countries in January 2007.[37] This questionnaire also contained one quantitative indicator as a case study (indicator 6.4, "expenditure for services").

Annex table 1 – D. MCPFE qualitative indicators for SFM, data collected through separate enquiry

A. Overall policies, institutions and instruments for sustainable forest management	A.1	National forest programmes or similar
	A.2	Institutional frameworks
	A.3	Legal/regulatory frameworks and international commitments
	A.4	Financial instruments/economic policy
	A.5	Informational means
B. Policies, institutions and instruments by policy area	B.1	Land use and forest area and other wooded land (C1)
	B.2	Carbon balance (C1)
	B.3	Health and vitality (C2)
	B.4	Production and use of wood (C3)
	B.5	Production and use of NWGS [39/], provision of especially recreation (C3)
	B.6	Biodiversity (C4)
	B.7	Protective forests and other wooded land (C5)
	B.8	Economic viability (C6)
	B.9	Employment (incl. safety and health) (C6)
	B.10	Research, training and education (C6)
	B.11	Public awareness and participation (C6)
	B.12	Cultural and spiritual values (C6)

Data on quantitative indicators were compiled, checked and verified with national correspondents where necessary and put into the FAO database through well-established routines for forest resource assessment at both UNECE/FAO and FAO. Data on qualitative indicators were compiled, checked and verified in collaboration with the UNECE/FAO and the MCPFE Liaison Unit Warsaw, and put into a specifically designed database.

These data were subsequently made available to coordinating lead authors of individual chapters of the report.

[37] The enquiry on the MCPFE qualitative indicators was conducted jointly with the enquiry on the implementation on MCPFE commitments.
[38/] Non-wood Goods and Services.

Annex 2. Data completeness and data quality

A key concern in the presentation of statistical data is the completeness of records and the extent to which they display sound and reliable information. Data on nine quantitative indicators were submitted by international data providers based on established procedures for data collection and validation. Data on 23 quantitative and on all qualitative indicators were collected from individual countries through questionnaires. As the country data submitted for qualitative and quantitative data are different in format (statistical figures versus text), data completeness and data quality will be discussed individually for qualitative and quantitative indicators.

Quantitative indicators

Data completeness

The questionnaire distributed for the collection of information on quantitative indicators from countries contained 23 reporting forms. Data for indicator 1.3 were collected by two reporting forms, one on age class and one on diameter distribution. Each reporting form contained a table to facilitate data collection. The number of requested table cell entries varied from four (services) to 168 (threatened forest species) (Annex table 2 – A). The large number of entries results from the need to report sub-categories as well as status at different points in time for each indicator. In total, information for 1 099 table cell entries were requested.

Annex table 2 – A. No. of requested table cell entries per reporting form

Reporting form	Table cell entries
Forest area	60
Growing stock	60
Age-class distribution	150
Diameter distribution	60
Carbon stock	36
Forest damage	84
Increment and fellings	6
Roundwood	12
Non-wood goods	78

Reporting form	Table cell entries
Services	4
Forests under mgmt. plan	6
Tree species composition	60
Regeneration	60
Naturalness	48
Introduced tree species	18
Deadwood	36
Threatened forest species	168
Protected forests	24

Reporting form	Table cell entries
Protective forests – soil	6
Protective forest – infrastructure	6
Forest holdings	63
Energy from wood	12
Accessibility for recreation	36
Cultural and spiritual values	6
Total	1099

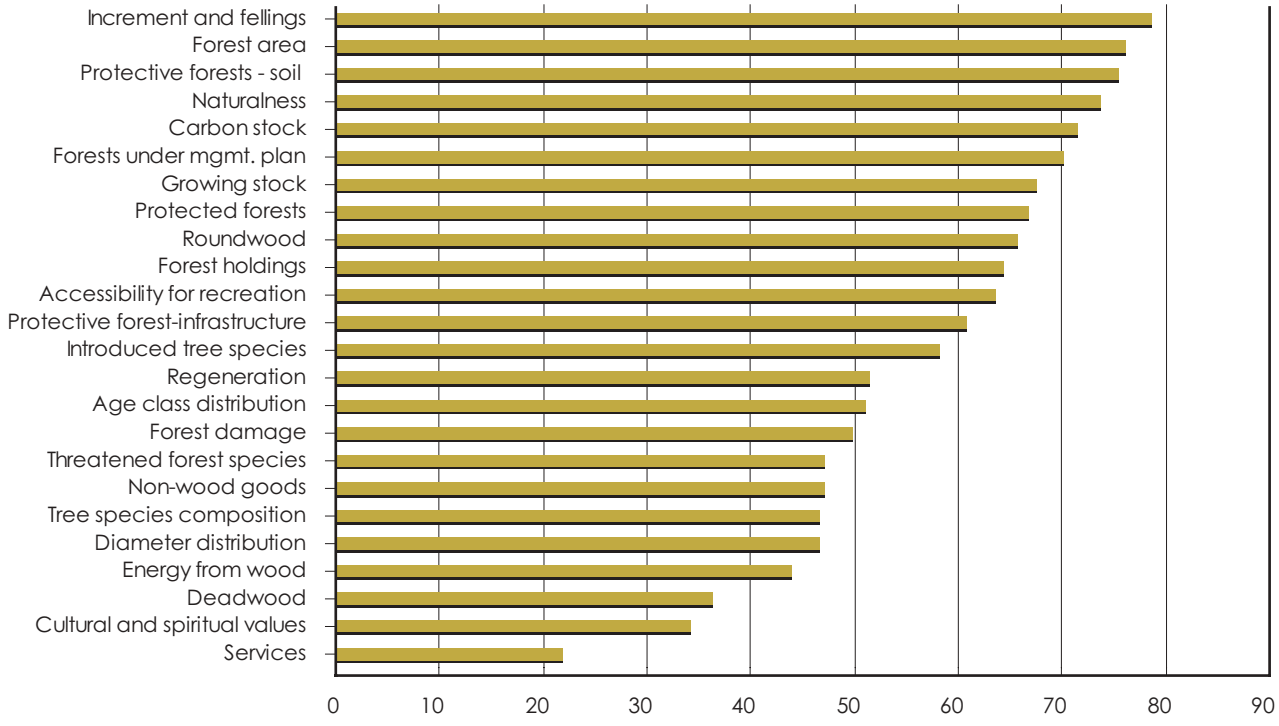
Some countries did not fill in and submit the Enquiry despite reminders; in these cases the UNECE secretariat and FAO headquarters conducted desk studies in order to complete the information required.

A detailed analysis of the completeness of the submitted data was conducted and showed for the MCPFE region, an overall completeness of 57 percent of the total number of requested table cell entries (Annex table 2 – B). The highest degree of completeness of requested table cell entries was achieved for indicator 3.1 "increment and fellings" (79 percent), followed by indicator 1.1 "forest area" (76 percent) and indicator 5.1 "protective forest – soil, water and other ecosystem functions" (76 percent). Lowest level of completeness was found for indicator 6.9 "Energy from wood" (44 percent), indicator 4.5 "deadwood" (36 percent), indicator 6.11 "cultural and spiritual values" (34 percent), and indicator 3.4 "services" (22 percent). Annex figure 2 – A shows the degrees of completeness for the individual indicators and reporting forms for the MCPFE region. Regarding the regions the degree of completeness varied between 72 percent (Nordic/Baltic countries) and 44 percent (South East Europe). Among the individual countries, Finland reached with 90 percent the highest degree of completeness, while the least degree of completeness was found to be 10 percent. Most countries were able to provide more than 75 percent of the requested information.

Annex table 2 – B. Completeness of table cell entries requested in reporting forms by country groups

Reporting form	Central Europe (8)	East Europe (4)	Nordic/ Baltic Countries (8)	North West Europe (7)	South East Europe (12)	South West Europe* (6)	MCPFE (45)
	%	%	%	%	%	%	%
Forest area	70	80	80	77	77	73	76
Growing stock	65	70	80	63	63	67	68
Age class distribution	68	55	75	54	25	43	51
Diameter distribution	48	50	85	31	35	33	47
Carbon stock	78	95	88	69	55	63	72
Forest damage	55	50	63	43	43	47	50
Increment and fellings	75	90	98	83	70	63	79
Roundwood	95	50	73	71	52	50	66
Non-wood goods	53	55	45	37	52	40	47
Services	23	30	20	26	13	30	22
Forests under management plans	88	100	78	69	55	50	70
Tree species composition	63	65	60	46	28	33	47
Regeneration	65	50	75	37	42	40	52
Naturalness	75	70	75	74	72	77	74
Introduced tree species	78	75	85	57	33	37	58
Deadwood	35	55	58	43	12	40	36
Threatened forest species	43	55	68	51	38	33	47
Protected forests	80	75	83	71	45	60	67
Protective forests – soil	73	80	85	89	62	77	76
Protective fores –infrastructure	80	90	95	43	27	60	61
Forest holdings	70	65	68	74	58	53	64
Energy from wood	60	25	75	57	17	33	44
Accessibility for recreation	78	65	75	63	52	53	64
Cultural and spiritual values	30	40	50	29	32	27	34
Average	64	64	72	57	44	49	57

* Holy See excluded.



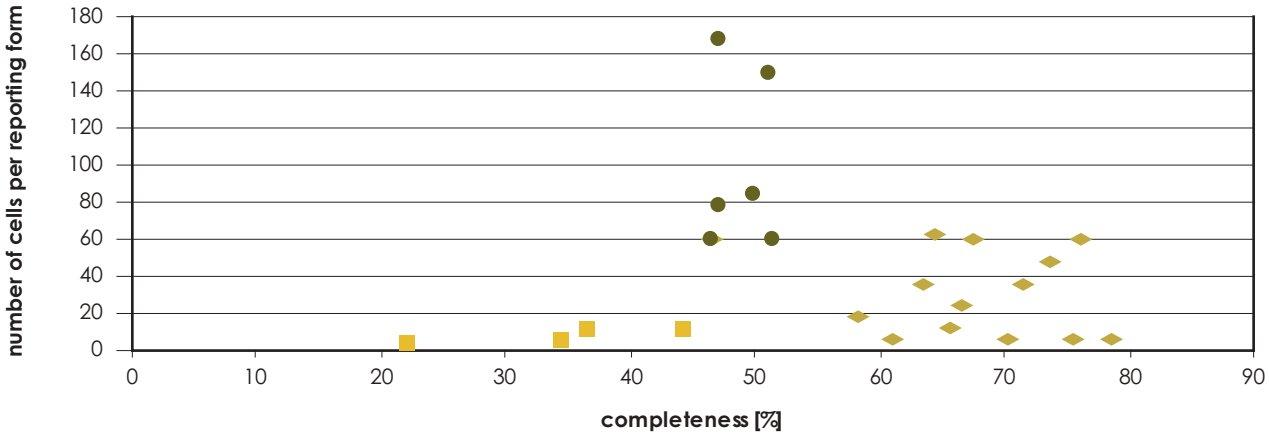
Annex figure 2 – A. Degree of completeness (%) of requested table cell entries by indicator

Annex figure 2 – B shows the degree of completeness by number of table cell entries for which information was requested in the reporting forms (see Annex table 2 – A). The number of cell entries identifies the degree of detail requested for an indicator. Three groups of indicators can be identified from Annex figure 2 – C:

1. One group (marked by squares) comprises four indicators for which only a few cell entries (6 to 12) were requested, but a low degree of completeness was reached. The data availability is obviously poor for those indicators[39].

2. In the second group (marked by diamonds), 13–60 cell entries were required and the degree of completeness was between 58 and 79 percent. Most of the indicators fall in this group.. Here the countries were in a position to provide most of the required data.

3. The third group of indicators (marked by dots) is characterized by a large number of specified cell entries (60 to 168), reflecting a high degree of detail requested. The degree of completeness for the 6 indicators[40] in this group ranged from 47 to 52 percent. Here the degree of completeness must be interpreted with care. While sufficient data may be available at the national level, the countries were obviously not in a position to report according to the specified degree of detail.



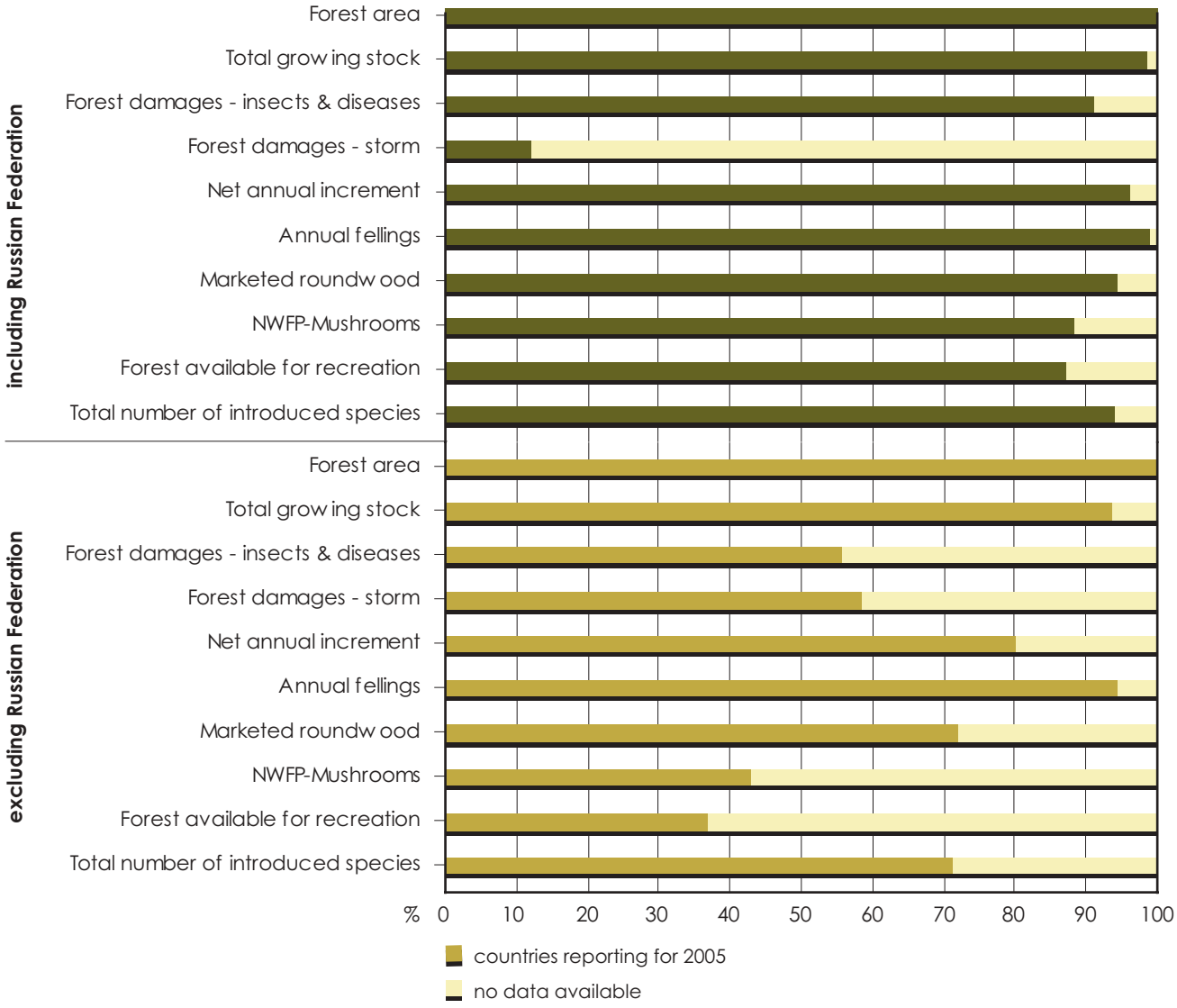
Annex figure 2 – B. Degree of completeness by number of requested table cell entries per reporting form

Annex figure 2 – A, Annex figure 2 – B and Annex table 2 – B show the degree of completeness of requested table cell entries on a per country basis. This form of presentation allows for assessing the willingness and capacity of countries to contribute information on individual indicators. As this approach does not take into consideration forest area, it does not provide complete information of information in terms of the percentage of total forest area covered by information. Ten selected table cells from the reporting forms were therefore analysed with reference to the forest area of the region. Information on forest area was available from all countries known to have forests.

Annex figure 2 – C shows the result for the figures of the reporting year 2005. It can be seen that for the entire MCPFE region, the percentage of total forest area covered by information is greater than 85 percent, except for the forest damages caused by storm. This result is mainly driven by the fact that the Russian Federation reported for all but one of the selected attributes (storm damage). The situation looks different when the Russian Federation is excluded from the analysis. More than 80 percent of forest area coverage is found only for forest area, total growing stock and annual fellings. The lowest area coverage is observed for the marketed values of the non-wood forest products

[39] Indicator 3.4 "services"; indicator 4.5 "deadwood"; indicator 6.9 "energy from wood"; indicator 6.11 "cultural and spiritual values".
[40] Indicator 1.3 "age class distribution", indicator 2.4 "forest damage"; indicator 3.3 "non wood goods"; indicator 4.2 "regeneration"; indicator 4.4 "tree species composition"; indicator 4.8 "threatened forest species".

(NWFP) mushrooms and the recreational services. A higher degree of forest area covered was found for forest damages caused by storm.



Annex figure 2 – C. Completeness of selected reporting variables in percentage of total forest area (including and excluding The Russian Federation)

Data quality

In addition to data completeness, other factors contribute to data quality. These include consistency, compliance with terms and definitions, timeliness, comprehensibility and user satisfaction with the results and information derived from this data. On the national level, data are assessed on the basis of best practices by national statisticians.

The data reported were subject to checking and validation procedures that aimed at a high degree of data completeness and data consistency. All national data underwent plausibility tests by consistency checks[41], plausibility checks[42], or an analysis of the likely ranges[43] provided. Several variables were systematically crosschecked with Forest Resources Assessment (FRA) 2005 figures and other published sources. In cases of doubt the national correspondents were approached and

[41] for instance the sum of the area of mixed, coniferous, and broadleaf forests equals total forest area.
[42] e.g. biomass-carbon ratios, per ha values.
[43] The concept of likely ranges was introduced to specify the range within which the true value of the submitted data is located with high probability. The likely range includes fuzziness due to different error sources such as sampling errors and measurement errors or prediction errors from models.

asked for clarification. During the data validation phase, UNECE/ FAO provided helpful guidance in the consideration of improvement measures for countries.

The systems of nomenclature applied in national forest resources assessments are characterized by tradition and by national information needs and are internationally not standardized. Even identically named attributes may be based on different concepts and definitions. A major concern of the data quality assessment was therefore the comparability of data among nations and the reliability of aggregated results. Definitions used were based on the nomenclature initially developed for the TBFRA 2000 which was further developed for the MCPFE 2003 report, the FRA 2005 report and for the current Enquiry. Guidance was provided for national correspondents to adjust national data to the common terms and definitions. Where adjustments of national date were made the applied procedures were documented in the Enquiry. Given the experiences from former UNECE/ FAO forest resources assessments the data submitted satisfy the demands for comparability and coherence for most indicators. To increase the reliability of information provided countries had the opportunity to provide comments to the data submitted. However, for some indicators, e.g. those on protective functions, problems with the comparability between countries occurred.

MCPFE qualitative indicators

Data completeness

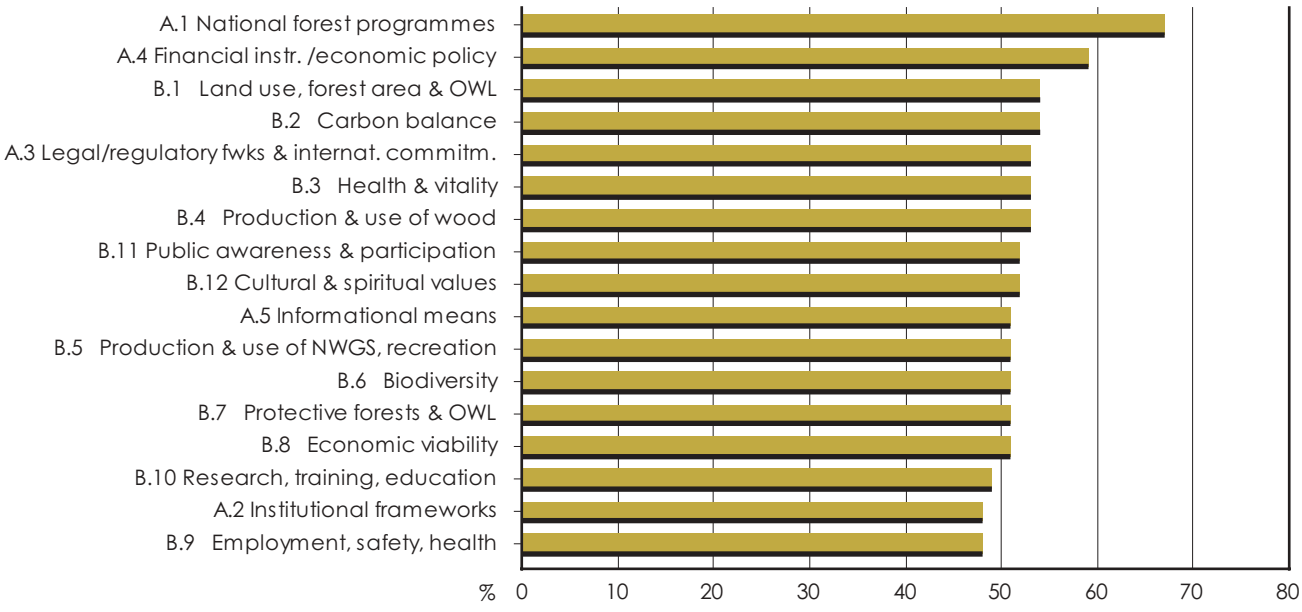
The report on policies, institutions and instruments is based on a total of 30 out of 45 reports (see Annex). These 30 countries, represent more than 95% of forest area of the MCPFE region (79 percent if the Russian Federation is excluded). Reports were submitted in time by almost all countries with larger forest areas with the exception of the Western Balkan countries, Turkey and the Iberian Peninsula countries Spain and Portugal. There is thus an information gap for these regions. All other regions are comparatively well covered.

Countries that submitted reports usually responded to both relevant parts (Part A on overall policies, institutions and instruments and Part B on policies, institutions and instruments per policy area) and most indicators in these two parts of the Enquiry. Most countries also responded to all or the large majority of aspects requested in the individual sections. Annex table 2 – C shows detailed response rates per question in the different qualitative indicators and per region. Overall, total response rate of countries to all items on which responses were requested was slightly higher than 50 percent, with very high response rates in Central Europe and Nordic and Baltic countries, and very low response rates in South West and South East Europe. This also reflects the diversity of institutional capacities across Europe.

Annex table 2 – C and Annex figure 2 – D show the comparatively homogeneous response rate per indicator in the MCPFE. Highest response rates can be found on national forest programmes and financial instruments. Data comprehensiveness is slightly lower for institutional frameworks (which included a range of sub-items), policies on employment as well as research training and education. Data comprehensiveness in terms of the amount of data submitted for individual requests was technically restricted to a maximum of 100 words per question This maximum limit was rarely used by respondents. While the length of responses varied considerably from question to question as well as per country, typical responses were often around a few sentences e.g. on main objectives. Overall, countries submitted more information on Part A indicators than on Part B indicators. There are data gaps in the information reported specifically on “main changes since 2003”.

Annex table 2 – C. Data completeness for MCPFE qualitative indicators, per indicator and region, in % of average response per indicator

			Central Europe (8)	East Europe (4)	Nordic/ Baltic Countries (8)	North West Europe (7)	South East Europe (12)	South West Europe* (6)	MCPFE (45)
			%	%	%	%	%	%	%
A. Overall policies, institutions and instruments for sustainable forest management	A.1	National forest programmes or similar	100	75	100	86	33	17	67
	A.2	Institutional frameworks	81	23	88	61	25	17	48
	A.3	Legal/regulatory frameworks and international commitments	96	38	92	58	25	17	53
	A.4	Financial instruments/ economic policy	88	25	75	67	25	17	59
	A.5	Informational means	75	75	100	71	17	17	51
B. Policies, institutions and instruments by policy area	B.1	Land use and forest area and other wooded land (C1)	91	38	88	63	25	8	54
	B.2	Carbon balance (C1)	94	38	78	69	25	8	54
	B.3	Health and vitality (C2)	91	38	75	72	25	8	53
	B.4	Production and use of wood (C3)	91	38	78	69	25	8	53
	B.5	Production and use of NWGS 1/, provision of especially recreation (C3)	91	38	88	59	25	8	51
	B.6	Biodiversity (C4)	89	38	93	53	25	2	51
	B.7	Protective forests and other wooded land (C5)	91	56	78	56	25	8	51
	B.8	Economic viability (C6)	91	53	75	56	25	8	51
	B.9	Employment (incl. safety and health) (C6)	89	51	78	44	25	8	48
	B.10	Research, training and education (C6)	91	49	63	59	25	8	49
	B.11	Public awareness and participation (C6)	91	51	72	42	25	8	52
	B.12	Cultural and spiritual values (C6)	91	56	78	59	25	2	52
Average			90	46	82	61	25	10	53



Annex figure 2 – D. Data completeness for individual MCPFE qualitative indicators in the MCPFE region (% of average responses for different qualitative indicators)

Data quality

The situation regarding data quality shows a mixed picture. Evidently, a rich and usually specific amount of information was submitted by countries. The tabular form of request combined with largely open response formats to the (predetermined) MCPFE qualitative indicator items allowed flexibility to report across a large diversity of country situations. The result of this new format is a greater diversity of responses. Many questions were specifically focused on main issues and changes since 2003. However, to a varying degree across questions, some countries have reported on general policies, rather than on specific policies and measures. With regard to specific data requests, e.g. on budgets or staff numbers, the guidance provided was not sufficiently detailed to allow more than indicative judgement. Overall, however, the quality of responses is satisfactory.

Annex 3. MCPFE Member Countries[44]

1	Albania
2	Andorra
3	Austria
4	Belarus
5	Belgium
6	Bosnia and Herzegovina
7	Bulgaria
8	Croatia
9	Cyprus
10	Czech Republic
11	Denmark
12	Estonia
13	Finland
14	France
15	Georgia
16	Germany
17	Greece
18	Holy See
19	Hungary
20	Iceland
21	Ireland
22	Italy
23	Latvia
24	Liechtenstein
25	Lithuania
26	Luxembourg
27	Malta
28	Monaco
29	Montenegro
30	Netherlands
31	Norway
32	Poland
33	Portugal
34	Republic of Moldova
35	Romania
36	Russian Federation
37	Serbia
38	Slovakia
39	Slovenia
40	Spain
41	Sweden
42	Switzerland
43	The former Yugoslav Republic of Macedonia
44	Turkey
45	Ukraine
46	United Kingdom

European Community

[44] In addition to the 46 European countries and the European Community, 13 non-European countries and 28 international organisations participate as observers in the MCPFE.

Annex 4. MCPFE Country Groups

Country group	Countries
Central Europe	Austria
	Czech Republic
	Hungary
	Liechtenstein
	Poland
	Slovakia
	Slovenia
	Switzerland
East Europe	Belarus
	Georgia
	Russian Federation
	Ukraine
Nordic/Baltic	Denmark
	Estonia
	Finland
	Iceland
	Latvia
	Lithuania
	Norway
	Sweden
North West Europe	Belgium
	France
	Germany
	Ireland

Country group	Countries
North West Europe	Luxembourg
	Netherlands
	United Kingdom
South East Europe	Albania
	Bosnia and Herzegovina
	Bulgaria
	Croatia
	Cyprus
	Greece
	Montenegro
	Republic of Moldova
	Romania
	Serbia
	The former Yugoslav Republic of Macedonia
	Turkey
South West Europe	Andorra
	Holy See
	Italy
	Malta
	Monaco
	Portugal
	Spain

Annex 5. MCPFE Quantitative and Qualitative Indicators

MCPFE quantitative indicators for SFM

Criteria	No.	Indicator	Full text
C 1: Maintenance and Appropriate Enhancement of 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 forest type and by availability for wood supply
	1.4	Carbon stock	Carbon stock of woody biomass and of soils on forest and other wooded land
C 2: Maintenance of Forest Ecosystem Health and Vitality	2.1	Deposition of air pollutants	Deposition of air pollutants on forest and other wooded land, classified by N, S and base cations
	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 "moderate", "severe" and "dead"
	2.4	Forest damage	Forest and other wooded land with damage, classified by primary damaging agent (abiotic, biotic and human induced) and by forest type
C 3: Maintenance and Encouragement of Productive Functions of Forests (Wood and Non-Wood)	3.1	Increment and fellings	Balance between net annual increment and annual fellings of wood on forest available for wood supply
	3.2	Roundwood	Value and quantity of marketed roundwood
	3.3	Non-wood goods	Value and quantity of marketed non-wood goods from forest and other wooded land
	3.4	Services	Value of marketed services on forest and other wooded land
	3.5	Forests under management plans	Proportion of forest and other wooded land under a management plan or equivalent
C 4: Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems	4.1	Tree species composition	Area of forest and other wooded land, classified by number of tree species occurring and by forest type
	4.2	Regeneration	Area of regeneration within even-aged stands and uneven-aged stands, classified by regeneration type
	4.3	Naturalness	Area of forest and other wooded land, classified by "undisturbed by man", by "semi-natural" or by "plantations", each by forest type
	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 classified by forest type
	4.6	Genetic resources	Area managed for conservation and utilisation of forest tree genetic resources (*in situ* and *ex situ* gene conservation) and area managed for seed production
	4.7	Landscape pattern	Landscape-level spatial pattern of forest cover
	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 Assessment Guidelines
C 5: Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (notably soil and water)	5.1	Protective forests – soil, water and other ecosystem functions	Area of forest and other wooded land designated to prevent soil erosion, to preserve water resources, or to maintain other forest ecosystem functions, part of MCPFE Class "Protective Functions"
	5.2	Protective forests – infrastructure and managed natural resources	Area of forest and other wooded land designated to protect infrastructure and managed natural resources against natural hazards, part of MCPFE Class "Protective Functions"

Criteria	No.	Indicator	Full text
C 6: Maintenance of other socio-economic 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	Expenditures for services	Total expenditures for long-term sustainable services from forests
	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	Energy from wood resources	Share of wood energy in total energy consumption, classified by origin of wood
	6.10	Accessibility for recreation	Area of forest and other wooded land where public has a right of access for recreational purposes and indication of intensity of use
	6.11	Cultural and spiritual values	Number of sites within forest and other wooded land designated as having cultural or spiritual values

MCPFE qualitative indicators for SFM

A. Overall policies, institutions and instruments for sustainable forest management

- A.1 National forest programmes or similar
- A.2 Institutional frameworks
- A.3 Legal/regulatory frameworks and international commitments
- A.4 Financial instruments/economic policy
- A.5 Informational means

B. Policies, institutions and instruments by policy area

Ind. No.	Crit.	Policy area	Main objectives	Relevant institutions	Main policy instruments used			Signific. changes since last Ministerial Conference
					Legal/ regulatory	Financial/ economic	Informational	
B.1	C1	Land use and forest area and OWL *						
B.2	C1	Carbon balance						
B.3	C2	Health and vitality						
B.4	C3	Production and use of wood						
B.5	C3	Production and use of non-wood goods and services, provision of especially recreation						
B.6	C4	Biodiversity						
B.7	C5	Protective forests and OWL						
B.8	C6	Economic viability						
B.9	C6	Employment (incl. safety and health)						
B.10	C6	Public awareness and participation						
B.11	C6	Research, training and education						
B.12	C6	Cultural and spiritual values						

Annex 6. National correspondents who supplied data on quantitative indicators of SFM[45]

Albania

National Correspondent:

Spiro KARADUMI

Other professionals involved in the reporting process:

Nehat DRAGOTI, Nehat ÇOLLAKU, Filip ZADRIMA, Safet DULE, Gjon FIERZA, Genci HOXHA, Alma SARAÇI

Austria

National Correspondent:

Johannes HANGLER

Other professionals involved in the reporting process:

Richard BÜCHSENMEISTER, Johannes PREM, Wolfgang BITTERMANN

Belarus

National Correspondent:

Valiantsin L. KRASOVSKI

Other professionals involved in the reporting process:

Mikhail ABRAMOVICH, Genrikh DMUHOVSKIY

Belgium

National Correspondent:

Christian LAURENT

Other professionals involved in the reporting process:

Hugues LECOMTE, Carl DE SCHEPPER, Stéphane VANWIJNSBERGHE, Etienne BRANQUART, Kris Vandekerkhove GERAARDSBERGEN

Bulgaria

National Correspondent:

Dolores BELORECHKA

Other professionals involved in the reporting process:

Georgy TINCHEV, Elena VELICHKOVA, Tanya ANDREEVA

Cyprus

National Correspondent:

Antonis HORATTAS

Other professionals involved in the reporting process:

Antonis SARRIS, Loizos LOISOU, Andreas CHRISTOU

[45] Countries which did not supply information are not included in this list. National representatives were asked to comment on data sets estimated by the secretariat.

Czech Republic

National Correspondent:

Karel VANCURA

Other professionals involved in the reporting process:

Vladimir HENZLIK, Josef KAHUDA

Denmark

National Correspondent:

Vivian Kvist JOHANNSEN

Other professionals involved in the reporting process:

Thomas NORD-LARSEN

Estonia

National Correspondent:

Mati VALGEPEA

Other professionals involved in the reporting process:

Veiko ADERMANN, Enn PÄRT

Finland

National Correspondent:

Erkki TOMPPO

Other professionals involved in the reporting process:

Tarja TUOMAINEN, Antti IHALAINEN, Yrjö SEVOLA, Kari KORHONEN

France

National Correspondent:

Alain CHAUDRON

Other professionals involved in the reporting process:

Claude VIDAL, Nabila HAMZA, Michel-Paul MOREL

Georgia

National Correspondent:

Paata TORCHINAVA

Germany

National Correspondent:

Friedrich SCHMITZ

Other professionals involved in the reporting process:

Michael KÖHL, Aljoscha REQUARDT, Thomas SCHNEIDER, Matthias DIETER, Heino POLLEY

Hungary

National Correspondent:

Péter KOTTEK

Other professionals involved in the reporting process:

György CZIBULA, Attila János TÓTH, Róbert LEHOCZKI, Éva RICHTER

Iceland

National Correspondent:

Arnor SNORRASON

Other professionals involved in the reporting process:

Þröstur EYSTEINSSON

Italy

National Correspondent:

Angelo MARIANO

Other professionals involved in the reporting process:

Piermaria CORONA, Patrizia GASPARINI, Antonio MACRI'

Latvia

National Correspondent:

Normunds STRUVE

Other professionals involved in the reporting process:

Lelda PAMOVSKA, Baiba ROTBERGA, Aija BUDREIKO

Lithuania

National Correspondent:

Andrius KULIESIS

Other professionals involved in the reporting process:

Andrius BUTKUS, Darius VIZLENSKAS

Luxembourg

National Correspondent:

Frank WOLTER

Other professionals involved in the reporting process:

Marc WAGNER

Monaco

National Correspondent:

Christophe CROVETTO

Other professionals involved in the reporting process:

Patrick Van KLAVEREN

Montenegro

National Correspondent:
Ranko KANKARAS

Netherlands

National Correspondent:
Jacob Martin PAASMAN

Other professionals involved in the reporting process:
Jan F. OLDENBURGER

Norway

National Correspondent:
Stein Michael TOMTER

Other professionals involved in the reporting process:
Trond Amund STEINSET

Poland

National Correspondent:
Roman MICHALAK

Other professionals involved in the reporting process:
Marek JABLONSKI, Waldemar WOJTASZEK

Romania

Data on quantitative indicators for SFM in reply to the Enquiry were provided by the Ministry of Agriculture, Forests and Rural Development, the Forest Research and Management Institute, and the National Institute of Statistics

Russian Federation

National Correspondent:
Andrey N. FILIPCHUK

Other professionals involved in the reporting process:
Boris MOISEEV, Vladimir KOROTKOV

Serbia

National Correspondent:
Predrag JOVIĆ

Slovakia

National Correspondent:
Martin MORAVCIK

Other professionals involved in the reporting process:
Roman LONGAUER, Julian MECKO, Milan ORAVEC, Zuzana SARVASOVA, Roman SVITOK, Jozef TUTKA

Slovenia

National Correspondent:

Milan HOCEVAR

Other professionals involved in the reporting process:

Matijasic DRAGAN, Jost JAKSA, Rok PISEK, Mirko MEDVED, Mitja PISKUR, Miran CAS, Lado KUTNAR, Nikica OGRIS, Anze JAPELJ

Sweden

National Correspondent:

Anders HILDINGSSON

Other professionals involved in the reporting process:

Hans TOET, Göran KEMPE, Tomas HALLINGBÄCK, Jan-Olof LOMAN, Surendra JOSHI, Olle HÖJER, Sandra WENNBERG

Switzerland

National Correspondent:

Sandra Edith LIMACHER

Other professionals involved in the reporting process:

Juergen BÖHL, David WALKER, Claire-Lise SUTER, Markus BOLLIGER, Bruno STADLER, Hans-Peter SCHAFFER, André WEHRLI, Richard VOLZ, Esther THUERIG

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National Correspondent:

Yücel FIRAT

Other professionals involved in the reporting process:

Gediz Metin KOCAELI

Ukraine

National Correspondent:

Volodymyr F. ROMANOVSKIY

Other professionals involved in the reporting process:

Georgiy BONDARUK, Mykola REKOVETS, Volodymyr YOSIPENKO

United Kingdom

National Correspondent:

Simon GILLAM

Annex 7. MCPFE national respondents who supplied data on qualititative indicators of SFM[46]

Austria
Ingwald GSCHWANDTL, Johannes PREM, Georg RAPPOLD, Johannes HANGLER

Belarus
Valiantsin L. KRASOVSKI

Belgium
Christian LAURENT, Carl DE SCHEPPER , Stéphane VANWIJNSBERGHE, Dominique PERRIN, Catherine DEBRUYNE

Bulgaria
Dolores BELORECHKA, Nikolai IONOV, Mariya BELOVARSKA, Neli MIHAYLOVA, Spas TODOROV, Rumyana VELINOVA, Tsenko TSENOV, Aglaya MINEVA, Lyubcho TRICHKOV, Valentin CHAMBOV, Irena STYANOVA, Magdalena STANCHEVA, Martin IVANOV, Boyan ROSNEV

Cyprus
Antonis HORATTAS, Andreas CHRISTOU, Loizos LOIZOU, Minas PAPADOPOULOS

Czech Republic
Karel VANCURA, Jan KUBIK, Vladimir HENZLIK, Jaroslav KUBISTA

Denmark
J. C. Briand PETERSEN

Estonia
Indrek LAAS, Rauno REINBERG, Kalle KAROLES

Finland
Taina VELTHEIM, Miika TEMISEVÄ

France
Alain CHAUDRON, Jacques ANDRIEU, Benjamin BEAUSSANT, Olivier BOUYER, Véronique JOUCLA, Patrick DERONZIER, Murièle MILLOT, Patricia BOSSARD, Jean-Michel GILBERT, Nicole JENSEN, Ghislaine TOUMIT, Jean-Luc FLOT, Fabien CAROULLE, Sabine ROCHEREAU, Nabila HAMZA

Germany
Matthias SCHWOERER, Thomas SCHNEIDER, Christof SCHWANITZ

Greece
Drougas PANAGIOTIS, Andreas DROUZAS, Despina PAITARIDOU, Irini NIKOLAOU

Hungary
András SZEPESI, Károly MÉSZÁROS, Ernő FÜHRER, Károly WISNOVSZKY

[46] Countries which did not supply information are not included in this list.

Iceland
Þröstur EYSTEINSSON

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Annex 8. List of Authors

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Annex 9. Output Tables

Table A1. Basic data on countries, 2005

Country	Land area	Forest & OWL		Population			GDP	
				Total	Density	Forest & OWL per capita	Per capita	Annual growth rate (2000–2005)
	1000 ha	1000 ha	% of land area	1000	Population per km²	ha	US$	%
Albania	2740	1040,2	38	3143	114,7	0,3	5064	5,98
Andorra [1]	47	16,0	34	66	140,4	0,2	33335	5,75
Austria	8245	3980,0	48	8225	99,8	0,5	33896	1,76
Belarus	20748	8935,3	43	9776	47,1	0,9	7770	7,16
Belgium	3023	698,0	23	10473	346,4	0,1	32524	1,84
Bosnia and Herzegovina	5120	2734,0	53	4324	84,5	0,6	7143	5,10
Bulgaria	10864	3678,0	34	7740	71,2	0,5	8877	5,02
Croatia	5592	2481,0	44	4443	79,5	0,6	13495	4,38
Cyprus	924	388,3	42	758	82,0	0,5	23053	3,80
Czech Republic	7726	2647,0	34	10234	132,5	0,3	20417	3,64
Denmark	4243	636,0	15	5419	127,7	0,1	34367	1,71
Estonia	4239	2358,0	56	1348	31,8	1,7	16635	8,69
Finland	30459	23311,0	77	5245	17,2	4,4	31367	2,89
France	55010	17262,0	31	62702	114,0	0,3	30104	1,91
Georgia	6949	3005,3	43	4361	62,8	0,7	3778	6,36
Germany [1]	34877	11076,0	32	82464	236,4	0,1	30253	1,04
Greece	12890	6532,0	51	11083	86,0	0,6	22691	4,43
Holy See	0	0,0	0	-	-	-	-	-
Hungary	8961	1948,0	22	10087	112,6	0,2	16994	4,42
Iceland	10025	149,2	1	296	3,0	0,5	35274	4,23
Ireland	6889	710,0	10	4146	60,2	0,2	38075	5,87
Italy	29411	11026,0	37	58530	199,0	0,2	28396	1,13
Latvia	6229	3149,7	51	2300	36,9	1,4	13054	7,89
Liechtenstein	16	7,4	46	34	212,5	0,2	101654	0,61
Lithuania	6268	2198,0	35	3414	54,5	0,6	14405	7,12
Luxembourg	259	88,2	34	456	176,1	0,2	68681	3,91
Malta	32	0,3	1	404	1262,5	0,0	19150	1,30
Monaco	0	0,0	0	33	16500,0	0,0	32984	2,75
Montenegro [2]	1358	718,0	53	622	45,8	1,2	4428	1,52
Netherlands	3388	365,0	11	16316	481,6	0,0	34359	1,61
Norway	30428	12000,0	39	4622	15,2	2,6	45512	2,18

[1] Forest & OWL include forest only
[2] Land area has been calculated based on unofficial estimates of inland water

Table A1. continued

Country	Land area	Forest & OWL		Population			GDP	
				Total	Density	Forest & OWL per capita	Per capita	Annual growth rate (2000–2005)
	1000 ha	1000 ha	% of land area	1000	Population per km²	ha	US$	%
Poland [1]	30633	9200,0	30	38161	124,6	0,2	13791	3,16
Portugal	9150	3867,0	42	10565	115,5	0,4	19707	1,19
Republic of Moldova	3287	360,0	11	3597	109,4	0,1	2416	6,17
Romania	22998	6648,7	29	21711	94,4	0,3	9566	5,15
Russian Federation	1638139	882975,2	54	143137	8,7	6,2	10801	6,77
Serbia [2] [3]	8731	1984,0	26	7498	98,1	0,3	4428	4,90
Slovakia	4810	1931,6	40	5387	112,0	0,4	15214	3,92
Slovenia	2014	1308,0	65	2001	99,4	0,7	22293	3,56
Spain	49919	28214,0	57	43398	86,9	0,7	27284	3,50
Sweden	41033	30929,0	75	9030	22,0	3,4	31691	2,68
Switzerland	4000	1286,0	32	7464	186,6	0,2	35302	1,43
The former Yugoslav Republic of Macedonia	2543	988,0	39	2037	80,1	0,5	6640	1,92
Turkey	76963	20864,0	27	73193	95,1	0,3	8371	4,82
Ukraine	57938	9616,0	17	46925	81,0	0,2	7079	7,39
United Kingdom	24193	2865,0	12	60188	248,8	0,0	32242	2,70

[1] Forest & OWL include forest only
[2] Land area has been calculated based on unofficial estimates of inland water
[3] Forest, OWL and population figures do not include Kosovo and Metohija

Notes:
data on population
a - Andorra, Liechtenstein, Monaco and Montenegro – data for year 2004

data on GDP per capita
b - Albania, Andorra, Liechtenstein, Monaco, Montenegro, Serbia and The former Yugoslav Republic of Macedonia – data for year 2004
c - Data reported for Montenegro and Serbia are for former Serbia and Montenegro
d - Regional averages do not include data for Andorra, Liechtenstein and Monaco, because of incomparability of data

data on GDP annual growth rate
e - Albania, Andorra, Liechtenstein, Monaco and Serbia – data for 2000–2004
f - Montenegro – data for 2000–2002
g - Regional averages do not include data for Andorra, Liechtenstein, Monaco, Montenegro and Serbia because of incomparability of data
h - The average of GDP annual growth rate for South East Europe and Total MCPFE was computed using 2000–2004 growth rates for Albania and former Serbia and Montenegro

Sources:
data on forest area
MCPFE/ECE/FAO quantitative indicators enquiry

data on population
for Andorra, Liechtenstein and Monaco – World bank, World Development Indicators, 2004
for other countries – UNECE, Statistical division

data on GDP per capita
for Andorra, Liechtenstein and Monaco – UNSD, 2004. Converted using exchange rates – not comparable with UNECE data
for other countries – UNECE, Statistical division

data on GDP annual growth rate
for Andorra, Liechtenstein and Monaco – UNSD, 2000–2004
for other countries – UNECE, Statistical division

Table A2. Extent of forest and other wooded land, 2005

Country	Land area					Inland water	Total area
	Forest		Other wooded land		Other land		
	1000 ha	% of land area	1000 ha	% of land area	1000 ha	1000 ha	1000 ha
Albania	782,4	28,6	257,8	9,4	1699,8	135,0	2875,0
Andorra	16,0	34,0	-	-	31,0	0,0	47,0
Austria	3862,0	46,8	118,0	1,4	4265,0	142,0	8387,0
Belarus	8436,0	40,7	499,3	2,4	11812,7	12,0	20760,0
Belgium	672,0	22,2	26,0	0,9	2325,0	30,0	3053,0
Bosnia and Herzegovina	2185,0	42,7	549,0	10,7	2386,0	1,0	5121,0
Bulgaria	3651,0	33,6	27,0	0,2	7186,0	235,0	11099,0
Croatia	2135,0	38,2	346,0	6,2	3111,0	62,0	5654,0
Cyprus	174,4	18,9	213,9	23,1	535,7	1,0	925,0
Czech Republic	2647,0	34,3	0,0	0,0	5079,0	161,0	7887,0
Denmark	500,0	11,8	136,0	3,2	3607,0	66,0	4309,0
Estonia	2264,0	53,4	94,0	2,2	1881,0	284,0	4523,0
Finland	22130,0	72,7	1181,0	3,9	7148,0	3356,0	33815,0
France	15554,0	28,3	1708,0	3,1	37748,0	140,0	55150,0
Georgia	2770,1	39,9	235,2	3,4	3943,7	21,0	6970,0
Germany	11076,0	31,8	-	-	23801,0	826,0	35703,0
Greece	3752,0	29,1	2780,0	21,6	6358,0	306,0	13196,0
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	1948,0	21,7	0,0	0,0	7013,0	342,0	9303,0
Iceland	43,1	0,4	106,1	1,1	9875,8	275,0	10300,0
Ireland	669,0	9,7	41,0	0,6	6179,0	138,0	7027,0
Italy	9979,0	33,9	1047,0	3,6	18385,0	723,0	30134,0
Latvia	3034,7	48,7	115,0	1,8	3079,3	230,0	6459,0
Liechtenstein	6,9	43,1	0,5	3,1	8,6	0,0	16,0
Lithuania	2121,0	33,8	77,0	1,2	4070,0	262,0	6530,0
Luxembourg	86,8	33,5	1,4	0,5	170,8	0,0	259,0
Malta	0,3	1,1	0,0	0,0	31,7	0,0	32,0
Monaco	0,0	0,0	0,0	0,0	0,2	0,0	0,2
Montenegro [1)]	543,0	40,0	175,0	12,9	640,4	22,8	1381,2
Netherlands	365,0	10,8	0,0	0,0	3023,0	765,0	4153,0
Norway	9387,0	30,8	2613,0	8,6	18428,0	1952,0	32380,0
Poland	9200,0	30,0	-	-	21433,0	636,0	31269,0
Portugal	3783,0	41,3	84,0	0,9	5283,0	62,0	9212,0
Republic of Moldova	329,0	10,0	31,0	0,9	2927,0	97,0	3384,0
Romania	6390,5	27,8	258,2	1,1	16349,3	841,0	23839,0
Russian Federation	808790,0	49,4	74185,2	4,5	755163,8	71685,0	1709824,0
Serbia [1) 2)]	1812,5	23,7	171,5	2,2	6747,1	105,0	8836,1
Slovakia	1931,6	40,2	0,0	0,0	2878,4	93,0	4903,0
Slovenia	1264,0	62,8	44,0	2,2	706,0	13,0	2027,0
Spain	17915,0	35,9	10299,0	20,6	21705,0	618,0	50537,0
Sweden	27871,0	67,9	3059,0	7,5	10103,0	3996,0	45029,0
Switzerland	1220,0	30,5	66,0	1,7	2714,0	128,0	4128,0
The former Yugoslav Republic of Macedonia	906,0	35,6	82,0	3,2	1555,0	28,0	2571,0
Turkey	10175,0	13,2	10689,0	13,9	56099,0	1393,0	78356,0
Ukraine	9575,0	16,5	41,0	0,1	48322,0	2417,0	60355,0
United Kingdom	2845,0	11,8	20,0	0,1	21328,0	168,0	24361,0

[1)] Inland water figures are unofficial estimates
[2)] Forest and OWL do not include Kosovo and Metohija. These regions have entirely been covered under „other land"

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A3a. Change in extent of forest, 1990–2005

Country	Forest						
	Area			Annual change rate			
	1990	2000	2005	1990–2000		2000–2005	
	1000 ha			1000 ha/yr	%	1000 ha/yr	%
Albania	788,8	769,3	782,4	-2,0	-0,25	2,6	0,34
Andorra	16,0	16,0	16,0	0,0	0, 0	0,0	0, 0
Austria	3775,0	3838,0	3862,0	6,3	0,17	4,8	0,12
Belarus	7678,7	8275,7	8436,0	59,7	0,75	32,1	0,38
Belgium	677,0	667,0	672,0	-1,0	-0,15	1,0	0,15
Bosnia and Herzegovina	2210,0	2185,0	2185,0	-2,5	-0,11	0,0	0, 0
Bulgaria	3327,0	3375,0	3651,0	4,8	0,14	55,2	1,58
Croatia	2116,0	2129,0	2135,0	1,3	0,06	1,2	0,06
Cyprus	161,1	172,8	174,4	1,2	0,70	0,3	0,18
Czech Republic	2630,0	2637,0	2647,0	0,7	0,03	2,0	0,08
Denmark	445,0	486,0	500,0	4,1	0,89	2,8	0,57
Estonia	2090,0	2243,0	2264,0	15,3	0,71	4,2	0,19
Finland	22194,0	22475,0	22130,0	28,1	0,13	-69,0	-0,31
France	14538,0	15351,0	15554,0	81,3	0,55	40,6	0,26
Georgia	2750,8	2770,0	2770,1	1,9	0,07	0,0	0, 0
Germany	10741,0	11076,0	11076,0	33,5	0,31	0,0	0, 0
Greece	3299,0	3601,0	3752,0	30,2	0,88	30,2	0,82
Holy See	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Hungary	1677,0	1866,0	1948,0	18,9	1,07	16,4	0,86
Iceland	22,1	35,8	43,1	1,4	4,94	1,5	3,78
Ireland	441,0	609,0	669,0	16,8	3,28	12,0	1,90
Italy	8383,0	9447,0	9979,0	106,4	1,20	106,4	1,10
Latvia	2822,0	2977,0	3034,7	15,5	0,54	11,5	0,38
Liechtenstein	6,5	6,9	6,9	0,0	0,60	0,0	0, 0
Lithuania	1945,0	2020,0	2121,0	7,5	0,38	20,2	0,98
Luxembourg	85,8	86,8	86,8	0,1	0,11	0,0	0, 0
Malta	0,3	0,3	0,3	0,0	0, 0	0,0	0, 0
Monaco	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Montenegro	543,0	543,0	543,0	0,0	0, 0	0,0	0, 0
Netherlands	345,0	360,0	365,0	1,5	0,43	1,0	0,28
Norway	9130,0	9301,0	9387,0	17,1	0,19	17,2	0,18
Poland	8881,0	9059,0	9200,0	17,8	0,20	28,2	0,31
Portugal	3099,0	3583,0	3783,0	48,4	1,46	40,0	1,09
Republic of Moldova	319,0	326,0	329,0	0,7	0,22	0,6	0,18
Romania	6371,0	6366,0	6390,5	-0,5	-0,01	4,9	0,08
Russian Federation	808949,9	809268,5	808790,0	31,9	0, 0	-95,7	-0,01
Serbia	1883,5	1822,0	1812,5	-6,2	-0,33	-1,9	-0,10
Slovakia	1921,7	1921,4	1931,6	-0,0	-0, 0	2,0	0,11
Slovenia	1188,0	1239,0	1264,0	5,1	0,42	5,0	0,40
Spain	13479,0	16436,0	17915,0	295,7	2, 0	295,8	1,74
Sweden	27309,0	27415,0	27871,0	10,6	0,04	91,2	0,33
Switzerland	1156,0	1199,0	1220,0	4,3	0,37	4,2	0,35
The former Yugoslav Republic of Macedonia	906,0	906,0	906,0	0,0	0, 0	0,0	0, 0
Turkey	9680,0	10052,0	10175,0	37,2	0,38	24,6	0,24
Ukraine	9274,0	9510,0	9575,0	23,6	0,25	13,0	0,14
United Kingdom	2611,0	2793,0	2845,0	18,2	0,68	10,4	0,37

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A3b. Change in extent of other wooded land, 1990–2005

Country	Other wooded land						
	Area			Annual change rate			
	1990	2000	2005	1990–2000		2000–2005	
	1000 ha			1000 ha/yr	%	1000 ha/yr	%
Albania	255,9	254,5	257,8	-0,1	-0,05	0,7	0,26
Andorra	-	-	-	-	-	-	-
Austria	118,0	117,0	118,0	-0,1	-0,09	0,2	0,17
Belarus	0,0	487,7	499,3	48,8	-	2,3	0,47
Belgium	21,0	27,0	26,0	0,6	2,54	-0,2	-0,75
Bosnia and Herzegovina	500,0	549,0	549,0	4,9	0,94	0,0	0, 0
Bulgaria	130,0	105,0	27,0	-2,5	-2,11	-15,6	-23,79
Croatia	322,0	338,0	346,0	1,6	0,49	1,6	0,47
Cyprus	-	213,9	213,9	-	-	0,0	0, 0
Czech Republic	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Denmark	136,0	136,0	136,0	0,0	0, 0	0,0	0, 0
Estonia	-	94,0	94,0	-	-	0,0	0, 0
Finland	923,0	830,0	1181,0	-9,3	-1,06	70,2	7,31
France	2087,0	1814,0	1708,0	-27,3	-1,39	-21,2	-1,20
Georgia	-	-	235,2	-	-	-	-
Germany	-	-	-	-	-	-	-
Greece	3212,0	2924,0	2780,0	-28,8	-0,94	-28,8	-1, 0
Holy See	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Hungary	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Iceland	106,1	106,1	106,1	0,0	0, 0	0,0	0, 0
Ireland	40,0	41,0	41,0	0,1	0,25	0,0	0, 0
Italy	880,0	992,0	1047,0	11,2	1,21	11,0	1,09
Latvia	112,0	120,0	115,0	0,8	0,69	-1,0	-0,85
Liechtenstein	0,5	0,5	0,5	0,0	0, 0	0,0	0, 0
Lithuania	80,0	83,0	77,0	0,3	0,37	-1,2	-1,49
Luxembourg	2,8	1,4	1,4	-0,1	-6,70	0,0	0, 0
Malta	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Monaco	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Montenegro	175,0	175,0	175,0	0,0	0, 0	0,0	0, 0
Netherlands	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Norway	2870,0	2699,0	2613,0	-17,1	-0,61	-17,2	-0,65
Poland	-	-	-	-	-	-	-
Portugal	236,0	84,0	84,0	-15,2	-9,81	0,0	0, 0
Republic of Moldova	31,0	31,0	31,0	0,0	0, 0	0,0	0, 0
Romania	314,4	234,2	258,2	-8,0	-2,90	4,8	1,97
Russian Federation	75143,7	72705,7	74185,2	-243,8	-0,33	295,9	0,40
Serbia	143,5	162,0	171,5	1,9	1,22	1,9	1,15
Slovakia	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Slovenia	44,0	44,0	44,0	0,0	0, 0	0,0	0, 0
Spain	12447,0	11016,0	10299,0	-143,1	-1,21	-143,4	-1,34
Sweden	3217,0	3238,0	3059,0	2,1	0,07	-35,8	-1,13
Switzerland	59,0	64,0	66,0	0,5	0,82	0,4	0,62
The former Yugoslav Republic of Macedonia	82,0	82,0	82,0	0,0	0, 0	0,0	0, 0
Turkey	10905,0	10728,0	10689,0	-17,7	-0,16	-7,8	-0,07
Ukraine	28,0	41,0	41,0	1,3	3,89	0,0	0, 0
United Kingdom	20,0	20,0	20,0	0,0	0, 0	0,0	0, 0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A4a. Forest and other wooded land by forest type, 2005

Country	Forest				Other wooded land			
	Total area	Pred. coniferous	Pred. broadleaved	Mixed	Total area	Pred. coniferous	Pred. broadleaved	Mixed
	1000 ha							
Albania	782,4	143,9	588,8	49,7	257,8	0,0	257,8	0,0
Andorra	16,0	-	-	-	-	-	-	-
Austria [1]	3862,0	1987,0	514,0	853,0	118,0	-	-	-
Belarus	8436,0	4083,9	3622,4	729,7	499,3	241,7	214,4	43,2
Belgium	672,0	296,0	342,0	34,0	26,0	0,0	26,0	0,0
Bosnia and Herzegovina	2185,0	-	-	-	549,0	-	-	-
Bulgaria	3651,0	1124,0	2527,0	0,0	27,0	23,0	4,0	0,0
Croatia	2135,0	202,8	1740,0	192,2	346,0	0,0	346,0	0,0
Cyprus	174,4	173,4	1,0	0,0	213,9	-	-	-
Czech Republic	2647,0	1879,0	392,0	376,0	0,0	0,0	0,0	0,0
Denmark	500,0	314,0	186,0	0,0	136,0	-	-	-
Estonia	2264,0	823,0	866,0	575,0	94,0	15,0	56,0	23,0
Finland	22130,0	17554,0	1497,0	3079,0	1181,0	959,0	115,0	107,0
France	15554,0	4129,0	9945,0	1480,0	1708,0	342,0	1195,0	171,0
Georgia	2770,1	-	-	-	235,2	-	-	-
Germany	11076,0	6530,0	4546,0	0,0	-	-	-	-
Greece	3752,0	1594,6	2157,4	0,0	2780,0	0,0	2780,0	0,0
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	1948,0	185,0	1635,0	128,0	0,0	0,0	0,0	0,0
Iceland	43,1	-	-	-	106,1	0,0	106,1	0,0
Ireland	669,0	561,3	96,3	11,4	41,0	-	-	-
Italy	9979,0	1459,8	7473,4	1045,8	1047,0	75,9	877,5	93,5
Latvia	3034,7	1389,6	1193,3	451,8	115,0	0,0	115,0	0,0
Liechtenstein	6,9	3,0	2,1	1,8	0,5	0,2	0,2	0,1
Lithuania	2121,0	939,0	809,0	373,0	77,0	-	-	-
Luxembourg	86,8	27,0	59,8	0,0	1,4	-	-	-
Malta	0,3	0,0	0,0	0,3	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	543,0	75,0	374,0	94,0	175,0	-	-	-
Netherlands	365,0	112,0	76,0	177,0	0,0	0,0	0,0	0,0
Norway	9387,0	4900,0	2420,0	2067,0	2613,0	472,0	2077,0	64,0
Poland [2]	9200,0	6009,0	1697,0	1353,0	-	-	-	-
Portugal [2]	3783,0	949,0	2168,0	466,0	84,0	-	-	-
Republic of Moldova	329,0	3,6	325,4	0,0	31,0	0,0	31,0	0,0
Romania [3]	6390,5	1909,0	4462,0	0,0	258,2	0,0	84,0	0,0
Russian Federation	808790,0	404395,0	177933,8	226461,2	74185,2	38472,0	35713,2	0,0
Serbia	1812,5	182,0	1064,5	566,0	171,5	0,0	171,5	0,0
Slovakia	1931,6	600,0	957,5	374,1	0,0	0,0	0,0	0,0
Slovenia	1264,0	277,0	480,0	507,0	44,0	-	-	-
Spain [3]	17915,0	5866,0	5112,0	2501,0	10299,0	3735,0	7467,0	1245,0
Sweden	27871,0	21378,0	1814,0	4678,0	3059,0	1797,0	386,0	876,0
Switzerland [1]	1220,0	502,0	235,0	448,0	66,0	-	-	-
The former Yugoslav Republic of Macedonia	906,0	-	-	-	82,0	-	-	-
Turkey	10175,0	6697,0	3478,0	0,0	10689,0	4660,0	6029,0	0,0
Ukraine	9575,0	3546,0	4980,0	1049,0	41,0	8,0	29,0	4,0
United Kingdom	2845,0	1555,0	1080,0	210,0	20,0	0,0	20,0	0,0

[1] Distribution by forest types is for FAWS
[2] Distribution by forest types is for year 2000
[3] Distribution by forest types is for year 1990

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A4b. Comparative data on forest and other wooded land by forest type, 2005

Country	Forest				Other wooded land			
	Total area	Pred. coniferous	Pred. broadleaved	Mixed	Total area	Pred. coniferous	Pred. broadleaved	Mixed
	1000 ha	%			1000 ha	%		
Albania	782,4	18,4	75,2	6,4	257,8	0,0	100,0	0,0
Andorra	16,0	-	-	-	-	-	-	-
Austria [1]	3862,0	59,3	15,3	25,4	118,0	-	-	-
Belarus	8436,0	48,4	42,9	8,6	499,3	48,4	42,9	8,7
Belgium	672,0	44,0	50,9	5,1	26,0	0,0	100,0	0,0
Bosnia and Herzegovina	2185,0	-	-	-	549,0	-	-	-
Bulgaria	3651,0	30,8	69,2	0,0	27,0	85,2	14,8	0,0
Croatia	2135,0	9,5	81,5	9,0	346,0	0,0	100,0	0,0
Cyprus	174,4	99,4	0,6	0,0	213,9	-	-	-
Czech Republic	2647,0	71,0	14,8	14,2	0,0	0,0	0,0	0,0
Denmark	500,0	62,8	37,2	0,0	136,0	-	-	-
Estonia	2264,0	36,4	38,3	25,4	94,0	16,0	59,6	24,5
Finland	22130,0	79,3	6,8	13,9	1181,0	81,2	9,7	9,1
France	15554,0	26,5	63,9	9,5	1708,0	20,0	70,0	10,0
Georgia	2770,1	-	-	-	235,2	-	-	-
Germany	11076,0	59,0	41,0	0,0	-	-	-	-
Greece	3752,0	42,5	57,5	0,0	2780,0	0,0	100,0	0,0
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	1948,0	9,5	83,9	6,6	0,0	0,0	0,0	0,0
Iceland	43,1	-	-	-	106,1	0,0	100,0	0,0
Ireland	669,0	83,9	14,4	1,7	41,0	-	-	-
Italy	9979,0	14,6	74,9	10,5	1047,0	7,3	83,8	8,9
Latvia	3034,7	45,8	39,3	14,9	115,0	0,0	100,0	0,0
Liechtenstein	6,9	43,5	30,4	26,1	0,5	40,0	40,0	20,0
Lithuania	2121,0	44,3	38,1	17,6	77,0	-	-	-
Luxembourg	86,8	31,1	68,9	0,0	1,4	-	-	-
Malta	0,3	0,0	0,0	100,0	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	543,0	13,8	68,9	17,3	175,0	-	-	-
Netherlands	365,0	30,7	20,8	48,5	0,0	0,0	0,0	0,0
Norway	9387,0	52,2	25,8	22,0	2613,0	18,1	79,5	2,4
Poland [2]	9200,0	66,3	18,7	15,0	-	-	-	-
Portugal [2]	3783,0	26,5	60,5	13,0	84,0	-	-	-
Republic of Moldova	329,0	1,1	98,9	0,0	31,0	0,0	100,0	0,0
Romania [3]	6390,5	30,0	70,0	0,0	258,2	0,0	100,0	0,0
Russian Federation	808790,0	50,0	22,0	28,0	74185,2	51,9	48,1	0,0
Serbia	1812,5	10,0	58,7	31,2	171,5	0,0	100,0	0,0
Slovakia	1931,6	31,1	49,6	19,4	0,0	0,0	0,0	0,0
Slovenia	1264,0	21,9	38,0	40,1	44,0	-	-	-
Spain [3]	17915,0	43,5	37,9	18,6	10299,0	30,0	60,0	10,0
Sweden	27871,0	76,7	6,5	16,8	3059,0	58,7	12,6	28,6
Switzerland [1]	1220,0	42,4	19,8	37,8	66,0	-	-	-
The former Yugoslav Republic of Macedonia	906,0	-	-	-	82,0	-	-	-
Turkey	10175,0	65,8	34,2	0,0	10689,0	43,6	56,4	0,0
Ukraine	9575,0	37,0	52,0	11,0	41,0	19,5	70,7	9,8
United Kingdom	2845,0	54,7	38,0	7,4	20,0	0,0	100,0	0,0

[1] Distribution by forest types is for FAWS
[2] Distribution by forest types is for year 2000
[3] Distribution by forest types is for year 1990

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A5. Forest available for wood supply by forest types, 1990–2005

Country	Forest available for wood supply											
	Total			Predominantly coniferous			Predominantly broadleaved			Mixed		
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
	1000 ha											
Albania	685,0	620,0	611,3	136,3	120,9	119,3	511,5	468,2	457,4	37,2	30,9	34,6
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	3310,0	3341,0	3354,0	2133,0	2043,0	1987,0	444,0	493,0	514,0	733,0	805,0	853,0
Belarus	5924,7	6350,3	6376,3	2731,3	2928,8	3087,2	2707,6	2898,2	2737,7	485,8	523,3	551,4
Belgium	673,0	663,0	667,0	350,0	283,0	296,0	303,0	335,0	338,0	20,0	45,0	33,0
Bosnia and Herzegovina	1266,3	1252,0	1252,0	-	-	-	-	-	-	-	-	-
Bulgaria	2365,0	2258,0	2561,0	847,0	734,0	753,0	1518,0	1524,0	1808,0	0,0	0,0	0,0
Croatia	2014,4	2026,8	2032,5	177,6	178,7	179,2	1667,6	1677,8	1682,5	169,3	170,3	170,8
Cyprus	43,2	43,2	43,2	43,2	43,2	43,2	0,0	0,0	0,0	0,0	0,0	0,0
Czech Republic	2575,0	2561,0	2518,0	-	-	1802,0	-	-	360,0	-	-	356,0
Denmark	344,0	371,0	385,0	-	-	-	-	-	-	-	-	-
Estonia	1737,0	2103,0	2090,0	-	734,0	734,0	-	823,0	820,0	-	546,0	536,0
Finland	21838,0	20508,0	20004,0	17594,0	16492,0	15975,0	1443,0	1307,0	1197,0	2801,0	2709,0	2832,0
France	13911,0	14645,0	14743,0	3803,0	3963,0	3910,0	8895,0	9352,0	9432,0	1213,0	1330,0	1401,0
Georgia	-	-	2344,0	-	-	-	-	-	-	-	-	-
Germany	-	10984,0	-	-	-	-	-	-	-	-	-	-
Greece	3038,4	3316,5	3455,6	1291,3	1409,5	1468,6	1747,1	1907,0	1987,0	0,0	0,0	0,0
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	1531,0	1622,0	1684,0	184,0	184,0	170,0	1177,0	1288,0	1403,0	170,0	150,0	111,0
Iceland	20,5	34,2	41,5	-	-	-	-	-	-	-	-	-
Ireland	432,6	597,4	656,3	367,0	506,8	556,7	58,2	80,3	88,3	7,5	10,3	11,3
Italy	7494,7	8445,9	8921,5	1026,7	1157,1	1222,2	5695,9	6418,9	6780,4	772,0	870,0	918,9
Latvia	-	2777,2	2843,7	-	1300,7	1299,6	-	1028,0	1120,4	-	448,5	423,7
Liechtenstein	3,6	4,0	4,0	1,7	1,6	1,6	0,9	0,9	0,9	1,0	1,5	1,5
Lithuania	1695,0	1756,0	1835,0	-	778,0	791,0	-	649,0	710,0	-	329,0	334,0
Luxembourg	85,8	86,8	86,1	-	-	-	-	-	-	-	-	-
Malta	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	281,0	290,0	295,0	110,0	113,0	113,0	63,0	64,0	64,0	108,0	113,0	118,0
Norway	6559,0	6519,0	6499,0	4059,0	3786,0	3650,0	1284,0	1289,0	1291,0	1216,0	1444,0	1558,0
Poland	8323,0	8342,0	8417,0	-	5572,0	-	-	1530,0	-	-	1240,0	-
Portugal	-	2009,0	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	205,3	213,0	216,2	2,3	2,3	2,4	203,0	210,6	213,8	0,0	0,0	0,0
Romania	5617,0	4627,5	-	1702,0	-	-	3915,0	-	-	0,0	-	-
Russian Federation	388452,5	331461,0	329788,9	178473,9	144156,5	141129,9	96550,5	94495,4	96318,1	113428,1	92809,1	92340,9
Serbia	1576,0	1539,0	1534,0	149,5	145,5	144,5	986,5	962,5	959,0	440,0	431,0	430,5
Slovakia	1771,7	1767,1	1751,2	565,2	552,2	515,6	855,3	873,8	893,7	351,2	341,1	341,9
Slovenia	1133,0	1130,0	1155,0	326,0	276,0	259,0	359,0	402,0	432,0	448,0	452,0	464,0
Spain	10479,0	-	-	4452,0	-	-	4366,0	-	-	1661,0	-	-
Sweden	21222,0	21076,0	21235,0	17735,0	16922,0	16952,0	786,0	997,0	1023,0	2701,0	3157,0	3260,0
Switzerland	1123,0	1165,0	1186,0	529,0	511,0	502,0	217,0	229,0	235,0	376,0	424,0	448,0
The former Yugoslav Republic of Macedonia	745,0	745,0	745,0	-	-	-	-	-	-	-	-	-
Turkey	8659,0	8648,0	8665,0	5415,0	5566,0	5589,0	3244,0	3082,0	3076,0	0,0	0,0	0,0
Ukraine	6392,0	5799,0	5307,0	2602,0	2386,0	2195,0	2969,0	2714,0	2493,0	821,0	699,0	619,0
United Kingdom	2141,0	2323,0	2375,0	1486,0	1522,0	1515,0	555,0	681,0	730,0	100,0	120,0	130,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A6a. Growing stock (volume) on forest and other wooded land by forest type, 2005

Country	Growing stock							
	Forest				Other wooded land			
	Total	Pred. coniferous	Pred. broad-leaved	Mixed	Total	Pred. coniferous	Pred. broad-leaved	Mixed
	1000 m^3							
Albania	74437,1	13623,8	51257,9	9555,4	7852,0	0,0	7852,0	0,0
Andorra	-	-	-	-	-	-	-	-
Austria	1158618,0	-	-	-	0,0	0,0	0,0	0,0
Belarus	1434800,0	645700,0	572500,0	216600,0	22500,0	10900,0	9700,0	1900,0
Belgium	145514,0	71648,0	66419,0	7447,0	0,0	0,0	0,0	0,0
Bosnia and Herzegovina	391000,0	-	-	-	-	-	-	-
Bulgaria	590781,0	258572,0	332209,0	0,0	0,0	0,0	0,0	0,0
Croatia	352000,0	33440,0	286880,0	31680,0	-	-	-	-
Cyprus	8003,0	7803,0	200,0	0,0	-	-	-	-
Czech Republic	734997,0	563516,0	85565,0	85916,0	0,0	0,0	0,0	0,0
Denmark	76456,0	47003,0	29453,0	0,0	-	-	-	-
Estonia	454461,0	180918,0	150414,0	123129,0	4884,0	739,0	2906,0	1239,0
Finland	2163442,0	1741241,0	112243,0	309958,0	11535,0	9801,0	846,0	888,0
France	2464762,0	797183,0	1425971,0	241608,0	-	-	-	-
Georgia	478000,0	-	-	-	1000,0	-	-	-
Germany	-	-	-	-	-	-	-	-
Greece	177000,0	75225,0	101775,0	0,0	-	0,0	-	0,0
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	341351,0	36672,0	280709,0	23970,0	0,0	0,0	0,0	0,0
Iceland	2739,0	-	-	-	1215,0	0,0	1215,0	0,0
Ireland	65400,0	54870,6	9417,6	1111,8	-	-	-	-
Italy	1447200,0	211725,4	1083808,1	151666,6	96800,0	7018,0	81128,1	8653,9
Latvia	568996,0	274958,0	207764,0	86274,0	1610,0	0,0	1610,0	0,0
Liechtenstein	1840,0	-	-	-	-	-	-	-
Lithuania	401114,0	202257,0	129895,0	68962,0	2400,0	-	-	-
Luxembourg	25950,0	-	-	0,0	-	-	-	-
Malta	0,1	0,0	0,0	0,1	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-
Netherlands	64769,0	-	-	-	0,0	0,0	0,0	0,0
Norway	861725,0	584903,0	119721,0	157101,0	33296,0	3914,0	28845,0	537,0
Poland	1897622,0	-	-	-	-	-	-	-
Portugal	350000,0	-	-	-	16000,0	-	-	-
Republic of Moldova	46508,0	270,9	46237,1	0,0	1600,0	0,0	1600,0	0,0
Romania	1347300,0	-	-	-	-	-	-	-
Russian Federation	80479050,0	40239525,0	17705391,0	22534134,0	1651050,0	856225,0	794825,0	0,0
Serbia	237202,0	22134,5	146236,5	68831,0	4073,0	0,0	4073,0	0,0
Slovakia	494689,0	178912,0	238481,0	77296,0	0,0	0,0	0,0	0,0
Slovenia	357210,0	93439,0	114817,0	148954,0	2650,0	-	-	-
Spain	888000,0	-	-	-	920,0	-	-	-
Sweden	3104632,0	2471667,0	168124,0	464840,0	36544,0	24342,0	3252,0	8950,0
Switzerland	-	-	-	-	-	-	-	-
The former Yugoslav Republic of Macedonia	63420,0	-	-	-	-	-	-	-
Turkey	1400437,0	937759,0	462678,0	0,0	-	-	-	-
Ukraine	2119000,0	965000,0	947000,0	207000,0	1000,0	195,0	707,0	98,0
United Kingdom	340000,0	231000,0	85000,0	24000,0	1000,0	0,0	1000,0	0,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A6b. Growing stock (volume per hectare) on forest and other wooded land by forest type, 2005

Country	Growing stock							
	Forest				Other wooded land			
	Total	Pred. coniferous	Pred. broadleaved	Mixed	Total	Pred. coniferous	Pred. broadleaved	Mixed
	m^3/ha							
Albania	95,14	94,65	87,06	192,22	30,46	0, 0	30,46	0, 0
Andorra	-	-	-	-	-	-	-	-
Austria	300, 0	-	-	-	0, 0	0, 0	0, 0	0, 0
Belarus	170,08	158,11	158,04	296,83	45,06	45,10	45,24	43,98
Belgium	216,54	242,05	194,21	219,03	0, 0	0, 0	0, 0	0, 0
Bosnia and Herzegovina	178,95	-	-	-	-	-	-	-
Bulgaria	161,81	230,05	131,46	0, 0	0, 0	0, 0	0, 0	0, 0
Croatia	164,87	164,87	164,87	164,87	-	-	-	-
Cyprus	45,89	45, 0	200, 0	0, 0	-	-	-	-
Czech Republic	277,67	299,90	218,28	228,50	0, 0	0, 0	0, 0	0, 0
Denmark	152,91	149,69	158,35	-	-	-	-	-
Estonia	200,73	219,83	173,69	214,14	51,96	49,27	51,89	53,87
Finland	97,76	99,19	74,98	100,67	9,77	10,22	7,36	8,30
France	158,46	193,07	143,39	163,25	-	-	-	-
Georgia	172,56	-	-	-	4,25	-	-	-
Germany	-	-	-	-	-	-	-	-
Greece	47,17	47,17	47,17	0, 0	-	-	-	-
Holy See	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
Hungary	175,23	198,23	171,69	187,27	0, 0	0, 0	0, 0	0, 0
Iceland	63,55	-	-	-	11,45	0, 0	11,45	0, 0
Ireland	97,76	97,76	97,76	97,76	-	-	-	-
Italy	145,02	145,04	145,02	145,02	92,45	92,42	92,45	92,51
Latvia	187,50	197,87	174,11	190,96	14, 0	0, 0	14, 0	0, 0
Liechtenstein	266,67	-	-	-	-	-	-	-
Lithuania	189,12	215,40	160,56	184,88	31,17	-	-	-
Luxembourg	299,14	-	-	-	-	-	-	-
Malta	0,23	0, 0	0, 0	0,23	0, 0	0, 0	0, 0	0, 0
Monaco	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
Montenegro	-	-	-	-	-	-	-	-
Netherlands	177,45	-	-	-	0, 0	0, 0	0, 0	0, 0
Norway	91,80	119,37	49,47	76, 0	12,74	8,29	13,89	8,39
Poland	206,26	-	-	-	-	-	-	-
Portugal	92,52	-	-	-	190,48	-	-	-
Republic of Moldova	141,36	74,86	142,10	0, 0	51,61	0, 0	51,61	0, 0
Romania	210,83	-	-	-	-	-	-	-
Russian Federation	99,51	99,51	99,51	99,51	22,26	22,26	22,26	-
Serbia	130,87	121,62	137,38	121,61	23,75	0, 0	23,75	0, 0
Slovakia	256,10	298,19	249,07	206,62	0, 0	0, 0	0, 0	0, 0
Slovenia	282,60	337,32	239,20	293,79	60,23	-	-	-
Spain	49,57	-	-	-	0,09	-	-	-
Sweden	111,39	115,62	92,68	99,37	11,95	13,55	8,42	10,22
Switzerland	-	-	-	-	-	-	-	-
The former Yugoslav Republic of Macedonia	70, 0	-	-	-	-	-	-	-
Turkey	137,64	140,03	133,03	-	-	-	-	-
Ukraine	221,31	272,14	190,16	197,33	24,39	24,38	24,38	24,50
United Kingdom	119,51	148,55	78,70	114,29	50, 0	0, 0	50, 0	0, 0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A6c. Growing stock (volume per capita) on forest and forest available for wood supply by forest type, 2005

Country	Growing stock							
	Forest				Forest available for wood supply			
	Total	Pred. coniferous	Pred. broadleaved	Mixed	Total	Pred. coniferous	Pred. broadleaved	Mixed
	m^3/capita							
Albania	23,68	4,33	16,31	3,04	18,24	3,27	12,81	2,17
Andorra	-	-	-	-	-	-	-	-
Austria	140,87	-	-	-	137,55	88,98	15,20	33,36
Belarus	146,77	66,05	58,56	22,16	120,13	58,14	51,66	10,33
Belgium	13,89	6,84	6,34	0,71	13,82	6,83	6,28	0,71
Bosnia and Herzegovina	90,43	-	-	-	51,81	-	-	-
Bulgaria	76,33	33,41	42,92	0, 0	48,86	21,03	27,83	0, 0
Croatia	79,23	7,53	64,57	7,13	75,26	7,15	61,34	6,77
Cyprus	10,56	10,29	0,26	0, 0	4,12	4,12	0, 0	0, 0
Czech Republic	71,82	55,06	8,36	8,40	68,93	53,38	7,60	7,95
Denmark	14,11	8,67	5,44	0, 0	10,74	7,20	3,54	0, 0
Estonia	337,14	134,21	111,58	91,34	308,04	119,12	104,30	84,62
Finland	412,48	331,98	21,40	59,10	388,28	311,94	19,72	56,62
France	39,31	12,71	22,74	3,85	36,74	11,87	21,27	3,60
Georgia	109,61	-	-	-	27,75	-	-	-
Germany	-	-	-	-	-	-	-	-
Greece	15,97	6,79	9,18	0, 0	14,71	6,25	8,46	0, 0
Holy See	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
Hungary	33,84	3,64	27,83	2,38	30,04	3,50	24,39	2,15
Iceland	9,25	-	-	-	8,64	-	-	-
Ireland	15,77	13,23	2,27	0,27	15,41	-	-	-
Italy	24,73	3,62	18,52	2,59	22,10	3,03	16,80	2,28
Latvia	247,39	119,55	90,33	37,51	229,47	109,35	85,07	35,05
Liechtenstein	54,12	-	-	-	43,24	30,88	12,35	0, 0
Lithuania	117,49	59,24	38,05	20,20	100,28	49,18	33,28	17,83
Luxembourg	56,91	-	-	0, 0	-	-	-	-
Malta	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
Monaco	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
Montenegro	-	-	-	-	-	-	-	-
Netherlands	3,97	-	-	-	3,18	-	-	-
Norway	186,44	126,55	25,90	33,99	156,89	109,43	18,94	28,52
Poland	49,73	-	-	-	45,18	-	-	-
Portugal	33,13	-	-	-	21,96	-	-	-
Republic of Moldova	12,93	0,08	12,85	0, 0	8,05	0,05	8, 0	0, 0
Romania	62,06	-	-	-	-	-	-	-
Russian Federation	562,25	281,13	123,70	157,43	276,86	121,20	78,14	77,52
Serbia	31,64	2,95	19,50	9,18	24,88	2,34	15,55	6,98
Slovakia	91,83	33,21	44,27	14,35	84,51	30,04	41,49	12,99
Slovenia	178,52	46,70	57,38	74,44	163,06	43,53	51,62	67,91
Spain	20,46	-	-	-	15,88	-	-	-
Sweden	343,81	273,72	18,62	51,48	299,83	241,99	14,92	42,92
Switzerland	-	-	-	-	60,21	27,71	7,82	24,68
The former Yugoslav Republic of Macedonia	31,13	-	-	-	25,60	-	-	-
Turkey	19,13	12,81	6,32	0, 0	16,56	10,94	5,62	0, 0
Ukraine	45,16	20,56	20,18	4,41	27,70	13,26	11,34	3,11
United Kingdom	5,65	3,84	1,41	0,40	4,98	3,61	1,03	0,35

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A7. Growing stock on forest available for wood supply by forest types, 1990–2005

Country	Growing stock on forest available for wood supply											
	Total			Predominantly coniferous			Predominantly broadleaved			Mixed		
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
	1000 m³											
Albania	66100,0	59300,0	57335,0	11226,0	10998,0	10275,0	47053,0	41835,0	40250,0	7821,0	6467,0	6810,4
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	965648,0	1059830,0	1131326,0	664119,0	702334,0	731901,0	94999,0	113303,0	125033,0	206530,0	244193,0	274392,0
Belarus	851000	1093000	1174400	392300	503900	568400	388900	499500	505000	69800,0	89600,0	101000,0
Belgium	126720,0	141561,0	144712,0	-	69038,0	71565,0	-	65500,0	65750,0	-	7023,0	7397,0
Bosnia and Herzegovina	166743,0	205134,0	224043,0	-	-	-	-	-	-	-	-	-
Bulgaria	259175,0	321052,0	378143,0	98621,0	141467,0	162772,0	160554,0	179585,0	215371,0	0	0	0
Croatia	295450,0	321100,0	334400,0	28067,8	30504,5	31768,0	240791,8	261696,5	272536,0	26590,5	28899,0	30096,0
Cyprus	3060,0	3090,0	3120,0	3060,0	3090,0	3120,0	0	0	0	0	0	0
Czech Republic	614000,0	678300,0	705452,0	-	-	546318,0	-	-	77803,0	-	-	81331,0
Denmark	49000,0	55500,0	58200,0	32400,0	37500,0	39000,0	16600,0	18000,0	19200,0	0	0	0
Estonia	352000,0	426900,0	415236,0	-	163596,0	160574,0	-	148229,0	140594,0	-	115075,0	114068,0
Finland	1874000,0	1916089,0	2036516,0	1561000,0	1564358,0	1636114,0	96000,0	98418,0	103456,0	217000,0	253313,0	296946,0
France	1985500,0	2119352,0	2303555,0	637392,0	686109,0	744367,0	1157473,0	1225299,0	1333587,0	190635,0	207944,0	225601,0
Georgia	121000,0	121000,0	121000,0	-	-	-	-	-	-	-	-	-
Germany	-	3356045,0	-	-	2146885,0	-	-	1209160,0	-	-	0	-
Greece	143676,0	156570,0	163017,0	61062,3	66542,3	69282,2	82613,7	90027,8	93734,8	0	0	0
Holy See	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	259154,0	291290,0	303010,0	25559,0	33078,0	35284,0	214261,0	236991,0	246002,0	19334,0	21221,0	21724,0
Iceland	1779,0	2219,0	2556,0	-	-	-	-	-	-	-	-	-
Ireland	51194,8	58424,6	63895,8	-	-	-	-	-	-	-	-	-
Italy	939951,6	1152723,6	1293796,8	128773,4	157923,1	177250,2	714363,2	876069,9	983285,6	96815,0	118730,5	133261,1
Latvia	-	-	527778,0	-	-	251501,0	-	-	195671,0	-	-	80606,0
Liechtenstein	1365,0	1435,0	1470,0	975,0	1025,0	1050,0	390,0	410,0	420,0	0	0	0
Lithuania	275000,0	320200,0	342371,0	-	155340,0	167900,0	-	103380,0	113601,0	-	61480,0	60870,0
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-
Malta	0	0	0	0	0	0	0	0	0	0	0	0
Monaco	0	0	0	0	0	0	0	0	0	0	0	0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	41893,0	48858,0	51815,0	-	-	-	-	-	-	-	-	-
Norway	605495,0	685253,0	725132,0	456895,0	489496,0	505797,0	67173,0	80741,0	87525,0	81427,0	115016,0	131810,0
Poland	-	1584436,0	1724254,0	-	1097190,0	-	-	274749,0	-	-	212497,0	-
Portugal	166000,0	210000,0	232000,0	-	-	-	-	-	-	-	-	-
Republic of Moldova	22844,0	26773,0	28956,0	133,1	156,0	168,7	22710,9	26617,0	28787,3	0	0	0
Romania	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	47595150,0	40279390,0	39629550,0	23204116,0	18163951,0	17348046,0	10493250,0	10837210,0	11185230,0	13897784,0	11278229,0	11096274,0
Serbia	191658,0	187158,0	186550,0	18181,0	17695,0	17573,0	119969,0	117050,0	116625,0	53508,0	52413,0	52352,0
Slovakia	363229,0	436859,0	455277,0	138044,0	164217,0	161815,0	171084,0	207419,0	223506,0	54101,0	65223,0	69956,0
Slovenia	260590,0	305100,0	326290,0	89090,0	88015,0	87113,0	69196,0	92108,0	103282,0	102304,0	124977,0	135895,0
Spain	472000,0	617000,0	689000,0	-	-	-	-	-	-	-	-	-
Sweden	2445529,0	2642791,0	2707505,0	2029805,0	2137784,0	2185156,0	103545,0	131590,0	134748,0	312179,0	373418,0	387600,0
Switzerland	387672,0	428812,0	449382,0	204736,0	206117,0	206807,0	51921,0	56238,0	58397,0	131016,0	166457,0	184177,0
The former Yugoslav Republic of Macedonia	52150,0	52150,0	52150,0	-	-	-	-	-	-	-	-	-
Turkey	1148570,0	1198356,0	1212164,0	744531,0	787201,0	801038,0	404039,0	411155,0	411126,0	0	0	0
Ukraine	981000,0	1248000,0	1300000,0	435000,0	583000,0	622000,0	457000,0	534000,0	532000,0	89000,0	131000,0	146000,0
United Kingdom	222000,0	267000,0	300000,0	132000,0	186000,0	217000,0	74000,0	62000,0	62000,0	16000,0	19000,0	21000,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A8a. Change in growing stock on forest, 1990–2005

Country	Forest						
	Growing stock			Annual change rate			
	1990	2000	2005	1990–2000		2000–2005	
	1000 m³			1000 m³/yr	%	1000 m³/yr	%
Albania	75200,0	75800,0	74437,1	60,0	0,08	-272,6	-0,36
Andorra	-	-	-	-	-	-	-
Austria	995477,0	1088585,0	1158618,0	9310,8	0,90	14006,6	1,25
Belarus	1002400,0	1339200,0	1434800,0	33680,0	2,94	19120,0	1,39
Belgium	128000,0	142275,0	145514,0	1427,5	1,06	647,8	0,45
Bosnia and Herzegovina	291000,0	358000,0	391000,0	6700,0	2,09	6600,0	1,78
Bulgaria	404872,0	525197,0	590781,0	12032,5	2,64	13116,8	2,38
Croatia	311000,0	338000,0	352000,0	2700,0	0,84	2800,0	0,82
Cyprus	7404,9	7929,6	8003,0	52,5	0,69	14,7	0,18
Czech Republic	625100,0	698800,0	734997,0	7370,0	1,12	7239,4	1,02
Denmark	64883,0	74313,0	76456,0	943,0	1,37	428,6	0,57
Estonia	375000,0	457600,0	454461,0	8260,0	2,01	-627,8	-0,14
Finland	1905000,0	2070000,0	2163442,0	16500,0	0,83	18688,4	0,89
France	2079213,0	2254193,0	2464762,0	17498,0	0,81	42113,8	1,80
Georgia	419900,0	447300,0	478000,0	2740,0	0,63	6140,0	1,34
Germany	2814695,0	3380602,0	-	56590,7	1,85	-	-
Greece	156000,0	170000,0	177000,0	1400,0	0,86	1400,0	0,81
Holy See	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Hungary	287989,0	325234,0	341351,0	3724,5	1,22	3223,4	0,97
Iceland	1962,0	2402,0	2739,0	44,0	2,04	67,4	2,66
Ireland	52400,0	59800,0	65400,0	740,0	1,33	1120,0	1,81
Italy	1051400,0	1289400,0	1447200,0	23800,0	2,06	31560,0	2,34
Latvia	451000,0	545972,0	568996,0	9497,2	1,93	4604,8	0,83
Liechtenstein	1705,0	1795,0	1840,0	9,0	0,52	9,0	0,50
Lithuania	319800,0	372500,0	401114,0	5270,0	1,54	5722,8	1,49
Luxembourg	20380,0	25950,0	25950,0	557,0	2,45	0,0	0, 0
Malta	0,1	0,1	0,1	0,0	0, 0	0,0	0, 0
Monaco	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Montenegro	-	72000,0	-	-	-	-	-
Netherlands	52366,0	61073,0	64769,0	870,7	1,55	739,2	1,18
Norway	700488,0	807979,0	861725,0	10749,1	1,44	10749,2	1,30
Poland	1484800,0	1735950,0	1897622,0	25115,0	1,58	32334,4	1,80
Portugal	238000,0	313000,0	350000,0	7500,0	2,78	7400,0	2,26
Republic of Moldova	36692,0	43002,0	46508,0	631,0	1,60	701,2	1,58
Romania	1347500,0	1346400,0	1347300,0	-110,0	-0,01	180,0	0,01
Russian Federation	80039640,0	80270390,0	80479050,0	23075,0	0,03	41732,0	0,05
Serbia	243460,0	237545,0	237202,0	-591,5	-0,25	-68,6	-0,03
Slovakia	401624,0	463235,0	494689,0	6161,1	1,44	6290,8	1,32
Slovenia	273330,0	334550,0	357210,0	6122,0	2,04	4532,0	1,32
Spain	592000,0	790000,0	888000,0	19800,0	2,93	19600,0	2,37
Sweden	2791549,0	3034049,0	3104632,0	24250,0	0,84	14116,6	0,46
Switzerland [1)]	387672,0	428812,0	449382,0	4114,0	1,01	4114,0	0,94
The former Yugoslav Republic of Macedonia	63420,0	63420,0	63420,0	0,0	0, 0	0,0	0, 0
Turkey	1273143,0	1372040,0	1400437,0	9889,7	0,75	5679,4	0,41
Ukraine	1414000,0	1884000,0	2119000,0	47000,0	2,91	47000,0	2,38
United Kingdom	266000,0	308000,0	340000,0	4200,0	1,48	6400,0	2, 0

[1)] Forest available for wood supply

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A8b. Change in growing stock on other wooded land, 1990–2005

Country	Other wooded land						
	Growing stock			Annual change rate			
	1990	2000	2005	1990–2000		2000–2005	
	1000 m³			1000 m³/yr	%	1000 m³/yr	%
Albania	6890,0	7974,0	7852,0	108,4	1,47	-24,4	-0,31
Andorra	-	-	-	-	-	-	-
Austria	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Belarus	0,0	20600,0	22500,0	2060,0	-	380,0	1,78
Belgium	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Bosnia and Herzegovina	-	-	-	-	-	-	-
Bulgaria	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Croatia	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-
Czech Republic	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Denmark	-	-	-	-	-	-	-
Estonia	-	4700,0	4884,0	-	-	36,8	0,77
Finland	6910,0	5000,0	11535,0	-191,0	-3,18	1307,0	18,20
France	-	-	-	-	-	-	-
Georgia	1300,0	1100,0	1000,0	-20,0	-1,66	-20,0	-1,89
Germany	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Hungary	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Iceland	1215,0	1215,0	1215,0	0,0	0, 0	0,0	0, 0
Ireland	-	-	-	-	-	-	-
Italy	56700,0	83600,0	96800,0	2690,0	3,96	2640,0	2,98
Latvia	1568,0	1680,0	1610,0	11,2	0,69	-14,0	-0,85
Liechtenstein	-	-	-	-	-	-	-
Lithuania	2300,0	2500,0	2400,0	20,0	0,84	-20,0	-0,81
Luxembourg	-	-	-	-	-	-	-
Malta	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Monaco	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Montenegro	-	-	-	-	-	-	-
Netherlands	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Norway	36161,0	34251,0	33296,0	-191,0	-0,54	-191,0	-0,56
Poland	-	-	-	-	-	-	-
Portugal	-	16000,0	16000,0	-	-	0,0	0, 0
Republic of Moldova	1600,0	1600,0	1600,0	0,0	0, 0	0,0	0, 0
Romania	-	-	-	-	-	-	-
Russian Federation	1604820,0	1593300,0	1651050,0	-1152,0	-0,07	11550,0	0,71
Serbia	3044,0	3730,0	4073,0	68,6	2,05	68,6	1,78
Slovakia	0,0	0,0	0,0	0,0	0, 0	0,0	0, 0
Slovenia	2650,0	2650,0	2650,0	0,0	0, 0	0,0	0, 0
Spain	1560,0	1130,0	920,0	-43,0	-3,17	-42,0	-4,03
Sweden	34533,0	35879,0	36544,0	134,6	0,38	133,0	0,37
Switzerland	-	-	-	-	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-
Ukraine	1000,0	1000,0	1000,0	0,0	0, 0	0,0	0, 0
United Kingdom	1000,0	1000,0	1000,0	0,0	0, 0	0,0	0, 0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A9a. Age-class distribution – total of all even-aged forest types, 2005

Country	Forest: even-aged stands, all forest types										
	Total	Age class									
		≤10 years	11–20	21–40	41–60	61–80	81–100	101–120	121–140	>140	Unspecified
	1000 ha										
Albania	611,4	16,7	14,8	202,9	122,8	92,3	53,9	52,9	55,1	0,0	0,0
Andorra	-	-	-	-	-	-	-	-	-	-	-
Austria	1879,0	25,0	300,0	499,0	265,0	189,0	162,0	117,0	80,0	102,0	140,0
Belarus	7208,4	313,3	589,0	1581,5	2525,2	1540,3	481,2	118,0	32,8	27,1	0,0
Belgium	512,8	49,1	54,1	134,3	80,1	35,3	12,6	2,4	0,6	0,6	143,7
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	3651,0	0,0	591,0	954,0	1051,0	430,0	247,0	176,0	115,0	87,0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	2647,4	215,8	225,7	389,2	368,0	484,9	427,1	288,9	111,8	52,7	83,3
Denmark	500,0	66,3	63,9	146,0	107,6	41,9	24,7	18,0	8,4	9,3	14,0
Estonia	2122,0	122,0	140,0	466,0	637,0	449,0	197,0	66,0	27,0	18,0	0,0
Finland	22130,0	2216,0	1705,0	3959,0	3705,0	3463,0	2746,0	1447,0	808,0	2081,0	0,0
France [1)]	9919,0	850,0	895,0	1842,0	1840,0	1409,0	1040,0	679,0	479,0	660,0	225,0
Georgia	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	1665,0	158,0	296,0	504,0	294,0	227,0	131,0	44,0	7,0	4,0	0,0
Iceland	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-
Italy	5902,0	988,0	674,0	1723,0	1778,0	206,0	207,0	108,0	99,0	119,0	0,0
Latvia	2331,0	212,8	144,5	353,0	529,5	513,9	347,9	144,2	53,8	31,4	0,0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-
Lithuania	2121,0	174,0	146,0	371,0	607,0	428,0	209,0	56,0	13,0	10,0	107,0
Luxembourg	-	-	8,3	12,8	5,3	2,6	2,9	4,4	6,5	6,1	-
Malta	-	-	-	-	-	-	-	-	-	-	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-
Netherlands	360,0	11,0	11,0	72,0	90,0	65,0	36,0	21,0	5,0	3,0	46,0
Norway	6648,0	464,0	702,0	895,0	958,0	598,0	744,0	707,0	673,0	499,0	408,0
Poland	8772,0	603,0	542,0	1906,0	2349,0	1649,0	1069,0	445,0	138,0	71,0	0,0
Portugal	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	808789,0	32655,0	53535,0	112125,0	145403,0	92316,0	155372,0	111392,0	71428,0	34563,0	0,0
Serbia	1747,0	275,0	296,0	500,0	379,0	186,0	70,0	31,0	10,0	0,0	0,0
Slovakia	1931,6	130,7	164,0	284,8	322,7	393,0	349,4	165,4	61,5	48,4	11,7
Slovenia	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-
Sweden	23507,0	2886,0	2447,0	4487,0	2938,0	1931,0	1499,0	1208,0	799,0	417,0	4895,0
Switzerland [1)]	1136,0	25,0	41,0	174,0	102,0	101,0	169,0	159,0	126,0	239,0	0,0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-
Turkey [1)]	-	727,0	717,0	384,0	1070,0	2248,0	1232,0	424,0	35,0	9,0	-
Ukraine	9575,0	276,0	623,0	2146,0	3107,0	1984,0	970,0	305,0	101,0	63,0	0,0
United Kingdom	2845,0	266,0	299,0	778,0	522,0	301,0	147,0	89,0	79,0	71,0	293,0

[1)] Forest available for wood supply

Note:
Czech Republic, Slovakia, Russian Federation, Ukraine, Denmark, Estonia, Finland, Lithuania, United Kingdom and Bulgaria did not classify even-aged and uneven-aged forest into separate categories, or estimated only insignificant areas of uneven-aged forest. Hence their total forest areas have been reported as even-aged.

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A9b. Age-class distribution of predominantly coniferous even-aged forest, 2005

Country	Forest: even-aged stands, predominantly coniferous										
	Total	Age class									
		≤10 years	11–20	21–40	41–60	61–80	81–100	101–120	121–140	>140	Unspecified
	1000 ha										
Albania	119,3	1,3	1,8	59,3	12,6	11,2	12,1	10,7	10,3	0,0	0,0
Andorra	-	-	-	-	-	-	-	-	-	-	-
Austria	1248,0	14,0	130,0	340,0	197,0	135,0	114,0	90,0	56,0	82,0	90,0
Belarus	3712,3	54,6	147,0	566,5	1327,5	1114,1	394,6	78,3	13,0	16,7	0,0
Belgium	282,0	37,3	26,1	103,2	70,4	30,7	10,2	1,4	0,1	0,0	2,6
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	1079,0	0,0	196,0	466,0	125,0	95,0	107,0	59,0	20,0	11,0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	1879,0	145,9	171,1	266,3	225,2	347,6	339,5	220,6	75,8	27,9	59,1
Denmark	315,3	40,6	43,3	120,3	74,6	17,8	5,9	3,0	1,0	0,0	8,8
Estonia	781,0	11,0	27,0	138,0	177,0	204,0	131,0	53,0	22,0	18,0	0,0
Finland	17553,0	1839,0	1256,0	2965,0	2632,0	2754,0	2237,0	1233,0	711,0	1926,0	0,0
France	-	-	-	-	-	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	172,0	3,0	22,0	104,0	38,0	4,0	1,0	0,0	0,0	0,0	0,0
Iceland	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-
Italy	699,0	82,0	45,0	132,0	132,0	86,0	86,0	45,0	41,0	50,0	0,0
Latvia	1160,9	89,2	63,8	158,3	186,0	243,8	224,1	115,7	49,6	30,4	0,0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-
Lithuania	-	86,0	40,0	122,0	232,0	203,0	150,0	45,0	9,0	5,0	-
Luxembourg	-	-	4,7	10,7	3,9	1,6	0,3	0,2	0,0	0,0	-
Malta	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-
Norway	3550,0	92,0	224,0	466,0	513,0	212,0	313,0	532,0	581,0	449,0	168,0
Poland	-	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	404395,0	11262,0	23198,0	37642,0	78838,0	38754,0	81737,0	65673,0	45135,0	22156,0	0,0
Serbia	-	-	-	-	-	-	-	-	-	-	-
Slovakia	600,0	31,7	41,6	94,1	92,4	120,6	123,5	50,8	21,4	20,2	3,7
Slovenia	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-
Sweden	18162,0	2565,0	1943,0	3352,0	2111,0	1495,0	1298,0	1109,0	764,0	400,0	3125,0
Switzerland [1)]	458,0	0,0	9,0	59,0	25,0	15,0	46,0	53,0	60,0	191,0	0,0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-
Turkey [1)]	-	724,0	608,0	260,0	858,0	1988,0	972,0	115,0	27,0	9,0	-
Ukraine	3546,0	82,0	209,0	803,0	1314,0	781,0	260,0	68,0	17,0	12,0	0,0
United Kingdom	1555,0	148,0	210,0	599,0	281,0	100,0	25,0	9,0	7,0	7,0	169,0

[1)] Forest available for wood supply

Note:
Czech Republic, Slovakia, Russian Federation, Ukraine, Denmark, Estonia, Finland, Lithuania, United Kingdom and Bulgaria did not classify even-aged and uneven-aged forest into separate categories, or estimated only insignificant areas of uneven-aged forest. Hence their total forest areas have been reported as even-aged.

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A9c. Age-class distribution of predominantly broadleaved even-aged forest, 2005

Country	Forest: even-aged stands, predominantly broadleaved										
	Total	Age class									
		≤10 years	11–20	21–40	41–60	61–80	81–100	101–120	121–140	>140	Unspecified
	1000 ha										
Albania	457,5	11,4	8,3	133,1	104,9	77,2	39,8	40,2	42,6	0,0	0,0
Andorra	-	-	-	-	-	-	-	-	-	-	-
Austria	253,0	6,0	67,0	61,0	30,0	25,0	18,0	13,0	6,0	4,0	23,0
Belarus	2832,9	229,5	374,8	857,2	987,9	279,6	45,3	31,7	17,8	9,1	0,0
Belgium	211,0	11,2	26,1	27,3	6,6	3,5	2,2	1,0	0,5	0,6	132,0
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	2572,0	0,0	395,0	488,0	926,0	335,0	140,0	117,0	95,0	76,0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	392,6	26,9	20,4	53,1	80,4	79,6	46,8	35,1	20,6	17,3	12,4
Denmark	184,7	25,7	20,7	25,7	33,1	24,1	18,8	14,9	7,4	9,3	5,2
Estonia	806,0	88,0	84,0	235,0	280,0	99,0	17,0	2,0	1,0	0,0	0,0
Finland	1495,0	118,0	216,0	352,0	336,0	222,0	161,0	52,0	29,0	9,0	0,0
France	-	-	-	-	-	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	1389,0	132,0	266,0	370,0	226,0	215,0	126,0	43,0	7,0	4,0	0,0
Iceland	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-
Italy	4692,0	834,0	585,0	1475,0	1519,0	78,0	78,0	41,0	37,0	45,0	0,0
Latvia	840,4	88,2	63,2	151,0	274,7	184,9	66,0	10,6	1,2	0,6	0,0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-
Lithuania	-	55,0	67,0	194,0	291,0	127,0	24,0	5,0	2,0	3,0	-
Luxembourg	-	-	3,6	2,1	1,4	1,0	2,6	4,3	6,5	6,1	-
Malta	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-
Norway	1684,0	202,0	169,0	165,0	294,0	281,0	330,0	77,0	17,0	4,0	145,0
Poland	-	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	177933,0	15086,0	17346,0	53404,0	22416,0	31860,0	27862,0	8942,0	1017,0	0,0	0,0
Serbia	-	-	-	-	-	-	-	-	-	-	-
Slovakia	957,5	56,7	62,0	118,7	184,6	220,1	172,0	86,9	30,2	20,5	5,8
Slovenia	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-
Sweden	1645,0	102,0	123,0	289,0	258,0	125,0	59,0	22,0	9,0	2,0	656,0
Switzerland [1)]	236,0	14,0	18,0	63,0	47,0	23,0	28,0	20,0	11,0	12,0	0,0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-
Turkey [1)]	-	3,0	109,0	124,0	212,0	260,0	260,0	309,0	8,0	0,0	-
Ukraine	4980,0	120,0	280,0	1036,0	1486,0	1053,0	658,0	220,0	79,0	48,0	0,0
United Kingdom	1080,0	94,0	69,0	130,0	204,0	176,0	109,0	72,0	65,0	58,0	103,0

[1)] Forest available for wood supply

Note:
Czech Republic, Slovakia, Russian Federation, Ukraine, Denmark, Estonia, Finland, Lithuania, United Kingdom and Bulgaria did not classify even-aged and uneven-aged forest into separate categories, or estimated only insignificant areas of uneven-aged forest. Hence their total forest areas have been reported as even-aged.

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A9d. Age-class distribution of mixed even-aged forest, 2005

Country	Forest: even-aged stands, mixed										
	Total	Age class									
		≤10 years	11–20	21–40	41–60	61–80	81–100	101–120	121–140	>140	Unspecified
	1000 ha										
Albania	34,6	4,0	4,7	10,5	5,3	3,9	2,0	2,0	2,2	0,0	0,0
Andorra	-	-	-	-	-	-	-	-	-	-	-
Austria	378,0	5,0	103,0	98,0	38,0	29,0	30,0	14,0	18,0	16,0	27,0
Belarus	663,4	29,2	67,2	157,8	209,8	146,8	41,3	8,0	2,0	1,3	0,0
Belgium	19,8	0,6	1,9	3,8	3,1	1,1	0,2	0,0	0,0	0,0	9,1
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	375,8	43,0	34,2	69,8	62,4	57,7	40,8	33,2	15,4	7,5	11,8
Denmark	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Estonia	535,0	23,0	29,0	93,0	180,0	146,0	49,0	11,0	4,0	0,0	0,0
Finland	3082,0	259,0	233,0	642,0	737,0	487,0	348,0	162,0	68,0	146,0	0,0
France	-	-	-	-	-	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	104,0	23,0	8,0	30,0	30,0	8,0	4,0	1,0	0,0	0,0	0,0
Iceland	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-
Italy	511,0	72,0	44,0	116,0	127,0	42,0	43,0	22,0	21,0	24,0	0,0
Latvia	329,7	35,4	17,5	43,7	68,8	85,2	57,8	17,9	3,0	0,4	0,0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-
Lithuania	-	33,0	39,0	55,0	84,0	98,0	35,0	6,0	2,0	2,0	-
Luxembourg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Malta	-	-	-	-	-	-	-	-	-	-	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-
Norway	1414,0	170,0	309,0	264,0	151,0	105,0	101,0	98,0	75,0	46,0	95,0
Poland	-	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Romania	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	226461,0	6307,0	12991,0	21079,0	44149,0	21702,0	45773,0	36777,0	25276,0	12407,0	0,0
Serbia	-	-	-	-	-	-	-	-	-	-	-
Slovakia	374,1	42,3	60,4	72,0	45,7	52,3	53,9	27,7	9,9	7,7	2,2
Slovenia	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-
Sweden	3701,0	219,0	381,0	846,0	569,0	311,0	142,0	77,0	26,0	15,0	1115,0
Switzerland [1)]	443,0	11,0	14,0	52,0	31,0	62,0	95,0	86,0	55,0	37,0	0,0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-
Turkey [1)]	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Ukraine	1049,0	74,0	134,0	307,0	307,0	150,0	52,0	17,0	5,0	3,0	0,0
United Kingdom	210,0	24,0	20,0	49,0	37,0	25,0	13,0	8,0	7,0	6,0	21,0

[1)] Forest available for wood supply

Note:
Czech Republic, Slovakia, Russian Federation, Ukraine, Denmark, Estonia, Finland, Lithuania, United Kingdom and Bulgaria did not classify even-aged and uneven-aged forest into separate categories, or estimated only insignificant areas of uneven-aged forest. Hence their total forest areas have been reported as even-aged.

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A10. Diameter distribution of all uneven-aged forest by forest type, 2005

Country	Forest: uneven-aged stands															
	Total				Predominantly coniferous				Predominantly broadleaved				Mixed			
Diameter class in cm	0–19	20–39	40–60	>=60	0–19	20–39	40–60	>=60	0–19	20–39	40–60	>=60	0–19	20–39	40–60	>=60
	m^3/ha															
Albania	119,3	50,4	100,6	-	119,3	50,4	100,6	-	0,0	0,0	0,0	-	0,0	0,0	0,0	-
Andorra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Austria	36,0	151,0	111,0	30,0	38,0	159,0	116,0	31,0	28,0	98,0	65,0	24,0	40,0	165,0	128,0	32,0
Belarus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	14,0	66,2	66,4	31,0	13,9	90,5	48,8	5,0	13,6	63,4	67,6	33,3	20,8	86,4	66,7	22,5
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Denmark	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Estonia	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Finland	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
France [1)]	52,0	55,0	35,0	14,0	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	174,0	101,0	10,0	0,0	7,0	6,0	0,0	0,0	158,0	79,0	10,0	0,0	9,0	16,0	0,0	0,0
Iceland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	47,0	75,0	44,0	21,0	30,1	98,1	73,7	20,6	54,4	70,8	36,5	21,9	28,9	62,7	42,1	15,2
Latvia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-	0,0	0,0	0,0	0,0
Malta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	47,0	64,0	12,0	0,6	45,0	86,0	15,0	0,4	48,0	25,0	3,0	0,5	55,0	64,0	11,0	0,8
Poland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-	-	-	0,0	0,0	0,0	0,0
Romania	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Russian Federation	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Serbia	30,2	168,7	135,7	22,9	27,4	218,5	140,1	24,2	23,4	115,0	127,4	27,8	39,8	172,5	139,7	16,7
Slovakia	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Slovenia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sweden [1)]	57,4	86,4	12,5	0,9	53,6	92,9	11,9	0,3	61,9	74,0	26,2	13,1	69,8	66,7	12,4	1,0
Switzerland [1)]	25,0	118,0	141,0	73,0	26,0	118,0	145,0	74,0	21,0	84,0	75,0	56,0	25,0	126,0	149,0	76,0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ukraine	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
United Kingdom	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

[1)] Forest available for wood supply

Note:
Czech Republic, Slovakia, Russian Federation, Ukraine, Denmark, Estonia, Finland, Lithuania, United Kingdom, Bulgaria and Romania did not classify even-aged and uneven-aged forest into separate categories, or estimated only insignificant areas of uneven-aged forest. The values in table 11 have been set at 0 for these countries, although uneven-aged forest may exist.

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A11a. Carbon stock of woody biomass on forest, 1990–2005

Country	Forest											
	Carbon stock of woody biomass total			of total carbon stock:								
				above ground living woody biomass			below ground living woody biomass			dead wood		
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
	1000 tonnes carbon											
Albania	63700,0	63400,0	61205,1,0	37300,0	37400,0	35629,3,0	11900,0	11900,0	11255,6	14500,0	14100,0	14320,2
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria [1)]	323000,0	358000,0	375500,0	253000,0	280000,0	293500,0	67000,0	74000,0	77500,0	3000,0	4000,0	4500,0
Belarus	385180,0	514600,0	551336,0	294277,5	393000,0	421055,0	88976,6	118900,0	127388,0	1925,9	2700,0	2893,0
Belgium	51732,0	62094,0	66691,0	40281,0	48570,0	52248,0	10070,0	12143,0	13062,0	1381,0	1381,0	1381,0
Bosnia and Herzegovina	-	-	-	102500,0	126000,0	137500,0	28500,0	35000,0	38000,0	-	-	-
Bulgaria	-	-	-	141000,0	183000,0	197000,0	47000,0	61000,0	66000,0	-	-	-
Croatia	169000,0	211100,0	219400,0	117200,0	146400,0	152200,0	31000,0	38700,0	40200,0	20800,0	26000,0	27000,0
Cyprus	2550,0	2730,0	2760,0	1930,0	2070,0	2090,0	620,0	660,0	670,0	0,0	0,0	0,0
Czech Republic	277352,1	308142,2	316692,1	220517,4	246516,6	259285,9	40634,7	45425,6	47778,6	16200	16200	9627,6
Denmark	-	-	-	17028,0	19607,0	20032,0	5037,0	5811,0	5939,0	-	-	-
Estonia	-	178594,3	179182,2	-	132416,0	131663,6	-	38451,4	38273,9	-	7726,9	9244,7
Finland	738500,0	797600,0	855857,0	599700,0	647900,0	696342,0	123800,0	134700,0	144515,0	15000,0	15000,0	15000,0
France	-	-	-	741579,0	804711,0	879218,0	241579,0	261956,0	286293,0	-	-	-
Georgia	217324,2	232417,5	238474,2	151528,8	161595,0	166632,6	38879,1	41895,0	42905,4	26916,3	28927,5	28936,2
Germany	-	-	-	774000,0	928000,0	1005000,0	207000,0	265000,0	278000,0	-	-	-
Greece	-	-	-	43100,0	47000,0	49000,0	8500,0	9300,0	9700,0	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	146271,4	161807,0	169025,7	94461,8	105164,6	109592,5	23615,4	26291,2	27398,1	28194,1	30351,2	32035,0
Iceland	1099,0	1337,0	1504,0	788,0	976,0	1107,0	197,0	244,0	277,0	114,0	117,0	120,0
Ireland	16100,0	18300,0	20000,0	13200,0	15100,0	16500,0	2700,0	3000,0	3300,0	200,0	200,0	200,0
Italy	476291,1	636586,9	715584,7	347293,5	463790,5	521188,9	76098,6	101997,9	114797,6	52899,0	70798,5	79598,3
Latvia	191259,8	228561,2	243280,1	134398,0	162699,7	169560,8	39462,5	47772,6	49787,2	17399,3	18089,0	23932,1
Liechtenstein	-	-	-	390,0	410,0	410,0	90,0	100,0	100,0	-	-	-
Lithuania	113000,0	130700,0	139400,0	83900,0	97700,0	104800,0	19300,0	22800,0	24100,0	9800,0	10200,0	10500,0
Luxembourg	7030,0	9235,0	9235,0	6170,0	7860,0	7860,0	860,0	1100,0	1100,0	0,0	275,0	275,0
Malta	-	-	-	50,0	50,0	50,0	10,0	10,0	10,0	-	-	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	38564,9	-	-	24664,3	-	-	8632,5	-	-	5268,1	-
Netherlands	20970,0	25330,0	27780,0	17070,0	20560,0	22150,0	3430,0	4130,0	4450,0	470,0	640,0	1180,0
Norway	306355,0	347123,0	380557,0	227626,0	258929,0	285499,0	60477,0	68627,0	74977,0	18252,0	19567,0	20081,0
Poland	578885,0	673462,0	736199,0	439709,0	514084,0	561974,0	131465,0	153702,0	168020,0	7711,0	5676,0	6205,0
Portugal	-	-	-	49500,0	65000,0	72800,0	27900,0	36700,0	41000,0	-	-	-
Republic of Moldova	-	-	-	9500,0	11100,0	11900,0	1000,0	1200,0	1300,0	-	-	-
Romania	-	-	-	-	448000,0	-	-	50000,0	-	-	-	-
Russian Federation	39721000,0	39185000,0	39208000,0	26052000,0	25736000,0	25787000,0	6452000,0	6421000,0	6423000,0	7217000,0	7028000,0	6998000,0
Serbia	147362,8	143782,5	143574,9	95432,4	93113,9	92979,4	33401,4	32589,9	32542,8	18528,9	18078,8	18052,7
Slovakia	175200,0	204300,0	218600,0	133900,0	156100,0	167000,0	28800,0	33700,0	35900,0	12500,0	14500,0	15700,0
Slovenia	130740,0	160360,0	171210,0	87270,0	107310,0	114570,0	24880,0	30430,0	32490,0	18590,0	22620,0	24150,0
Spain	-	-	-	195000,0	263000,0	297000,0	81000,0	90000,0	95000,0	-	-	-
Sweden	1112416,7	1205547,9	1233691,3	813025,9	874785,9	893338,8	279305,4	307475,8	315510,0	20085,3	23286,2	24842,4
Switzerland	132000,0	149000,0	158000,0	104000,0	117500,0	124000,0	25000,0	28000,0	30000,0	3000,0	3500,0	4000,0
The former Yugoslav Republic of Macedonia	-	-	-	16440,0	16440,0	16440,0	3880,0	3880,0	3880,0	-	-	-
Turkey	-	-	-	636571,0	686020,0	700218,0	106497,0	114412,0	116599,0	-	-	-
Ukraine	471000,0	666000,0	766000,0	402000,0	533000,0	613000,0	67000,0	129000,0	148000,0	2000,0	4000,0	5000,0
United Kingdom	98600,0	106600,0	115100,0	82000,0	88000,0	95000,0	13500,0	15500,0	17000,0	3100,0	3100,0	3100,0

[1)] Data are for total forest and OWL

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A11b. Carbon stock of woody biomass on other wooded land, 1990–2005

Country	Other wooded land											
	Carbon stock of woody biomass total			of total carbon stock:								
				above ground living woody biomass			below ground living woody biomass			dead wood		
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
	1000 tonnes carbon											
Albania	19300,0	21500,0	16299,3	3800,0	4400,0	2914,5	10700,0	12300,0	8248,0	4800,0	4800,0	5136,9
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	-	-	-	-	-	-	-	-	-	-	-	-
Belarus	0,0	7976,3	8853,8	0,0	6093,9	6764,3	0,0	1842,5	2045,2	0,0	39,9	44,3
Belgium	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Denmark	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	-	1875,6	1947,5	-	1448,4	1498,9	-	393,0	405,9	-	34,2	42,6
Finland	1800,0	2000,0	4455,0	1400,0	1600,0	3619,0	300,0	300,0	736,0	100,0	100,0	100,0
France	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	675,8	582,5	525,8	471,2	405,0	367,4	120,9	105,0	94,6	83,7	72,5	63,8
Germany	-	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Iceland	1248,0	1248,0	1248,0	876,0	876,0	876,0	219,0	219,0	219,0	153,0	153,0	153,0
Ireland	-	-	-	-	-	-	-	-	-	-	-	-
Italy	40398,5	59179,4	68632,6	25999,0	38086,7	44120,9	10799,6	15794,5	18308,7	3599,9	5298,2	6202,9
Latvia	-	-	-	493,9	529,2	507,2	128,4	137,6	131,9	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	900,0	900,0	900,0	650,0	650,0	600,0	150,0	150,0	200,0	100,0	100,0	100,0
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-
Malta	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Norway	19987,0	18368,0	16646,0	14887,0	13728,0	12488,0	3909,0	3605,0	3280,0	1191,0	1035,0	878,0
Poland	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	4100,0	4100,0	-	2300,0	2300,0	-	-	-
Republic of Moldova	-	-	-	400,0	400,0	400,0	500,0	500,0	500,0	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	750000,0	700000,0	750000,0	200000,0	200000,0	200000,0	175000,0	150000,0	175000,0	375000,0	350000,0	375000,0
Serbia	1902,0	2330,6	2544,9	1235,9	1514,4	1653,6	432,6	530,0	578,8	233,6	286,2	312,5
Slovakia	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Slovenia	1270,0	1270,0	1270,0	850,0	850,0	850,0	240,0	240,0	240,0	180,0	180,0	180,0
Spain	-	-	-	510,0	380,0	310,0	210,0	130,0	80,0	-	-	-
Sweden	21874,7	21049,8	22848,1	14576,9	14391,8	15684,8	6552,6	5822,3	6178,5	745,2	835,7	984,8
Switzerland	-	-	-	-	-	-	-	-	-	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-	-	-	-
Ukraine	333,1	353,5	361,5	284,3	282,9	289,3	47,4	68,5	69,8	1,4	2,1	2,4
United Kingdom	600,0	600,0	600,0	500,0	500,0	500,0	100,0	100,0	100,0	0,0	0,0	0,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A12. Area of damage to forest and other wooded land by different primarily damaging agents, 2005

Country	Total area of FOWL with damage	Biotic agents		Abiotic agents		Human induced	
		Insects & disease	Wildlife & grazing	Storm, wind, snow, etc.	Fire */, Forest area	Forest operations	Other
	1000 ha						
Albania	92,0	80,8	5,0	2,8	1,04	0,0	0,1
Andorra	-	-	-	-	-	-	-
Austria	-	102,0	647,0	14,0	0,08	180,0	-
Belarus	-	-	-	-	0,55	-	-
Belgium	-	-	-	-	0,00	-	-
Bosnia and Herzegovina	-	-	-	-	-	-	-
Bulgaria	141,6	129,6	0,1	10,5	1,40	0,0	0,0
Croatia	-	-	-	-	2,92	-	-
Cyprus	-	-	4,5	0,0	0,32	2,8	-
Czech Republic	-	3,5	-	10,3	0,20	-	0,0
Denmark	-	0,0	0,0	-	0,00	0,0	0,0
Estonia	319,0	73,0	201,0	33,0	3,00	6,0	3,0
Finland	653,0	242,0	128,0	250,0	18,00	0,0	15,0
France	-	-	-	-	20,97	-	-
Georgia	-	-	-	-	44,80	-	-
Germany	-	-	-	-	0,18	-	-
Greece	-	-	-	-	5,52	-	-
Holy See	0,0	0,0	0,0	0,0	0,00	0,0	0,0
Hungary	609,3	439,3	30,3	104,3	1,69	3,7	30,1
Iceland	-	-	-	0,0	0,00	0,0	0,0
Ireland	-	-	-	-	0,55	-	-
Italy	2750,0	1012,0	471,0	637,0	21,47	35,0	118,0
Latvia	-	-	-	-	0,07	-	-
Liechtenstein	-	0,1	-	-	0,00	-	-
Lithuania	-	-	-	-	0,20	-	-
Luxembourg	-	-	-	-	0,00	-	-
Malta	-	-	-	-	-	-	-
Monaco	0,0	0,0	0,0	0,0	0,00	0,0	0,0
Montenegro	-	-	-	-	-	-	-
Netherlands	-	-	-	-	0,03	-	-
Norway	-	220,0	-	-	0,20	0,0	0,0
Poland	-	-	-	-	7,00	-	-
Portugal	-	-	-	-	213,52	-	-
Republic of Moldova	-	-	-	-	-	-	-
Romania	-	-	-	-	0,70	-	-
Russian Federation	-	-	-	-	736,30	-	-
Serbia	-	33,0	1,5	1,5	0,05	-	0,5
Slovakia	-	12,3	1,0	10,9	0,05	-	4,4
Slovenia	1,7	1,1	0,0	0,3	0,14	0,1	0,1
Spain	-	-	-	-	177,75	-	-
Sweden	4902,0	444,0	2869,0	1189,0	0,69	352,0	47,0
Switzerland	-	-	-	-	0,03	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	2,08	-	-
Turkey	-	589,6	-	-	2,82	-	-
Ukraine	685,0	463,0	7,0	153,0	23,00	6,0	33,0
United Kingdom	56,0	5,0	45,0	5,5	0,50	0,0	0,0

Notes:
Minimum size of damage and reference period (new or already existing damage) are not consistent among countries.
The country reports should be consulted for further details.

Source:
MCPFE/ECE/FAO quantitative indicators enquiry
*/ – Data presented on Fores Fires are on „Forest area" only, and they are completed from the JRC database…

Table A13. Increment and fellings on forest available for wood supply, 1990–2005

Country	Net annual increment						Fellings						Fellings as percent of net annual increment		
	1990		2000		2005		1990		2000		2005		1990	2000	2005
	1000 m^3 o.b.	m^3 o.b./ha	1000 m^3 o.b.	m^3 o.b./ha	1000 m^3 o.b.	m^3 o.b./ha	1000 m^3 o.b.	m^3 o.b./ha	1000 m^3 o.b.	m^3 o.b./ha	1000 m^3 o.b.	m^3 o.b./ha	%	%	%
Albania	835,0	1,2	874,6	1,4	470,4	0,8	1950,0	2,8	2599,5	4,2	2588,7	4,2	233,5	297,2	550,3
Andorra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Austria	27337,0	8,3	31255,0	9,4	-	-	19521,0	5,9	18797,0	5,6	-	-	71,4	60,1	-
Belarus	19570,0	3,3	22796,0	3,6	22809,0	3,6	11002,0	1,9	10787,0	1,7	14109,0	2,2	56,2	47,3	61,9
Belgium	5176,0	7,7	5289,0	8,0	5289,0	7,9	4352,0	6,5	3526,0	5,3	4475,0	6,7	84,1	66,7	84,6
Bosnia and Herzegovina	5480,0	4,3	5480,0	4,4	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	11239,0	4,8	13563,0	6,0	14120,0	5,5	4681,0	2,0	3755,0	1,7	5768,0	2,3	41,6	27,7	40,8
Croatia	7423,0	3,7	-	-	-	-	4600,0	2,3	-	-	-	-	62,0	-	-
Cyprus	46,5	1,1	42,0	1,0	40,0	0,9	41,0	0,9	17,7	0,4	6,4	0,1	88,2	42,1	16,0
Czech Republic	17000,0	6,6	19800,0	7,7	20500,0	8,1	13030,0	5,1	15860,0	6,2	17190,0	6,8	76,6	80,1	83,9
Denmark	4552,0	13,2	4849,0	13,1	5176,0	13,4	2023,0	5,9	2099,0	5,7	1837,0	4,8	44,4	43,3	35,5
Estonia	10168,0	5,9	11363,0	5,4	11015,0	5,3	3770,0	2,2	12746,0	6,1	5730,0	2,7	37,1	112,2	52,0
Finland	76031,0	3,5	79362,0	3,9	92860,0	4,6	52320,0	2,4	67173,0	3,3	64526,0	3,2	68,8	84,6	69,5
France	84050,0	6,0	97578,0	6,7	102456,0	6,9	56302,0	4,0	63125,0	4,3	56623,0	3,8	67,0	64,7	55,3
Georgia	-	-	800,0	-	-	-	351,0	-	389,0	-	666,0	0,3	-	48,6	-
Germany	-	-	122000,0	11,1	122000,0	-	42177,0	-	48818,0	4,4	60770,0	-	-	40,0	49,8
Greece	3813,0	1,3	-	-	-	-	2979,0	1,0	2221,0	0,7	1842,0	0,5	78,1	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	11002,0	7,2	11711,0	7,2	12899,0	7,7	7415,0	4,8	7287,0	4,5	7167,0	4,3	67,4	62,2	55,6
Iceland	44,0	2,1	56,0	1,6	67,0	1,6	0,3	0,0	0,3	0,0	0,5	0,0	0,6	0,6	0,7
Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	26296,0	3,5	31836,0	3,8	38320,0	4,3	10397,0	1,4	10559,0	1,3	10105,0	1,1	39,5	33,2	26,4
Latvia	16500,0	-	16500,0	5,9	16500,0	5,8	4820,0	-	11574,0	4,2	11290,0	4,0	29,2	70,1	68,4
Liechtenstein	25,0	6,9	25,0	6,3	-	-	16,0	4,4	16,0	4,0	-	-	64,0	64,0	-
Lithuania	-	-	8966,0	5,1	9888,0	5,4	3780,0	2,2	6343,0	3,6	7238,0	3,9	-	70,7	73,2
Luxembourg	650,0	7,6	650,0	7,5	650,0	7,5	706,0	8,2	306,0	3,5	249,0	2,9	108,6	47,1	38,3
Malta	-	-	-	-	-	-	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	1490,0	-	-	-	-	-	570,0	-	-	-	-	38,3	-
Netherlands	2200,0	7,8	2227,0	7,7	2230,0	7,6	1715,0	6,1	1312,0	4,5	1552,0	5,3	78,0	58,9	69,6
Norway	20121,0	3,1	22676,0	3,5	23954,0	3,7	13414,0	2,0	11080,0	1,7	11119,0	1,7	66,7	48,9	46,4
Poland	-	-	-	-	67595,0	8,0	22021,0	2,6	32531,0	3,9	37156,0	4,4	-	-	55,0
Portugal	-	-	12900,0	6,4	-	-	11922,0	-	10590,0	5,3	13286,0	-	-	82,1	-
Republic of Moldova	-	-	1035,0	4,9	-	-	-	-	483,0	2,3	-	-	-	46,7	-
Romania	32100,0	5,7	34600,0	7,5	34600,0	-	20000,0	3,6	14300,0	3,1	15900,0	-	62,3	41,3	46,0
Russian Federation	644830,0	1,7	553539,9	1,7	552660,0	1,7	340000,0	0,9	166000,0	0,5	186000,0	0,6	52,7	30,0	33,7
Serbia	5643,0	3,6	5232,0	3,4	5232,0	3,4	3195,0	2,0	2947,0	1,9	2484,0	1,6	56,6	56,3	47,5
Slovakia	10155,0	5,7	11747,6	6,6	11979,7	6,8	5453,6	3,1	6683,3	3,8	8961,9	5,1	53,7	56,9	74,8
Slovenia	5116,0	4,5	6546,0	5,8	7277,0	6,3	-	-	2572,0	2,3	3203,0	2,8	-	39,3	44,0
Spain	-	-	28589,0	-	-	-	18517,0	1,8	17965,0	-	19093,0	-	-	62,8	-
Sweden	90174,0	4,2	90724,0	4,3	91355,0	4,3	62709,0	3,0	74089,0	3,5	78127,0	3,7	69,5	81,7	85,5
Switzerland	-	-	8980,7	7,7	-	-	-	-	7204,3	6,2	-	-	-	80,2	-
The former Yugoslav Republic of Macedonia	-	-	830,2	1,1	-	-	-	-	999,0	1,3	-	-	-	120,3	-
Turkey	32740,0	3,8	35029,0	4,1	36609,0	4,2	11241,0	1,3	13301,0	1,5	14107,0	1,6	34,3	38,0	38,5
Ukraine	24285,0	3,8	23075,0	4,0	21228,0	4,0	10574,0	1,7	8748,0	1,5	13304,0	2,5	43,5	37,9	62,7
United Kingdom	18000,0	8,4	20700,0	8,9	20700,0	8,7	8000,0	3,7	9400,0	4,0	9900,0	4,2	44,4	45,4	47,8

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A14. Quantity and value of marketed roundwood, 1990–2005

Country	Marketed roundwood											
	Volume						Value					
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
	1000 m³			m³/ha FAWS			million €			€/ha FAWS		
Albania	1180,0	214,2	232,6	43,0	43,8	33,3	-	0,8	0,8	-	173,5	110,1
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	13506,0	10426,0	12926,0	4,1	3,1	3,9	955,0	641,0	770,0	289,0	192,0	230,0
Belarus	-	-	8048,0	-	-	1,2	-	-	102,7	-	-	16,1
Belgium	3899,4	3159,3	4009,6	5,8	4,8	6,0	133,7	107,0	115,1	198,6	161,4	172,6
Bosnia and Herzegovina	-	4924,3	4376,9	-	-	-	-	-	-	-	-	-
Bulgaria	3511,0	2745,0	4681,0	1,5	1,2	1,8	-	-	107,9	-	-	30,2
Croatia	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	43,9	20,1	8,7	1,0	0,5	0,2	1,1	0,7	0,3	25,6	15,3	7,6
Czech Republic	11874,0	14837,0	14236,0	4,6	5,8	5,7	193,3	657,8	889,6	75,1	256,8	353,3
Denmark	1573,0	1456,0	909,0	4,6	3,9	2,4	71,8	139,6	44,6	208,8	376,2	115,9
Estonia	-	-	-	-	-	-	-	-	-	-	-	-
Finland	38400,0	49200,0	46300,0	1,8	2,4	2,3	1710,0	2270,0	2060,0	78,0	111,0	103,0
France	36307,0	38528,0	33761,0	2,6	2,6	2,3	1640,0	1628,0	-	118,0	111,0	-
Georgia	-	-	-	-	-	-	-	-	-	-	-	-
Germany	36143,0	58988,0	-	3,5	5,6	-	1573,0	2072,0	-	151,0	195,0	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	3306,0	3054,0	3450,0	2,2	1,9	2,0	56,9	84,7	122,5	37,2	52,2	72,7
Iceland	0,2	0,3	0,4	0,0	0,0	0,0	0,1	0,1	0,1	6,2	3,4	3,0
Ireland	-	-	-	-	-	-	-	-	-	-	-	-
Italy	8588,3	8722,8	8049,0	1,1	1,0	0,9	352,3	481,1	456,1	47,0	57,0	51,1
Latvia	-	-	-	-	-	-	-	-	-	-	-	-
Liechtenstein	21,0	21,0	21,0	5,8	5,3	5,3	-	-	-	-	-	-
Lithuania	3213,0	5378,0	6241,0	1,9	3,1	3,4	-	108,5	153,5	-	61,7	83,7
Luxembourg	706,0	306,0	249,0	-	-	-	20,4	14,8	-	-	-	-
Malta	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	1286,0	1039,0	1110,0	4,6	3,7	3,7	30,0	24,0	26,0	107,0	87,0	87,0
Norway	10070,0	8284,0	8316,0	1,5	1,3	1,3	413,0	319,2	312,6	63,0	48,9	48,1
Poland	17617,0	26025,0	29725,0	2,1	3,1	3,5	235,5	847,8	1020,4	28,5	101,5	121,3
Portugal	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	56,8	-	-	-	-	-	-	-	-	-	-
Romania	11363,6	9428,0	11783,0	2,3	2,0	-	-	-	-	-	-	-
Russian Federation	236188,0	92000,0	92752,0	0,6	0,3	0,3	-	1241,0	1423,4	-	3,7	4,3
Serbia	1894,0	1797,0	1640,0	1,2	1,2	1,1	183,6	203,1	123,4	116,5	132,0	80,4
Slovakia	4942,0	6150,0	7580,0	2,8	3,5	4,3	104,2	184,5	252,0	58,8	104,4	143,9
Slovenia	2234,0	1487,0	1874,0	2,0	1,3	1,6	120,4	56,3	65,2	106,2	49,8	56,5
Spain	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	52900,0	63300,0	98300,0	2,5	3,0	4,6	2493,9	2440,2	3063,8	117,5	115,8	144,3
Switzerland	4488,0	6801,0	3425,0	4,0	5,8	2,9	218,2	162,5	111,7	194,3	139,5	94,2
The former Yugoslav Republic of Macedonia	-	-	822,0	-	-	1,1	-	-	-	-	-	-
Turkey	16575,0	16787,0	16185,0	1,9	1,9	1,9	787,9	772,4	906,3	90,9	88,9	104,9
Ukraine	8670,0	7202,0	10475,0	1,4	1,2	2,0	-	-	-	-	-	-
United Kingdom	6370,0	7550,0	7930,0	3,0	3,3	3,3	249,4	321,6	286,6	116,3	137,8	121,4

Sources:
MCPFE/ECE/FAO quantitative indicators enquiry

currency conversion factors: for Czech Republic, Serbia, Slovakia 1990 – World Currency Yearbook; for Slovenia 1990, Serbia 2000 – IMF/World-bank; for Bosnia and Herzegovina 2000 and 2005 – EUROSTAT; for other countries – UNECE Database

Table A15a. Quantity and value of marketed non-wood forest goods, marketed plant product / raw material, 2005

Country	Christmas trees		Mushrooms and truffles		Fruits, berries and edible nuts		Cork		Resins, raw material- medicine, aromatic products, colorants, dyes		Decorative foliage, incl. ornamental plants (mosses,..)		Other plant products	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	1000 pcs	1000 €	tonnes	1000 €	tonnes	1000 €	tonnes	1000 €	tonnes	1000 €	tonnes	1000 €	tonnes	1000 €
Albania	-	-	4,7	0,9	1178,6	19,0	-	-	8957,4	72,1	505,1	2,8	-	-
Andorra	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Austria	1400,0	21000,0	-	-	-	-	0,0	0,0	-	-	-	-	-	-
Belarus	37,8	-	4420,9	4136,3	11811,0	4258,3	0,0	0,0	7332,0	2626,0	0,0	0,0	438,8	257,0
Belgium	-	-	-	-	-	-	0,0	0,0	-	-	-	-	-	-
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	43,0	51,1	7937,0	794,0	2172,0	55,2	28,0	1,0	4521,0	34,3	37,0	34,3	0,0	0,0
Croatia	-	-	400,0	319,1	-	-	-	-	40,0	33,2	-	-	1200,0	202,7
Cyprus	1,3	12,1	0,0	0,0	0,0	0,0	0,0	0,0	-	-	0,0	0,0	-	1,8
Czech Republic	-	-	3900,0	13767,8	2720,0	8227,1	0,0	0,0	0,0	0,0	-	-	-	-
Denmark	9900,0	90343,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	36500,0	48983,0	-	-
Estonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Finland	500,0	7000,0	426,0	1019,0	12027,0	11862,0	0,0	0,0	-	-	216,0	1045,0	-	-
France	-	-	-	-	-	-	5200,0	1650,0	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iceland	9,0	245,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Ireland	-	3000,0	-	-	-	-	-	-	-	-	-	3000,0	-	-
Italy	-	-	1082,4	34843,0	86166,2	102927,0	6851,0	10676,0	-	-	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	300,0	868,9	2242,0	-	1558,0	-	-	-	-	-	-	-	-	-
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	750,0	11263,0	-	-	-	-	0,0	0,0	-	-	-	-	-	-
Norway	900,0	11237,4	500,0	1872,9	350,0	524,4	0,0	0,0	-	-	517,0	1303,5	-	-
Poland	49,0	498,9	4186,0	9722,3	19138,0	23267,9	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	30,0	66,9	-	-	-	-	-	-	-	-	-	-	-	-
Romania	1104,0	-	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	1286,2	2611,0	64,5	87,0	263,0	40,1	-	-	150,1	170,2	-	-	362,1	220,7
Serbia	50,0	244,8	5498,1	107687,0	107,8	105,6	-	-	18,3	179,2	-	-	557,5	5459,0
Slovakia	370,0	1438,0	385,0	488,8	400,0	497,5	0,0	0,0	160,0	870,6	250,0	1406,9	150,0	678,8
Slovenia	80,0	2855,4	450,0	2770,4	70,0	227,7	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	70050,0	-	959,0	-	-	-	-	-
Sweden	2800,0	12065,8	-	-	-	-	-	-	-	-	-	-	-	-
Switzerland	100,0	2906,4	0,0	0,0	12,0	-	0,0	0,0	0,0	0,0	-	-	2,0	58,1
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turkey	323,8	7723,8	747,0	979,4	2877,5	1141,5	-	-	11499,2	1645,6	9879,2	4627,5	9434,0	50997,4
Ukraine	2300,0	-	75,7	-	7202,5	-	3,8	-	1657,1	-	0,0	-	4113,8	-
United Kingdom	6500,0	76045,8	50,0	548,4	5,0	23,4	0,0	0,0	29,0	8,8	45,0	5849,7	120,0	631,8

Sources:
MCPFE/ECE/FAO quantitative indicators enquiry

currency conversion factors: UNECE Database

Table A15b. Quantity and value of marketed non-wood forest goods, marketed animal product / raw material, 2005

Country	Game meat		Game harvest		Pelts, hides, skins and trophies		Wild honey and bee-wax		Raw material for medicine, colorants		Other animal products	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	tonnes	1000 €	1000 pcs	1000 €	1000 pcs	1000 €	tonnes	1000 €	tonnes	1000 €	tonnes	1000 €
Albania	22,3	185,6	-	-	-	-	-	-	-	-	-	-
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	7500,0	15000,0	281,0	-	-	-	0,0	0,0	-	-	-	-
Belarus	-	26,7	56,8	-	0,2	-	57,0	328,5	-	-	-	-
Belgium	-	-	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	1208,0	1240,4	99,0	-	2,5	640,1	0,0	0,0	0,0	0,0	0,0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-	300,0	0,0
Cyprus	0,0	0,0	0,0	0,0	0,0	0,0	717,0	3193,5	0,0	0,0	0,0	0,0
Czech Republic	-	-	-	-	-	-	0,0	0,0	-	-	0,0	0,0
Denmark	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	-	506,2	-	-	-	1,5	-	-	-	-	-	-
Finland	500,0	2500,0	-	-	-	-	-	-	-	-	2800,0	13000,0
France	-	-	-	-	-	-	6300,0	25100,0	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	180,3	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	6770,0	-	399,0	-	50,0	-	0,0	0,0	-	-	-	-
Iceland	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Ireland	-	1406,0	-	-	-	-	-	-	-	-	-	-
Italy	-	-	-	-	-	-	-	-	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	1250,0	778,2	-	-	30,0	-	-	-	50,0	-	-	-
Luxembourg	196,1	1251,1	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	376,0	1506,0	-	-	-	-	-	-	-	-	-	-
Norway	76,0	741,8	-	-	33,0	466,2	-	-	-	-	-	-
Poland	-	-	366,0	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	-	-	243,4	-	194,0	-	196,7	288,8	-	-	-	-
Serbia	909,1	5563,7	331,3	8110,2	10,6	3113,9	3665,0	11,2	-	-	1230,5	12049,1
Slovakia	1265,0	1291,0	327,0	3107,3	22,0	2445,9	-	-	-	-	-	-
Slovenia	1000,0	9007,2	-	-	20,0	13474,6	2400,0	10653,2	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	-	-	-	-	-	-	-	-	-	-	-	-
Switzerland	-	-	-	-	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-	-	-	-
Ukraine	168,0	-	-	-	400,0	-	-	-	-	-	-	-
United Kingdom	3500,0	5118,5	0,0	0,0	0,0	0,0	183,0	731,2	0,0	0,0	0,0	0,0

Sources:
MCPFE/ECE/FAO quantitative indicators enquiry

currency conversion factors: UNECE Database

Table A16. Value of marketed services on forest and other wooded land, 2005

Country	Recreational services	Environmental services	Protective services	Other services
	1000 €			
Albania	39	-	-	-
Andorra	-	-	-	-
Austria	36000	780	-	-
Belarus	415	-	-	-
Belgium	15406	-	-	-
Bosnia and Herzegovina	-	-	-	-
Bulgaria	-	-	-	-
Croatia	-	-	-	-
Cyprus	1508	0	0	1080
Czech Republic	-	-	-	-
Denmark	-	-	-	-
Estonia	-	-	-	-
Finland	8600	-	-	-
France	72829	-	-	-
Georgia	-	-	-	-
Germany	-	-	-	-
Greece	-	-	-	-
Holy See	0	0	0	0
Hungary	-	-	-	-
Iceland	2268	4447	256	267
Ireland	-	-	-	-
Italy	295000	100000	-	131250
Latvia	-	-	-	-
Liechtenstein	-	-	-	-
Lithuania	-	-	-	-
Luxembourg	0	0	0	0
Malta	-	-	-	-
Monaco	0	0	0	0
Montenegro	-	-	-	-
Netherlands	-	-	0	-
Norway	46198	-	-	-
Poland	-	-	-	-
Portugal	-	-	-	-
Republic of Moldova	-	-	-	-
Romania	-	-	-	-
Russian Federation	19381	5121	0	119254
Serbia	-	-	-	-
Slovakia	31118	8706	1632	13378
Slovenia	-	22	-	-
Spain	-	-	-	-
Sweden	-	-	-	-
Switzerland	-	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-
Turkey	-	-	-	-
Ukraine	-	-	-	-
United Kingdom	26324	-	-	-

Sources:
MCPFE/ECE/FAO quantitative indicators enquiry

currency conversion factors: UNECE Database

Table A17. Proportion of forest and other wooded land under a management plan or equivalent, 2005

Country	Forest		Other wooded land	
	Management plans	Equivalents	Management plans	Equivalents
	% of forest area		% of OWL	
Albania	57	43	0	100
Andorra	-	-	-	-
Austria	50	50	50	50
Belarus	100	0	5	0
Belgium	48	26	39	26
Bosnia and Herzegovina	-	-	-	-
Bulgaria	100	0	100	0
Croatia	-	-	-	-
Cyprus	0	62	0	24
Czech Republic	100	0	0	0
Denmark	52	17	-	-
Estonia	69	-	-	-
Finland	77	23	77	23
France	41	30	-	-
Georgia	-	-	-	-
Germany	65	25	-	-
Greece	-	-	-	-
Holy See	0	0	0	0
Hungary	98	2	0	0
Iceland	50	21	0	0
Ireland	-	-	-	-
Italy	18	78	7	54
Latvia	100	0	0	0
Liechtenstein	100	0	100	0
Lithuania	75	25	0	100
Luxembourg	-	-	-	-
Malta	100	0	0	0
Monaco	0	0	0	0
Montenegro	-	-	-	-
Netherlands	62	38	0	0
Norway	44	15	-	-
Poland	81	11	-	-
Portugal	-	-	-	-
Republic of Moldova	100	0	100	0
Romania	90	5	0	70
Russian Federation	100	0	100	0
Serbia	-	0	-	0
Slovakia	100	0	0	0
Slovenia	100	0	38	62
Spain	-	-	-	-
Sweden	69	31	-	-
Switzerland	62	29	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-
Turkey	100	0	100	0
Ukraine	100	0	100	0
United Kingdom	51	14	0	0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A18. Share of different types of regeneration, 2005

Country	Forest (even-aged and uneven-aged stands) with regeneration type							
	Natural regeneration		Natural regeneration enhanced by planting		Regeneration by planting and/or seeding		Coppice sprouting	
	Area	Share	Area	Share	Area	Share	Area	Share
	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
Albania	365,4	46,7	0,0	0,0	92,9	11,9	324,1	41,4
Andorra	-	-	-	-	-	-	-	-
Austria	472,0	-	7,0	-	26,0	-	-	-
Belarus	201,4	-	31,0	-	260,3	-	-	-
Belgium	2,8	-	-	-	4,8	-	0,0	-
Bosnia and Herzegovina	-	-	-	-	-	-	-	-
Bulgaria	11,0	7,7	0,0	0,0	79,0	55,2	53,0	37,1
Croatia	-	-	-	-	-	-	-	-
Cyprus	15,7	98,7	0,0	0,0	0,2	1,3	0,0	0,0
Czech Republic	0,0	0,0	34,0	15,8	181,8	84,2	0,0	0,0
Denmark	-	-	-	-	-	-	-	-
Estonia	57,0	73,1	8,0	10,3	13,0	16,7	0,0	0,0
Finland	1237,0	31,3	10,0	0,3	2708,0	68,5	0,0	0,0
France	-	-	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-
Holy See	0,0	-	0,0	-	0,0	-	0,0	-
Hungary	72,4	35,6	24,1	11,9	70,6	34,8	36,0	17,7
Iceland	0,0	-	0,0	-	0,0	-	0,0	-
Ireland	-	-	-	-	-	-	-	-
Italy	-	-	0,0	-	10,0	-	201,0	-
Latvia	-	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-
Lithuania	-	-	-	-	-	-	-	-
Luxembourg	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-
Monaco	0,0	-	0,0	-	0,0	-	0,0	-
Montenegro	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-
Norway	546,0	44,2	82,0	6,6	606,0	49,1	0,0	0,0
Poland	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-
Romania	-	-	0,0	-	-	-	0,0	-
Russian Federation	-	-	-	-	-	-	-	-
Serbia	216,0	37,8	190,0	33,3	165,0	28,9	0,0	0,0
Slovakia	47,9	36,6	52,4	40,1	24,0	18,4	6,4	4,9
Slovenia	54,6	-	3,2	-	6,4	-	-	-
Spain	-	-	-	-	-	-	-	-
Sweden	2433,5	47,2	4,2	0,1	2691,2	52,2	25,0	0,5
Switzerland	105,0	81,4	18,0	14,0	2,0	1,6	4,0	3,1
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-
Ukraine	26,0	20,2	53,0	41,1	46,0	35,7	4,0	3,1
United Kingdom	12,0	7,1	0,0	0,0	133,0	78,7	24,0	14,2

Notes:
The definition of areas considered regeneration is not consistent among countries; the country reports should be consulted for further details

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A19. Proportions of forest, classified by number of tree species occurring, 2005

Country	Number of tree species occurring in forest									
	1		2–3		4–5		6–10		>10	
	Area	Share	Area	Share	Area	Share	Area	Share	Area	Share
	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%	1000 ha	%
Albania	593	75,8	48	6,1	142	18,1	0	0,0	0	0,0
Andorra	-	-	-	-	-	-	-	-	-	-
Austria	1508	44,9	1641	48,9	196	5,8	12	0,4	0	0,0
Belarus	1576	18,7	4702	55,7	2020	23,9	138	1,6	0	0,0
Belgium	233	51,8	183	40,6	31	6,8	3	0,7	0	0,0
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-
Bulgaria	1499	41,1	366	10,0	1786	48,9	0	0,0	0	0,0
Croatia	-	-	-	-	-	-	-	-	-	-
Cyprus	172	98,6	3	1,4	0	0,0	0	0,0	0	0,0
Czech Republic	474	18,5	1174	45,8	654	25,5	254	9,9	10	0,4
Denmark	-	-	-	-	-	-	-	-	-	-
Estonia	492	21,7	1401	61,9	361	15,9	10	0,4	0	0,0
Finland	9298	42,0	12143	54,9	689	3,1	0	0,0	0	0,0
France	3785	24,3	8109	52,1	3077	19,8	582	3,7	1	0,0
Georgia	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-
Holy See	0	-	0	-	0	-	0	-	0	-
Hungary	693	35,6	821	42,1	362	18,6	72	3,7	0	0,0
Iceland	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-
Italy	467	4,7	2742	27,5	4678	46,9	2092	21,0	0	0,0
Latvia	471	16,8	1513	54,0	756	27,0	61	2,2	0	0,0
Liechtenstein	-	-	-	-	-	-	-	-	-	-
Lithuania	303	15,0	984	48,9	582	28,9	145	7,2	0	0,0
Luxembourg	6	6,4	24	27,5	29	33,0	28	32,0	1	1,1
Malta	-	-	-	-	-	-	-	-	-	-
Monaco	0	-	0	-	0	-	0	-	0	-
Montenegro	-	-	-	-	-	-	-	-	-	-
Netherlands	70	19,2	199	54,5	82	22,5	14	3,8	0	0,0
Norway	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-
Russian Federation	-	-	-	-	-	-	-	-	-	-
Serbia	1246	68,7	567	31,3	0	0,0	0	0,0	0	0,0
Slovakia	342	17,8	934	48,6	511	26,6	134	7,0	0	0,0
Slovenia	62	4,9	640	50,6	482	38,1	80	6,3	0	0,0
Spain	-	-	-	-	-	-	-	-	-	-
Sweden	8250	29,6	17946	64,4	1643	5,9	31	0,1	0	0,0
Switzerland	303	26,1	681	58,7	162	14,0	14	1,2	0	0,0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-	-
Ukraine	3330	34,8	3668	38,3	2191	22,9	386	4,0	0	0,0
United Kingdom	1598	56,2	1027	36,1	187	6,6	33	1,2	0	0,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A20a. Forest by classes of naturalness, 1990–2005

Country	Forest											
	Undisturbed by man			Semi-natural						Plantations		
				Total			of which: Modified natural					
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
	1000 ha											
Albania	84,8	84,8	84,8	600,7	588,1	604,7	600,7	588,1	604,7	103,3	96,4	92,9
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	62,0	64,0	64,0	3442,0	3498,0	3520,0	809,0	823,0	829,0	271,0	276,0	278,0
Belarus	134,8	134,8	134,8	5816,2	6276,9	6283,6	-	-	-	1727,7	1864,0	2017,6
Belgium	0,0	0,0	0,0	374,0	384,0	386,0	0,0	0,0	0,0	303,0	283,0	286,0
Bosnia and Herzegovina	0,0	2,0	2,0	2210,0	2041,0	2041,0	1163,0	1184,0	1184,0	0,0	142,0	142,0
Bulgaria	267,0	396,0	451,0	3020,0	2931,0	3145,0	2028,0	2046,0	2327,0	40,0	48,0	55,0
Croatia	10,0	10,0	10,0	2050,0	2060,0	2063,0	2050,0	2060,0	2063,0	56,0	60,0	61,0
Cyprus	-	-	-	-	-	-	-	-	-	3,3	3,3	5,0
Czech Republic	0,0	0,0	0,0	2630,0	2637,0	2647,0	14,0	14,0	14,0	0,0	0,0	0,0
Denmark	0,0	0,0	0,0	154,0	181,0	186,0	1,0	6,0	6,0	291,0	305,0	314,0
Estonia	-	137,0	168,0	-	2105,0	2095,0	-	1418,0	1392,0	-	1,0	1,0
Finland	624,0	914,0	852,0	21570,0	21561,0	21278,0	-	-	-	0,0	0,0	0,0
France	30,0	30,0	30,0	12666,0	13385,0	13556,0	0,0	0,0	0,0	1842,0	1936,0	1968,0
Georgia	500,0	500,0	500,0	2196,8	2210,0	2209,6	2196,8	2210,0	2209,6	54,0	60,0	60,5
Germany	-	-	-	-	10496,0	-	-	0,0	-	-	0,0	-
Greece	0,0	0,0	0,0	3181,0	3472,0	3618,0	3181,0	3472,0	3618,0	118,0	129,0	134,0
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	0,0	0,1	0,1	1607,4	1791,5	1858,6	691,5	1092,2	983,0	69,6	74,4	89,3
Iceland	0,0	0,0	0,0	14,5	14,5	14,5	14,5	14,5	14,5	7,6	21,3	28,6
Ireland	1,0	0,0	0,0	90,0	90,0	90,0	-	-	-	350,0	519,0	579,0
Italy	160,0	160,0	160,0	7457,0	8514,0	9042,0	3751,8	4338,4	4860,2	766,0	773,0	777,0
Latvia	-	15,3	14,1	-	2961,7	3020,6	-	2307,1	2381,2	-	0,1	1,6
Liechtenstein	1,5	1,5	1,5	4,8	5,1	5,1	4,8	-	-	0,2	0,3	0,3
Lithuania	20,0	21,0	26,0	1801,0	1862,0	1965,0	1493,0	1520,0	1565,0	124,0	137,0	130,0
Luxembourg	0,0	0,0	0,0	57,5	58,5	58,5	0,0	0,0	0,0	28,3	28,3	28,3
Malta	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,3	0,3	0,3
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	0,0	0,0	0,0	341,0	356,0	361,0	0,0	0,0	0,0	4,0	4,0	4,0
Norway	250,0	250,0	250,0	8658,0	8796,0	8875,0	-	-	-	222,0	255,0	262,0
Poland	30,0	51,0	69,0	8819,0	8982,0	9105,0	-	-	-	32,0	26,0	26,0
Portugal	55,0	55,0	55,0	2494,0	2494,0	2494,0	-	-	-	550,0	1034,0	1234,0
Republic of Moldova	0,0	0,0	0,0	318,0	325,0	328,0	318,0	325,0	328,0	1,0	1,0	1,0
Romania	233,2	127,7	-	5977,4	-	-	-	-	-	160,4	-	-
Russian Federation	241725,4	258130,5	255470,0	554573,3	535777,6	536357,5	-	-	-	12651,2	15360,4	16962,5
Serbia	0,0	0,0	0,0	1747,5	1660,0	1639,0	0,0	0,0	0,0	136,0	162,0	173,5
Slovakia	24,0	24,0	24,0	1874,7	1877,4	1888,6	937,6	938,7	942,6	23,0	20,0	19,0
Slovenia	-	-	119,0	-	-	1145,0	-	-	1107,0	-	-	0,0
Spain	621,0	748,0	812,0	11732,0	14332,0	15632,0	8865,0	10676,0	11582,0	1126,0	1356,0	1471,0
Sweden	4555,6	4606,6	4906,9	22236,2	22191,4	22327,3	-	-	-	516,9	617,2	636,3
Switzerland	3,0	6,0	14,0	1149,0	1189,0	1203,0	3,0	7,0	15,0	3,0	4,0	4,0
The former Yugoslav Republic of Macedonia	0,0	0,0	0,0	876,0	876,0	876,0	876,0	876,0	876,0	30,0	30,0	30,0
Turkey	739,0	897,0	975,0	7102,0	6851,0	6663,0	6640,0	6205,0	5925,0	1839,0	2304,0	2537,0
Ukraine	59,0	59,0	59,0	8890,0	9084,0	9128,0	4578,0	4696,0	4729,0	325,0	367,0	388,0
United Kingdom	0,0	0,0	0,0	734,0	859,0	921,0	646,0	646,0	646,0	1877,0	1934,0	1924,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A20b. Other wooded land by classes of naturalness, 2005

Country	Other wooded land			
	Undisturbed by man	Semi-natural		Plantations
		Total	of which: Modified natural	
	1000 ha			
Albania	0,0	257,3	257,3	0,5
Andorra	-	-	-	-
Austria	55,0	62,0	47,0	1,0
Belarus	0,0	499,3	-	0,0
Belgium	0,0	26,0	0,0	0,0
Bosnia and Herzegovina	0,0	549,0	549,0	0,0
Bulgaria	0,0	27,0	0,0	0,0
Croatia	2,0	344,0	344,0	0,0
Cyprus	-	-	-	0,0
Czech Republic	0,0	0,0	0,0	0,0
Denmark	0,0	-	-	-
Estonia	0,0	94,0	94,0	0,0
Finland	423,0	758,0	-	0,0
France	0,0	1708,0	0,0	0,0
Georgia	0,0	235,2	235,2	0,0
Germany	-	-	-	-
Greece	0,0	2780,0	2780,0	0,0
Holy See	0,0	0,0	0,0	0,0
Hungary	0,0	0,0	0,0	0,0
Iceland	0,0	106,1	106,1	0,0
Ireland	1,0	40,0	-	0,0
Italy	0,0	1047,0	1047,0	0,0
Latvia	-	-	-	-
Liechtenstein	0,3	0,2	0,2	0,0
Lithuania	0,0	77,0	77,0	0,0
Luxembourg	-	-	-	-
Malta	0,0	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-
Netherlands	0,0	0,0	0,0	0,0
Norway	261,0	2352,0	2352,0	0,0
Poland	-	-	-	-
Portugal	44,0	40,0	40,0	0,0
Republic of Moldova	0,0	31,0	31,0	0,0
Romania	-	-	-	0,0
Russian Federation	73169,1	0,0	0,0	1016,1
Serbia	0,0	171,5	0,0	0,0
Slovakia	0,0	0,0	0,0	0,0
Slovenia	-	-	-	-
Spain	0,0	10299,0	10299,0	0,0
Sweden	2962,0	96,0	-	0,0
Switzerland	0,0	67,0	0,0	0,0
The former Yugoslav Republic of Macedonia	0,0	82,0	82,0	-
Turkey	359,0	10330,0	2256,0	0,0
Ukraine	0,0	41,0	21,0	0,0
United Kingdom	0,0	20,0	10,0	0,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A21. Share of forest area dominated by introduced tree species, 2005

Country	Forest area dominated by introduced tree species		
	total		of which: invasive
	Area	Share of total forest area	Area
	1000 ha	%	1000 ha
Albania	8,4	1,1	2,5
Andorra	-	-	-
Austria	53,0	1,4	22,0
Belarus	0,6	0,0	0,0
Belgium	258,6	38,5	0,2
Bosnia and Herzegovina	-	-	-
Bulgaria	173,0	4,7	0,0
Croatia	-	-	-
Cyprus	1,4	0,8	0,0
Czech Republic	11,0	0,4	0,0
Denmark	314,0	62,8	0,0
Estonia	1,0	0,0	0,0
Finland	26,0	0,1	0,0
France	1051,0	6,8	-
Georgia	0,0	0,0	0,0
Germany	-	-	-
Greece	-	-	-
Holy See	0,0	-	0,0
Hungary	820,0	42,1	426,0
Iceland	21,7	50,3	0,0
Ireland	-	-	-
Italy	406,4	4,1	282,0
Latvia	1,4	0,0	0,0
Liechtenstein	0,0	0,0	0,0
Lithuania	4,0	0,2	0,0
Luxembourg	26,2	30,2	0,0
Malta	-	-	-
Monaco	0,0	-	0,0
Montenegro	-	-	-
Netherlands	91,0	24,9	0,0
Norway	262,0	2,8	0,0
Poland	-	-	-
Portugal	-	-	-
Republic of Moldova	-	-	-
Romania	-	-	-
Russian Federation	71,3	0,0	54,7
Serbia	1,6	0,1	0,0
Slovakia	40,9	2,1	26,1
Slovenia	16,0	1,3	11,3
Spain	-	-	-
Sweden	636,0	2,3	0,0
Switzerland	4,0	0,3	1,0
The former Yugoslav Republic of Macedonia	-	-	-
Turkey	73,7	0,7	-
Ukraine	586,0	6,1	6,0
United Kingdom	1420,0	49,9	0,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A22. Average volume of standing and lying deadwood in forest and other wooded land, 2005

Country	Volume of deadwood					
	Forest			OWL		
	total	standing	lying	total	standing	lying
	m³/ha					
Albania	-	0,48	-	-	0,06	-
Andorra	-	-	-	-	-	-
Austria	20,0	6,10	13,90	-	-	-
Belarus	0,99	0,67	0,32	1,16	0,76	0,40
Belgium	6,95	2,82	4,13	-	-	-
Bosnia and Herzegovina	-	-	-	-	-	-
Bulgaria	-	-	-	-	-	-
Croatia	-	-	-	-	-	-
Cyprus	-	0,94	-	-	-	-
Czech Republic	11,60	4,80	6,80	0,0	0,0	0,0
Denmark	-	-	-	-	-	-
Estonia	11,70	6,30	5,40	1,30	0,50	0,80
Finland	5,70	1,30	4,30	0,70	0,30	0,40
France	-	-	-	-	-	-
Georgia	-	-	-	-	-	-
Germany	-	-	-	-	-	-
Greece	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	-	7,16	-	-	0,0	-
Iceland	-	-	-	-	-	-
Ireland	-	-	-	-	-	-
Italy	12,27	3,98	8,29	8,58	-	-
Latvia	16,20	6,40	9,80	-	-	-
Liechtenstein	-	-	-	-	-	-
Lithuania	23,0	-	-	3,0	-	-
Luxembourg	11,60	4,40	7,20	-	-	-
Malta	-	-	-	0,0	0,0	0,0
Monaco	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-
Netherlands	9,24	4,34	4,90	0,0	0,0	0,0
Norway	-	-	-	-	-	-
Poland	-	-	-	-	-	-
Portugal	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-
Romania	-	-	-	-	-	-
Russian Federation	21,80	6,60	15,30	12,80	3,80	8,90
Serbia	-	-	1,20	-	-	5,30
Slovakia	-	-	-	0,0	0,0	0,0
Slovenia	-	-	-	-	-	-
Spain	-	-	-	-	-	-
Sweden	6,10	2,30	3,80	0,80	0,50	0,40
Switzerland	-	-	-	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-
Turkey	-	-	-	-	-	-
Ukraine	0,88	0,82	0,06	0,0	0,0	0,0
United Kingdom	3,90	0,80	3,10	0,0	0,0	0,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A23. Genetic resources, 1990–2005

Country	Area managed for *in situ* gene conservation			Area managed for *ex situ* gene conservation			Area managed for seed production		
	Reference year			Reference year			Reference year		
	1990	2000	2005	1990	2000	2005	1990	2000	2005
	ha	ha	ha	ha	ha	ha	ha	ha	ha
Albania	–	–	–	–	–	–	–	–	–
Andorra	–	–	–	–	–	–	–	–	–
Austria	1693,7	14364,3	14416,5	16,8	93,7	95,4	–	–	7175,0
Belarus	5248,3	5248,3	6086,3	1021,6	1823,6	1796,4	1434,4	2301,8	2101,3
Belgium	1003,9	1448,1	1700,3	65,6	88,8	119,2	1407,2	3579,0	3876,4
Bosnia and Herzegovina	3559,8	–	4942,0	11,0	–	11,8	1766,1	–	3233,7
Bulgaria	–	131744,2	145105,2	161,6	514,5	540,0	50035,7	52840,4	51267,0
Croatia	5162,0	5274,6	4977,0	75,7	80,7	80,7	22,6	27,1	74,6
Cyprus	250,0	5445,0	5445,0	–	–	3,0	19,0	19,0	19,0
Czech Republic	106001,7	106001,7	106001,7	338,9	357,9	357,9	149000,0	137361,5	111794,4
Denmark	–	–	4650,5	–	–	–	–	–	1632,5
Estonia	3551,0	3224,0	3195,0	222,0	256,2	227,6	–	–	2546,0
Finland	0,0	7030,0	6941,9	0,0	6,3	7,4	3041,1	2830,8	2824,5
France	–	9762,0	10228,0	–	28,0	32,0	75408,9	66254,1	60695,8
Georgia	–	–	–	–	–	–	–	–	–
Germany	1891,2	11093,3	12618,9	268,2	1112,7	1123,9	102,7	801,5	625,0
Greece	30797,0	30797,0	30797,0	2,7	3,6	6,7	–	–	7532,9
Holy See									
Hungary	–	–	2289,2	27,0	57,9	91,4	3773,9	4400,4	4359,0
Iceland	0,0	0,0	0,0	0,0	14,0	14,0	0,0	9,0	10,0
Ireland	–	–	–	25,4	29,7	29,7	2282,0	–	3828,6
Italy	92914,0	92914,0	92914,0	49,6	34,0	34,0	13,0	13,6	13,6
Latvia	4950,0	5565,0	4883,0	238,0	328,0	438,0	7583,0	7452,0	7067,0
Liechtenstein	–	–	1278,9	–	–	–	–	51,0	51,0
Lithuania	3081,6	3144,8	4650,7	25,0	35,9	35,5	1310,6	1450,7	1992,4
Luxembourg	0,0	0,0	0,0	0,0	0,0	6,0	106,9	–	144,2
Malta	–	–	–	–	–	–	–	–	–
Monaco	–	–	–	–	–	–	–	–	–
Montenegro	–	–	–	–	–	–	–	–	–
Netherlands	0,0	0,0	0,0	–	5,2	12,6	28,6	47,5	47,0
Norway	20,2	48,1	48,1	–	78,1	78,1	207,1	217,1	217,1
Poland	0,0	4737,0	5258,0	0,0	45,0	584,0	13331,0	16028,0	17086,0
Portugal	0,0	0,0	0,0	0,0	91,8	104,8	–	23855,0	25294,3
Republic of Moldova	–	1991,9	1991,9	–	25,7	25,7	–	31,1	31,1
Romania	–	10702,5	12150,9	114,8	129,7	135,4	59058,7	59058,7	59775,7
Russian Federation*	26621,5	25927,6	91623,0	1,0	17,9	241,0	153,7	1970,2	1201,9
Serbia	–	–	78419,2	13,0	16,5	16,5	–	2060,3	1902,0
Slovakia	–	9631,3	21540,7	232,1	381,5	373,5	51860,0	59072,9	60388,4
Slovenia	0,0	0,0	0,0	0,0	0,0	0,0	2399,0	2295,7	3567,2
Spain	0,0	0,0	320,0	0,0	10,0	52,0	0,0	33560,4	29642,4
Sweden	520,0	520,0	520,0	0,0	26,0	26,0	0,0	4054,0	4054,0
Switzerland	–	–	1464,0	–	–	–	–	2270,6	2680,6
The former Yugoslav Republic of Macedonia	–	–	–	–	–	–	–	–	–
Turkey	–	20387,3	27477,2	24,7	27,7	38,4	35916,6	45377,4	46219,3
Ukraine	29075,4	30363,7	26566,2	121,6	397,6	397,6	1445,7	1490,1	1490,1
United Kingdom	–	17882,0	17882,0	177,9	249,9	256,0	2372,1	2621,2	2245,6

* Data received only for the Komi, Arkhangelsk, Karelia and Vologda Regions

Source:
European Forest Genetic Resources Programme,
Bioversity International

Table A24. Number of threatened forest tree species, classified according to IUCN Red List categories in relation to total number of forest species, 2005

Country	vulnerable		endangered		critically endangered		extinct in the wild	
	absolute number	in % of total	absolute number	in % of total	absolute number	in % of total	absolute number	in % of total
Albania	2	0,70	26	9,30	3	1,10	1	0,40
Andorra	-	-	-	-	-	-	-	-
Austria	6	11,76	5	9,80	0	0,0	0	0,0
Belarus	0	0,0	2	6,10	1	3,90	0	0,0
Belgium	1	2,0	0	0,0	1	2,0	2	4,0
Bosnia and Herzegovina	1	1,0	0	0,0	0	0,0	0	0,0
Bulgaria	0	0,0	0	0,0	0	0,0	0	0,0
Croatia	0	0,0	0	0,0	0	0,0	-	-
Cyprus	1	0,50	0	0,0	0	0,0	0	0,0
Czech Republic	1	1,10	0	5,0	0	0,0	0	0,0
Denmark	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-
Finland	2	8,0	0	0,0	0	0,0	0	0,0
France	-	-	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-
Greece	0	-	0	-	0	-	-	-
Holy See	0	0,0	0	0,0	0	0,0	0	0,0
Hungary	43	-	25	-	11	-	3	-
Iceland	0	0,0	0	0,0	0	0,0	0	0,0
Ireland	1	4,0	0	0,0	0	0,0	-	-
Italy	0	0,0	0	0,0	2	2,0	0	0,0
Latvia	1	3,80	1	3,80	1	3,80	0	0,0
Liechtenstein	0	0,0	0	0,0	0	0,0	0	0,0
Lithuania	0	0,0	0	0,0	0	0,0	0	0,0
Luxembourg	0	0,0	0	0,0	0	0,0	0	0,0
Malta	0	0,0	0	0,0	0	0,0	0	0,0
Monaco	0	0,0	0	0,0	0	0,0	0	0,0
Montenegro	-	-	-	-	-	-	-	-
Netherlands	0	0,0	0	0,0	0	0,0	0	0,0
Norway	1	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-
Republic of Moldova	0	0,0	-	-	0	0,0	0	0,0
Romania	0	0,0	0	0,0	0	0,0	0	0,0
Russian Federation	11	6,08	6	3,31	5	2,76	0	0,0
Serbia	16	7,27	18	8,18	-	-	-	-
Slovakia	4	6,80	2	3,40	1	1,70	-	-
Slovenia	2	2,70	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-
Sweden	1	3,30	1	3,30	2	6,70	0	0,0
Switzerland	-	-	-	-	-	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-
Ukraine	8	9,41	5	5,88	0	0,0	0	0,0
United Kingdom	6	-	1	-	3	-	0	-

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A25a. Area of forest and other wooded land protected to conserve biodiversity, landscapes and specific natural elements, according to MCPFE Assessment Guidelines, 2000–2005

Country	Forest and OWL area							
	MCPFE Class 1.1		MCPFE Class 1.2		MCPFE Class 1.3		MCPFE Class 2	
	2000	2005	2000	2005	2000	2005	2000	2005
	1000 ha							
Albania	14,5	14,5	55,2	88,6	47,7	63,7	29,9	94,3
Andorra	-	-	-	-	-	-	-	-
Austria	0,0	0,0	28,0	28,0	89,0	89,0	902,0	902,0
Belarus	134,8	134,8	133,2	134,0	443,1	497,5	628,0	649,4
Belgium	0,0	0,8	3,8	4,7	4,5	6,8	27,2	27,3
Bosnia and Herzegovina	-	-	-	-	-	-	-	-
Bulgaria	45,0	33,0	99,0	115,0	1,0	2,0	100,0	128,0
Croatia	6,3	7,3	-	-	-	-	-	-
Cyprus	4,8	4,8	10,8	15,7	0,0	0,0	0,0	0,0
Czech Republic	15,0	15,0	0,0	0,0	67,0	67,0	584,0	584,0
Denmark	-	-	-	-	-	-	-	-
Estonia	97,0	133,0	45,0	44,0	44,0	120,0	128,0	173,0
Finland	971,0	930,0	823,0	852,0	277,0	270,0	593,0	509,0
France	-	12,0	-	221,0	-	104,0	-	3861,0
Georgia	140,7	-	61,3	-	6,0	-	346,5	-
Germany	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	0,0	3,4	0,0	8,1	65,3	61,2	327,0	351,3
Iceland	0,0	0,0	0,0	0,0	0,0	0,0	13,6	13,6
Ireland	-	-	-	-	-	-	-	-
Italy	-	256,0	-	1391,0	-	1522,0	-	1116,0
Latvia	-	-	-	-	-	-	-	-
Liechtenstein	1,3	1,3	0,6	0,6	0,0	0,0	0,2	0,2
Lithuania	-	-	-	-	-	-	-	-
Luxembourg	0,2	2,0	0,0	0,0	27,9	27,9	0,0	0,0
Malta	0,0	-	0,0	-	0,0	-	0,0	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-
Netherlands	3,0	3,0	24,0	28,0	23,0	23,0	33,0	33,0
Norway	0,0	0,0	217,0	252,0	0,0	0,0	282,0	282,0
Poland	-	-	-	-	-	-	-	-
Portugal	-	1,0	-	8,9	-	-	-	944,9
Republic of Moldova	44,1	44,1	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-
Russian Federation	-	-	-	-	-	-	-	-
Serbia	0,0	6,9	0,0	182,0	0,0	196,0	0,0	53,0
Slovakia	84,9	81,9	9,5	15,5	218,5	237,0	547,8	501,3
Slovenia	-	-	-	-	-	-	-	-
Spain	4,2	-	112,8	-	102,9	-	1416,8	-
Sweden	81,0	79,0	2648,0	1772,0	60,0	42,0	423,0	69,0
Switzerland	-	-	-	-	-	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-
Turkey	22,5	-	0,0	-	298,9	-	15,5	-
Ukraine	194,0	200,0	108,0	110,0	55,0	57,0	746,0	754,0
United Kingdom	7,0	7,0	3,0	3,0	135,0	135,0	646,0	646,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A25b. Area of forest protected to conserve biodiversity, landscapes and specific natural elements, according to MCPFE Assessment Guidelines, 2000–2005

Country	Forest area							
	MCPFE Class 1.1		MCPFE Class 1.2		MCPFE Class 1.3		MCPFE Class 2	
	2000	2005	2000	2005	2000	2005	2000	2005
	1000 ha							
Albania	8,4	8,4	55,2	88,6	47,7	63,7	29,9	94,3
Andorra	-	-	-	-	-	-	-	-
Austria [1)]	0,0	0,0	28,0	28,0	89,0	89,0	902,0	902,0
Belarus	134,8	134,8	133,2	134,0	443,1	497,5	628,0	649,4
Belgium	0,0	0,8	3,8	4,7	4,5	6,8	27,2	27,3
Bosnia and Herzegovina	-	-	-	-	-	-	-	-
Bulgaria	45,0	33,0	99,0	115,0	1,0	2,0	100,0	128,0
Croatia	6,0	7,0	-	-	-	-	-	-
Cyprus	-	-	-	-	0,0	0,0	0,0	0,0
Czech Republic	15,0	15,0	0,0	0,0	67,0	67,0	584,0	584,0
Denmark	6,0	6,0	5,0	5,0	81,0	81,0	0,0	0,0
Estonia	96,0	131,0	44,0	43,0	44,0	115,0	125,0	165,0
Finland	780,0	713,0	696,0	715,0	259,0	252,0	579,0	476,0
France	5,0	8,0	95,0	95,0	64,0	75,0	2942,0	3171,0
Georgia [1)]	140,7	-	61,3	-	6,0	-	346,5	-
Germany	0,0	0,0	91,0	130,5	2048,0	2634,1	4686,0	5007,0
Greece	152,0	159,0	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	0,0	3,4	0,0	8,1	65,3	61,2	327,0	351,3
Iceland	0,0	0,0	0,0	0,0	0,0	0,0	1,6	1,6
Ireland	5,7	5,7	-	-	-	-	-	-
Italy	154,0	240,0	1088,0	1295,0	946,0	1399,0	-	1019,0
Latvia	4,7	9,0	90,9	154,9	175,1	132,3	127,0	140,9
Liechtenstein	1,3	1,3	0,6	0,6	0,0	0,0	0,2	0,2
Lithuania	21,0	26,0	0,0	0,0	145,0	167,0	98,0	94,0
Luxembourg [1)]	0,2	2,0	0,0	0,0	27,9	27,9	0,0	0,0
Malta	0,0	-	0,0	-	0,0	-	0,0	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-	-	-
Netherlands	3,0	3,0	24,0	28,0	23,0	23,0	33,0	33,0
Norway	0,0	0,0	121,0	156,0	0,0	0,0	-	-
Poland	51,0	69,0	0,0	0,0	226,0	226,0	1346,0	1403,0
Portugal	-	0,9	-	8,9	-	-	-	938,4
Republic of Moldova	44,1	44,1	-	-	-	-	-	-
Romania	-	136,2	-	83,8	-	178,4	-	140,5
Russian Federation	11696,9	12097,6	4080,1	4206,1	93,4	93,3	93,1	90,8
Serbia	0,0	6,8	0,0	111,0	0,0	195,0	0,0	47,5
Slovakia	84,9	81,9	9,5	15,5	218,5	237,0	547,8	501,3
Slovenia	10,3	9,6	0,0	0,0	-	6,0	51,0	51,3
Spain	4,1	-	100,0	-	32,3	-	1205,2	-
Sweden	80,0	78,0	1868,0	1055,0	46,0	42,0	302,0	68,0
Switzerland	4,8	11,9	11,0	16,9	13,1	64,4	200,2	227,4
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-
Turkey	17,8	-	0,0	-	160,9	-	9,8	-
Ukraine	193,0	199,0	107,0	109,0	55,0	57,0	743,0	751,0
United Kingdom	7,0	7,0	3,0	3,0	135,0	135,0	646,0	646,0

[1)] Data are for total forest and OWL

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A26a. Protective forest and other wooded land, according to MCPFE Assessment Guidelines, 2000–2005

Country	Forest and OWL in MCPFE Class 3			
	For soil, water and other forest ecosystem functions		For infrastructure and managed natural resources	
	2000	2005	2000	2005
	1000 ha			
Albania	186,6	164,7	-	-
Andorra	-	-	-	-
Austria	755,0	776,0	165,0	280,0
Belarus	1244,5	1286,8	2359,3	1547,2
Belgium	154,0	181,2	0,0	0,0
Bosnia and Herzegovina	-	-	-	-
Bulgaria	433,0	451,0	232,0	146,0
Croatia	90,6	81,5	-	-
Cyprus	0,0	0,0	0,0	0,0
Czech Republic	148,0	154,0	241,0	241,0
Denmark	-	-	0,0	0,0
Estonia	270,0	252,0	0,0	0,0
Finland	775,0	775,0	0,0	0,0
France	-	-	-	-
Georgia	2214,2	2214,1	0,0	0,0
Germany	-	-	-	-
Greece	-	-	-	-
Holy See	0,0	0,0	0,0	0,0
Hungary	181,8	149,9	36,4	31,6
Iceland	3,5	5,3	0,0	0,0
Ireland	0,0	0,0	-	-
Italy	467,0	530,0	61,2	-
Latvia	-	-	0,0	0,0
Liechtenstein	-	-	2,4	2,4
Lithuania	-	-	-	-
Luxembourg	1,2	1,2	0,0	0,0
Malta	0,0	-	-	-
Monaco	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-
Netherlands	0,0	0,0	0,0	0,0
Norway	4281,0	4281,0	0,0	0,0
Poland	-	-	-	-
Portugal	95,0	220,3	-	0,7
Republic of Moldova	53,0	53,0	-	-
Romania	-	-	-	-
Russian Federation	-	-	-	-
Serbia	179,0	179,0	1,5	1,5
Slovakia	302,8	334,3	14,1	10,1
Slovenia	-	-	-	-
Spain	4049,0	3641,0	0,0	0,0
Sweden	3200,0	3200,0	0,0	0,0
Switzerland	-	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-
Turkey	3395,9	3109,3	-	-
Ukraine	1395,0	1770,0	2413,0	2163,0
United Kingdom	5,0	5,0	0,0	0,0

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A26b. Protective forest, according to MCPFE Assessment Guidelines, 2000–2005

Country	Forest area in MCPFE Class 3			
	For soil, water and other forest ecosystem functions		For infrastructure and managed natural resources	
	2000	2005	2000	2005
	1000 ha			
Albania	149,2	128,0	-	-
Andorra	-	-	-	-
Austria [1]	663,0	682,0	165,0	280,0
Belarus	1244,5	1286,8	2359,3	1547,2
Belgium	148,9	172,4	0,0	0,0
Bosnia and Herzegovina	-	-	-	-
Bulgaria	328,0	424,0	232,0	146,0
Croatia	52,0	49,0	-	-
Cyprus	0,0	0,0	0,0	0,0
Czech Republic	148,0	154,0	241,0	241,0
Denmark	34,0	34,0	0,0	0,0
Estonia	267,0	239,0	0,0	0,0
Finland	680,0	680,0	0,0	0,0
France	425,0	441,0	-	-
Georgia [2]	2214,2	2214,1	0,0	0,0
Germany	2981,0	3775,0	-	-
Greece	-	-	-	-
Holy See	0,0	0,0	0,0	0,0
Hungary	181,8	149,9	36,4	31,6
Iceland	3,5	5,3	0,0	0,0
Ireland	0,0	0,0	-	-
Italy	437,0	499,0	61,2	-
Latvia	113,9	129,5	0,0	0,0
Liechtenstein	-	-	2,4	2,4
Lithuania	293,0	319,0	13,0	22,0
Luxembourg	1,2	1,2	0,0	0,0
Malta	0,0	-	-	-
Monaco	0,0	0,0	0,0	0,0
Montenegro	52,0	-	-	-
Netherlands	0,0	0,0	0,0	0,0
Norway	2590,0	2593,0	0,0	0,0
Poland	1757,0	1938,0	1666,0	1326,0
Portugal	53,0	216,5	-	0,7
Republic of Moldova	22,0	22,0	-	-
Romania	-	1601,0	-	225,0
Russian Federation	70385,8	70555,7	99572,5	99397,8
Serbia	162,0	162,0	1,0	1,0
Slovakia	302,8	334,3	14,1	10,1
Slovenia	74,1	94,7	13,5	13,5
Spain	2518,0	2350,0	0,0	0,0
Sweden	3200,0	3200,0	0,0	0,0
Switzerland	1199,0	1220,0	700,0	700,0
The former Yugoslav Republic of Macedonia	-	-	-	-
Turkey	1194,1	1119,2	-	-
Ukraine	1389,0	1762,0	2403,0	2154,0
United Kingdom	5,0	5,0	0,0	0,0

[1] Data for infrastructure and managed natural resources are for total forest and OWL
[2] Data for soil, water and other ecosystem functions are for total forest and OWL

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A27. Ownership and number of holdings of forest and other wooded land, 2005

Country	Public			Private			Other		
	Area (1000 ha)	% of FOWL area	number of holdings	Area (1000 ha)	% of FOWL area	number of holdings	Area (1000 ha)	% of FOWL area	number of holdings
Albania	1022,7	98,3	185	17,5	1,7	170	0,0	0,0	0
Andorra	-	-	-	-	-	-	-	-	-
Austria	-	-	-	-	-	-	-	-	-
Belarus	8935,3	100,0	116	0,0	0,0	0	0,0	0,0	0
Belgium	308,0	44,1	877	390,0	55,9	-	0,0	0,0	0
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-
Bulgaria [2)]	3106,0	84,4	316	27,5	0,7	28	0,0	0,0	0
Croatia	2017,0	81,3	-	464,0	18,7	-	0,0	0,0	0
Cyprus	158,2	40,7	4	230,1	59,3	-	0,0	0,0	0
Czech Republic	2002,0	75,6	1824	645,0	24,4	224623	0,0	0,0	0
Denmark [1)]	139,6	22,0	335	360,6	56,7	27133	0,0	0,0	0
Estonia	908,0	38,5	-	1034,0	43,9	-	416,0	17,6	-
Finland	7549,0	32,4	-	15762,0	67,6	443700	0,0	0,0	-
France	4206,0	24,4	16974	13056,0	75,6	-	0,0	0,0	0
Georgia	3005,3	100,0	-	0,0	0,0	0	-	-	-
Germany	-	-	8695	-	-	19036	-	-	-
Greece	-	-	-	-	-	-	-	-	-
Holy See	0,0	-	0	0,0	-	0	0,0	-	0
Hungary	1156,7	59,4	1445	789,1	40,5	28117	2,2	0,1	105
Iceland	-	-	259	-	-	539	-	-	0
Ireland	-	-	-	-	-	-	-	-	-
Italy	3859,1	35,0	-	7166,9	65,0	-	0,0	0,0	0
Latvia [1)]	1637,9	52,0	6897	1395,2	44,3	173233	1,6	0,1	-
Liechtenstein [1)]	6,4	86,5	-	0,5	6,8	-	0,0	0,0	0
Lithuania [1)]	1404,0	63,9	47	717,0	32,6	213324	0,0	0,0	0
Luxembourg	39,5	44,8	243	48,7	55,2	13080	0,0	0,0	0
Malta	0,3	100,0	21	0,0	0,0	0	0,0	0,0	0
Monaco	0,0	-	0	0,0	-	0	0,0	-	0
Montenegro	-	-	-	-	-	-	-	-	-
Netherlands	184,0	50,4	2298	181,0	49,6	29578	0,0	0,0	0
Norway	2859,0	23,8	-	9141,0	76,2	-	0,0	0,0	0
Poland	7609,0	-	2272	1591,0	-	838608	0,0	-	0
Portugal	-	-	-	-	-	-	-	-	-
Republic of Moldova	360,0	100,0	1690	0,0	0,0	0	0,0	0,0	0
Romania	-	-	-	-	-	-	-	-	-
Russian Federation	882975,2	100,0	1788	0,0	0,0	0	0,0	0,0	0
Serbia	982,0	49,5	9	1002,0	50,5	500000	0,0	0,0	0
Slovakia	995,6	51,5	296	823,2	42,6	14475	112,8	5,8	0
Slovenia	320,0	24,5	-	988,0	75,5	320000	0,0	0,0	0
Spain	-	-	-	-	-	-	-	-	-
Sweden	9480,0	30,7	462	21450,0	69,4	253970	0,0	0,0	0
Switzerland	881,0	68,5	3040	405,0	31,5	246415	0,0	0,0	0
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-
Ukraine	9609,0	99,9	912	7,0	0,1	1480	0,0	0,0	0
United Kingdom [1)]	983,0	34,3	646	1862,0	65,0	106700	0,0	0,0	0

[1)] Data on ownership does not include OWL. The percentages of Public, Private and Other will not sum up to the total FOWL area.
[2)] Data sources do not cover all areas of forest and OWL. The percentages of Public, Private and Other will not sum up to the total FOWL area.

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A28a. Forest sector gross value-added, 2005

Country	Gross value-added			
	Forestry and logging (ISIC/NACE 02)	Wood industries (ISIC/NACE 20)	Pulp and paper industry (ISIC/NACE 21)	Total forest sector (ISIC/NACE 02, 20, 21)
	EUR million			
Albania	3*	5*	11*	18
Andorra	-	-	-	-
Austria	1010	2110	1649	4769
Belarus	132	283	69	484
Belgium	145*	850	1125*	2120
Bosnia and Herzegovina	60*	50*	12*	122
Bulgaria	38	68	52	159
Croatia	70*	145*	120*	335
Cyprus	2*	80	26*	109
Czech Republic	581	858	478*	1918
Denmark	288*	713	549*	1549
Estonia	116	239	27	382
Finland	2421	1350	3542	7313
France	3841	3744	4706*	12291
Georgia	8*	3	1	12
Germany	1802	8020*	10153*	19975
Greece	90*	420*	359	868
Holy See	-	-	-	-
Hungary	169*	180	263*	613
Iceland	1	22	8	30
Ireland	59	411	324*	795
Italy	323*	5921	4614	10858
Latvia	159	301	16	476
Liechtenstein	1*	-	-	1
Lithuania	128	352	47	526
Luxembourg	8	42	29*	80
Malta	0	2	4	6
Monaco	-	-	-	-
Montenegro	10*	4*	-	13
Netherlands	51	1020	1590	2661
Norway	722	952	537	2211
Poland	666	1550	968	3184
Portugal	666	833*	675*	2174
Republic of Moldova	1*	4*	4*	10
Romania	305*	1368*	88	1762
Russian Federation	695*	1621	1503*	3819
Serbia	45	29	54	128
Slovakia	218	396	197*	811
Slovenia	69	199	158*	426
Spain	952*	2783	3302	7037
Sweden	1910	2279*	3582*	7771
Switzerland	193	1972	1062	3227
The former Yugoslav Republic of Macedonia	8	2*	2*	12
Turkey	1165	446	706	2317
Ukraine	275	260*	225*	760
United Kingdom	193	4433	4811	9436

* Estimates based on latest available year

Sources:
EUROSTAT, UNIDO, UN Statistics Division and National Statistical Organisations, as of May 2007

Table A28b. Contribution of the forest sector (ISIC/NACE 02, 20, 21) to GDP, 1990–2005

Country	Contribution to GDP			
	1990	1995	2000	2005
	% of gross value added			
Albania	3,4	0,5	0,4	0,3
Andorra	-	-	-	-
Austria	2,6	2,4	2,5	2,2
Belarus	3,1	2,5	2,7	2,3
Belgium	1,1	0,9	0,9	0,8
Bosnia and Herzegovina	3,3	1,7	3,0	2,0
Bulgaria	1,0	1,5	0,7	0,9
Croatia	2,2	1,6	1,4	1,3
Cyprus	1,1	1,0	0,8	0,9
Czech Republic	1,8	2,2	2,0	2,1
Denmark	1,0	1,0	0,9	0,9
Estonia	1,8	3,0	4,5	4,2
Finland	7,2	8,5	8,1	5,4
France	1,1	1,2	0,9	0,8
Georgia	0,3	0,2	0,2	0,2
Germany	1,7	2,0	1,0	1,0
Greece	0,7	0,8	0,7	0,5
Holy See	-	-	-	-
Hungary	1,0	1,3	1,1	0,8
Iceland	0,6	0,6	0,4	0,3
Ireland	0,9	1,0	0,7	0,5
Italy	1,1	1,1	1,0	0,9
Latvia	1,5	3,3	4,5	4,3
Liechtenstein	0,0	0,1	0,0	0,0
Lithuania	1,6	2,4	2,2	2,9
Luxembourg	0,5	0,3	0,4	0,3
Malta	0,4	0,3	0,3	0,1
Monaco	-	-	-	-
Montenegro	0,7	1,5	1,7	0,9
Netherlands	0,8	0,7	0,7	0,6
Norway	1,8	1,8	1,1	1,0
Poland	1,5	1,9	1,6	1,6
Portugal	2,6	2,3	2,3	1,7
Republic of Moldova	0,5	1,0	0,4	0,5
Romania	1,8	1,7	2,9	3,5
Russian Federation	1,5	1,1	0,9	0,7
Serbia	1,4	2,0	1,4	0,8
Slovakia	1,9	3,0	2,4	2,4
Slovenia	2,3	1,9	2,2	1,8
Spain	1,1	1,2	1,1	0,9
Sweden	4,0	4,8	3,8	3,1
Switzerland	1,7	1,4	1,2	1,1
The former Yugoslav Republic of Macedonia	1,5	0,9	1,0	0,3
Turkey	1,2	1,5	0,9	0,8
Ukraine	0,5	0,6	1,3	1,3
United Kingdom	1,2	1,0	0,7	0,6

Sources:
EUROSTAT, UNIDO, UN Statistics Division and National Statistical Organisations, as of May 2007

Table A29. Employment in forest sector, 2005

Country	Employment in forest sector			
	Forestry and logging (ISIC/NACE 02)	Wood industries (ISIC/NACE 20)	Pulp and paper industry (ISIC/NACE 21)	Total forest sector (ISIC/NACE 02, 20, 21)
	1000 persons (in full-time equivalents)			
Albania	2*	1*	2*	5
Andorra	-	-	-	-
Austria	7	34	18	59
Belarus	33	122		155
Belgium	2	14	16	32
Bosnia and Herzegovina	3	5*	2	10*
Bulgaria	15	20	12	47
Croatia	10	15	5	30
Cyprus	1	3	1	5
Czech Republic	20	75	20	115
Denmark	4	15	7	25
Estonia	6	19	2	27
Finland	20	30	33	83
France	30	93	92	214
Georgia	6	2*	0*	9
Germany	40	165	140	344
Greece	5*	34	7	45
Holy See	-	-	-	-
Hungary	12*	37	19	67
Iceland	0	1	0	1
Ireland	2*	9	4	15
Italy	41	176	79	297
Latvia	35	31	2	67
Liechtenstein	0	1*	0*	1
Lithuania	8	24	2	34
Luxembourg	0*	1	0	1
Malta	-	0	0	0
Monaco	-	-	-	-
Montenegro	1	2	1	4
Netherlands	1*	16	22	40
Norway	5*	14	8	27
Poland	53	146	42	242
Portugal	12*	60	12	84
Republic of Moldova	3*	2	2	7
Romania	60	85	16	161
Russian Federation	248	358	145*	751
Serbia	6	13	9	28
Slovakia	14	37	8	58
Slovenia	4	12	6	22
Spain	25	117	55	197
Sweden	20	37	37	94
Switzerland	5	35	12	52
The former Yugoslav Republic of Macedonia	5	3	2	9
Turkey	337*	100	15	452
Ukraine	124*	37	24	185
United Kingdom	16	81	93	190

* Estimates based on latest available year

Sources:
EUROSTAT, ILO, UNIDO, UN Statistics Division and National Statistical Organisations, as of May 2007

Table A30. Occupational safety and health, 1990–2005

Country	Fatal occupational accidents						Non-fatal occupational accidents			Occupational diseases		
	Reporting year						Reporting year			Repporting year		
	1990		2000		2005		1990	2000	2005	1990	2000	2005
	Absolute number	per 100 workers/ yr.	Absolute number	per 100 workers/ yr.	Absolute number	per 100 workers/ yr.	Absolute number of occupational accidents			Frequency of cases per number of persons exposed multiplied by number of years of exposure		
Albania	-	-	-	-	-	-	-	-	-	-	-	-
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	30	0,4918	11	0,2245	23	0,5111	3683	1141	1126	-	-	-
Belarus	5	0,014	5	0,013	4	0,01	90	47	34	-	-	-
Belgium	-	-	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	-	-	5	0,04	2	0,02	-	75	9	-	-	-
Croatia	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	7	0,0156	13	0,4029	4	0,01832	-	1398	829	-	-	-
Denmark	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	-	-	3	0,036	0	0	-	64	25	-	-	-
Finland[1]	10	0,026	3	0,013	2	0,009	3058	1170	868	34,4	10,4	..
France	10	-	20	-	-	-	6947	5510	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	-	-	-	-	-	-	-	-	-	-	-	-
Iceland	0	0	0	0	0	0	-	-	-	0	0	0
Ireland	-	-	-	-	-	-	-	-	-	-	-	-
Italy	23	0,01	25	0,01	20	0,01	23732	26329	19605	0,01	0,01	0,01
Latvia	-	-	5	-	1	-	-	38	52	-	7[2]	17[2]
Liechtenstein	-	-	0	-	0	-	-	10	12	-	-	-
Lithuania	-	-	-	-	-	-	-	-	-	-	-	-
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	-	-	-	-	-	-	-	-	-	-	-	-
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-
Norway	4	-	1	-	0	0	116	55	22	-	-	-
Poland	14	1,05	4	0,68	11	2,43	1343	453	354	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	93	0,03	46	0,02	52	0,02	2773	708	523	-	-	-
Serbia	-	-	-	-	-	-	-	-	-	-	-	-
Slovak Republic	-	-	-	-	11[4]	-	-	560[5]	268[5]	-	46[6]	66[6]
Slovenia	2	0,033	0	0	2	0,082	439	230	185	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-	-
Sweden [3]	9	-	7	-	10	-	1197	185	171	-	-	-
Switzerland	30	0,33	17	0,23	10	0,17	-	2195	1758	-	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	-	-	-	-
Ukraine	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	10	0,1	7	0,1	0	0,0	242	205	99	-	-	-

[1] data for 2005 is from 2004, non-fatal occupational accidents are with at least 3 days absence from work
[2] in case of occupational diseases only number of cases is available
[3] only for NACE 2
[4] number of fatal occupational accidents reiterated by state organizations among contractors and self-producers
[5] number of injuries in state forest organizations
[6] number of newly detected occupational diseases in state forest organizations

Source:
MCPFE/ECE enquiry

Table A31. Share of wood energy in total energy consumption, classified by origin of wood, 2000–2005

Country	Total energy from wood		Share of national energy consumption		Directly from forests		Wood processing residues		Black liquors		Post consumer wood energy	
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
	TJ/year		% of total		TJ/year							
Albania	10802	8374	14	10	10802	8374	0	0	0	0	0	0
Andorra	-	-	-	-	-	-	-	-	-	-	-	-
Austria	112430	139045	9	10	55693	61295	29685	47784	24121	26740	2931	3226
Belarus	-	-	-	6	-	36839	-	3655	-	-	-	-
Belgium	28780	25053	1	1	4571	6213	-	11404	-	1694	-	5741
Bosnia and Herzegovina	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	-	-	-	-	-	-	-	-	-	-	-	-
Croatia	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	73	52	-	-	0	0	-	-
Czech Republic	-	-	-	1	-	-	-	-	-	-	-	-
Denmark	-	-	3	3	17383	22199	6895	6455	0	0	-	-
Estonia	-	-	8	8	12121	11969	8531	12458	-	-	-	-
Finland	273700	271000	21	20	45300	46900	84900	92400	143500	131700	0	0
France	406854	392868	4	-	-	-	-	-	-	-	-	-
Georgia	-	-	-	-	-	-	-	-	-	-	-	-
Germany	242494	-	2	-	121490	-	26244	-	15975	-	78785	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-
Holy See	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	29800	35500	3	3	14925	25088	14365	10130	403	229	107	53
Iceland	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	-	-	-	-	-	-	-	-	-	-	-	-
Italy	95749	118108	1	1	49300	44800	41507	65528	330	500	4612	7281
Latvia	38049	44106	30	35	21959	19756	16090	24350	0	0	0	0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	-	-	8	8	12310	13820	13874	16409	-	-	-	-
Luxembourg	-	213	-	0	-	209	-	4	0	0	0	0
Malta	-	-	-	-	-	-	-	-	-	-	-	-
Monaco	0	0	0	0	0	0	0	0	0	0	0	0
Montenegro	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	12000	19100	0	1	-	2300	-	16000	0	0	-	800
Norway	23515	28300	6	6	8200	9900	-	-	-	-	-	-
Poland	-	-	4	4	123502	126922	10726	15928	12847	16920	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-	-	-	-	-	-	-
Romania	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	-	-	-	1	-	351000	-	-	-	-	-	-
Serbia	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	19940	22970	3	3	4180	5920	8040	8910	6150	6440	1570	1700
Slovenia	-	-	7	-	12100	-	-	-	1450	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	-	-	14	15	37080	46080	128016	149342	132480	141840	-	-
Switzerland	20025	22630	3	3	9009	-	7435	-	-	-	1093	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-	-	-	-	-	-	-
Turkey	228714	186596	6	5	-	-	-	-	-	-	-	-
Ukraine	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	17600	11700	0	0	2000	2900	700	1200	-	-	-	-

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A32. Share of forest area and other wooded land where access to public is legally allowed or accepted, 2005

Country	Area with a legal right of access		Access available to the public for recreational purposes		Access with recreational purposes as one main management goal	
	1000 ha	% of total FOWL	1000 ha	% of total FOWL	1000 ha	% of total FOWL
Albania	1025,7	98,6	1025,7	98,6	0,0	0,0
Andorra	-	-	-	-	-	-
Austria	3740,0	94,0	3740,0	94,0	44,0	1,1
Belarus	8800,5	98,5	8800,5	98,5	1743,8	19,5
Belgium	-	-	678,0	97,6	-	-
Bosnia and Herzegovina	2734,0	100,0	2734,0	100,0	-	-
Bulgaria	3470,0	94,3	3470,0	94,3	509,0	13,8
Croatia	2481,0	100,0	2481,0	100,0	-	-
Cyprus	158,1	40,7	158,1	40,7	15,7	4,1
Czech Republic	2647,0	100,0	2647,0	100,0	21,4	3,6
Denmark	-	-	-	-	-	-
Estonia	2225,0	94,4	2225,0	94,4	-	-
Finland	23200,0	99,5	23200,0	99,5	752,0	3,2
France	-	-	-	-	-	-
Georgia	-	-	-	-	-	-
Germany	-	-	-	-	-	-
Greece	-	-	-	-	-	-
Holy See	0,0	0,0	0,0	0,0	0,0	0,0
Hungary	1944,7	99,8	1944,7	99,8	47,5	2,4
Iceland	149,2	100,0	149,2	100,0	31,7	21,0
Ireland	710,0	100,0	710,0	100,0	-	-
Italy	9106,0	68,9	9106,0	68,9	165,0	1,5
Latvia	-	-	-	-	-	-
Liechtenstein	7,4	100,0	7,4	100,0	0,6	8,0
Lithuania	-	-	-	-	-	-
Luxembourg	0,0	0,0	87,6	99,3	-	-
Malta	0,3	100,0	0,3	100,0	-	-
Monaco	0,0	0,0	0,0	0,0	0,0	0,0
Montenegro	-	-	-	-	-	-
Netherlands	292,0	80,0	301,0	82,0	-	-
Norway	12000,0	100,0	12000,0	100,0	-	-
Poland	-	-	-	-	-	-
Portugal	3864,0	99,9	3864,0	99,9	-	-
Republic of Moldova	-	-	-	-	-	-
Romania	-	-	-	-	-	-
Russian Federation	867081,6	98,2	867081,6	98,2	16021,9	1,8
Serbia	1984,0	100,0	1984,0	100,0	5,0	0,3
Slovakia	1818,5	94,1	1818,5	94,1	38,6	2,0
Slovenia	-	-	-	-	-	-
Spain	-	-	-	-	10,1	0,0
Sweden	30929,0	100,0	30929,0	100,0	-	-
Switzerland	1286,0	100,0	1286,0	100,0	-	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-
Turkey	-	-	-	-	-	-
Ukraine	9338,0	97,1	9338,0	97,1	1366,0	14,2
United Kingdom	1600,0	56,0	2083,0	73,0	105,0	3,7

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Table A33. Number of sites within forest and other wooded land designated as having cultural or spiritual values, 2005

Country	Sites					
	Archaeological	Designated nature monuments			Designated historical sites	Other sites with recognized cultural & spiritual values
		Forested landscape	Trees	Other forest related		
	(number of sites)					
Albania	1	455	348	0	0	0
Andorra	-	-	-	-	-	-
Austria	-	-	-	-	-	-
Belarus	0	96	46	2	0	0
Belgium	-	-	519	-	-	-
Bosnia and Herzegovina	-	-	-	-	-	-
Bulgaria	-	19	2	-	0	-
Croatia	-	-	-	-	-	-
Cyprus	34	-	41	45	-	-
Czech Republic	-	-	-	-	-	-
Denmark	14008	-	-	-	-	-
Estonia	-	-	-	-	-	-
Finland	-	155	-	-	-	-
France	-	60	2000	200	160	300
Georgia	-	-	-	-	-	-
Germany	-	-	-	-	-	-
Greece	-	-	-	-	-	-
Holy See	0	0	0	0	0	0
Hungary	5000	371	-	-	200	-
Iceland	27	6	0	0	1	0
Ireland	-	-	-	-	-	-
Italy	43	695	1255	-	-	-
Latvia	2116	9	3513	69	114	-
Liechtenstein	-	-	-	-	-	-
Lithuania	504	48	145	69	-	-
Luxembourg	-	-	-	-	-	-
Malta	-	-	-	-	-	-
Monaco	0	0	0	0	0	0
Montenegro	-	-	-	-	-	-
Netherlands	2846	0	0	0	-	-
Norway	-	-	-	-	-	-
Poland	-	188	33026	6421	-	186
Portugal	-	-	-	-	-	-
Republic of Moldova	-	-	-	-	-	-
Romania	-	-	-	-	-	-
Russian Federation	-	-	-	107	107	38
Serbia	2	0	130	84	40	24
Slovakia	-	22	485	4	340	41
Slovenia	-	-	-	243	-	-
Spain	-	-	-	-	-	-
Sweden	1000000	1433	820000	22	14	-
Switzerland	-	-	-	-	99	-
The former Yugoslav Republic of Macedonia	-	-	-	-	-	-
Turkey	-	7	93	1	-	-
Ukraine	-	-	-	-	-	-
United Kingdom	4567	-	-	-	-	-

Source:
MCPFE/ECE/FAO quantitative indicators enquiry

Annex 10. Terms and Definitions applied in the National Data Enquiry for the MCPFE Report 2007

Introduction

This document contains terms and definitions for terms used in the national data reporting tables for quantitative MCPFE indicators collected through this enquiry. Utmost importance was given to ensure the continuity of definitions to be applied exactly as in previous assessments in order to enable consistency of data over time wherever possible. Definitions are only provided for those terms that are specified in the reporting tables. Sources of the respective definition are given for each term.

The reference documents for the terms and definitions listed here are:

1	MCPFE "Relevant Definitions Used for the Improved Pan-European Indicators for Sustainable Forest Management" 2003 (MCPFE 2003)
2	FAO "Global Forest Resources Assessment Update 2005 – Terms and Definitions (Final version)"; Forest Resources Assessment Programme Working Paper 83/E Rome 2004. (FAO 2004)

The FAO Global Forest Resources Assessment Update 2005 terms and definitions have been adopted for those key definitions where important changes were adopted or accepted by the international community. Most of these changes, that were done and applied in the National Data Enquiry for the MCPFE 2007 Report, were incremental and intended to clarify terms used on the basis of experiences made in the forest resource assessments in 2000. In several cases, explanatory notes were added to the definition to facilitate interpretation, e.g. in the FAO FRA 2005 update definitions document. Furthermore, definitions on carbon stock related terms have been further clarified by the Intergovernmental Panel on Climate Change (IPCC).

The following terms were taken from FAO FRA 2005 terms and definitions document:

- forest
- other wooded land
- carbon stock
- carbon stock in below-ground biomass (adapted to woody biomass)
- deadwood
- growing stock
- modified natural forest/other wooded land
- semi-natural forest (explanatory notes)

List of definitions

Table of terms and definitions

Abiotic

1. Not biotic. Nonliving, e.g.: ***abiotic damage*** = damage caused by non-living agents (snow, storms, etc.) (MCPFE 2003, from EFI 2001).

Age class

Any interval into which the age range of trees, forests, stands, or forest types is divided for classification, e.g. 1, 5, 10 or 20 year age classes, as used in inventory or management (MCPFE 2003, from IUFRO, 2000).

Biotic

1. Of or relating to life; especially: caused or produced by living beings.
2. Living. Living organisms make up the biotic parts of ecosystems, e.g.: biotic damage = damage caused by living organisms (fungi, insects etc.) (MCPFE 2003, from EFI, 2001).

Black liquors

Black liquors comprises lignin etc. from chemical pulping used for energy.

Note: this T&D was formulated in the process of the elaboration of the MCPFE-2007 Enquiry on the basis of existing definitions in different processes.

Carbon stock

The quantity of carbon in a "pool", meaning a reservoir or system which has the capacity to accumulate or release carbon. (FAO 2004, from IPCC. 2003. *Good Practice Guidance for LULUCF* – Glossary)

Critically endangered

A taxon is critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria A to E of IUCN (1998) on page l and li (MCPFE 2003, from IUCN, 1998).

Damage to forest

Disturbance to the forest which may be caused by biotic or abiotic agents, resulting in death, or a significant loss of vitality, productivity or value of trees and other components of the forest ecosystem (MCPFE 2003, from TBFRA 2000).

primarily damaged by insects and disease

Forest and other wooded land where insect attack or disease has been identified as the primary cause of damage (MCPFE 2003, TBFRA 2000).

primarily damaged by wildlife and grazing

Forest and other wooded land where damage has been caused by wildlife or grazing by domestic animals. Includes: Grazing or browsing of young plants, preventing or delaying the establishment or regeneration of the stand (MCPFE 2003, TBFRA 2000).

primarily damaged by storm, wind, snow or other identifiable abiotic factors

Forest and other wooded land on which the trees have been felled or damaged by storm, wind, snow or other abiotic factors such as avalanches, landslides or flooding (MCPFE 2003, TBFRA 2000).

primarily damaged by fire

Forest and other wooded land, the vegetation on which, including the trees, has been wholly or largely destroyed by fire (MCPFE 2003, TBFRA 2000).

primarily damaged by forest operations

Forest and other wooded land where damage has been caused by forest management operations, including damages incurred by road construction (permanent roads, landings) and harvesting damage, incl. through skidding tracks, hauling and transport. (adjusted from the above).

Note: this T&D was formulated in the process of the elaboration of the MCPFE-2007 Enquiry on the basis of existing definitions in different processes.

Deadwood

All non-living woody biomass not contained in the litter, either standing, lying on the ground,or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country (FAO 2004).

It is up to the countries to define the threshold level for the minimum size of diameter to be reported. Thresholds used should be documented and reported.

Recommended thresholds:

- Minimum length of standing and lying dead trees: 2 m or less
- Minimum diameter of standing and lying dead trees: Standing deadwood: 10 cm d.b.h., Lying deadwood: 10 cm mean diameter

Diameter class

Any of the intervals into which the range of stem diameters of trees or logs is divided for classification and use. Also the trees or logs falling into such an interval (MCPFE 2003, from IUFRO, 2000).

Endangered

A taxon is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria A to E of IUCN (1998) (MCPFE 2003, from IUCN, 1998).

Energy from wood directly from forests

Comprises wood used for energy taken directly from forest, other wooded land or from trees outside forest, such as orchards, hedges etc. whether or not marketed or recorded in official statistics (the volumes concerned may be estimated on the basis of household energy use surveys). This category thus includes self-consumption. If figures for marketed wood for energy directly from forests are available, please report these under "country comments".

Note: this T&D was formulated in the process of the elaboration of the MCPFE-2007 Enquiry on the basis of existing definitions in different processes.

Extinct in the wild

A taxon is extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxons's life cycle and life form (MCPFE 2003, from IUCN, 1998).

Fellings (annual)

Average annual standing volume of all trees, living or dead, measured overbark to a minimum diameter of 0 cm (d.b.h.) that are felled during the given reference year, including the volume of trees or parts of trees that are not removed from the forest, other wooded land or other felling site. Includes: silvicultural and pre-commercial thinnings and cleanings left in the forest; and natural losses that are recovered (harvested) (MCPFE 2003, from TBFRA 2000).

Forest

Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.

Explanatory notes:

1. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters *in situ*. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10 percent and a tree height of 5 m are included, as are temporarily unstocked areas, resulting from human intervention or natural causes, which are expected to regenerate.

2. Includes areas with bamboo and palms provided that height and canopy cover criteria are met.

3. Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific scientific, historical, cultural or spiritual interest.

4. Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m.

5. Includes plantations primarily used for forestry or protection purposes, such as rubberwood plantations and cork oak stands.

6. Excludes tree stands in agricultural production systems, for example in fruit plantations and agroforestry systems. The term also excludes trees in urban parks and gardens.

(FAO 2004)

Forest available for wood supply

Forest where any legal, economic, or specific environmental restrictions do not have a significant impact on the supply of wood. Includes: areas where, although there are no such restrictions, harvesting is not taking place, for example areas included in long-term utilisation plans or intentions (MCPFE 2003, from TBFRA 2000).

Forest holding

One or more parcels of forest and other wooded land which constitute a single unit from the point of view of management or utilisation. For State-owned forest and other wooded land a holding may be defined as the area forming a major management unit administered by a senior official, .e.g. a Regional Forestry Officer. For forest and other wooded land that is owned publicly, other than by the State, or owned by large-scale forest owners, e.g. forest industries, a holding may constitute a number of separated properties which are, however, managed according to one corporate strategy. Under any category of ownership, other than State-owned, one holding may be the property of one or several owners (TBFRA 2000).

Forest services (marketed)

Marketed forest services comprise recreational, environmental and protective services that are forest-dependent or mainly forest-related, but are not necessarily to marketed by forest owners.

marketed recreational services

Marketed recreational services include e.g. hunting or fishing licences, renting of huts and houses as well as forest-related leisure, sport and outdoor adventure activities and educational services that are not free of cost to consumers (the public, schools,..). Forest-related means that forests constitute an essential element of the service marketed. Recreational services not exchanged via market transaction are not to be reported. (see also MCPFE indicator 6.10)

marketed environmental services

Marketed environmental services include those related to MCPFE indicator 4.6 (*in situ* or *ex situ* gene conservation of genetic resources) as well as MCPFE indicator 4.9 (protected forest area) e.g. nature protection on a voluntary contractual basis with compensation or other payments from private or public bodies (this includes NATURA 2000). This class also includes carbon-sequestration related afforestation projects in the context of the Kyoto Protocol.

marketed protective services

Marketed protective services include those related to MCPFE indicators 5.2 (soil, water and other environmental functions as well as infrastructure and managed natural resources) on a voluntary contractual basis with compensation or other payments from private or public bodies. This can include contractual arrangements for the protection against soil erosion by air or water, avalanches, mud and rock slides, flooding, air pollution, noise, etc.

other marketed services

Other marketed services include include payments to woodland owners for licences for gravel extraction, telecommunication masts, wind farms and electricity distribution.

Note: this T&D was formulated in the process of the elaboration of the MCPFE-2007 Enquiry on the basis of existing definitions in different processes.

Forest species

A forest species is a species that is dependent on a forest for part or all of its day to day living requirements, or for its reproductive requirements. Therefore, an animal species may be considered a forest species even if it does not live most of its life in a forest. (MCPFE 2003, from AD HOC Technical Expert Group on Forest Biological Diversity, convened by the Secretarial of the CBD to prepare a report for SBSTTA-7, 2001).

Forest type

Forest types are classified as follows, based on EUNIS Top Level and TBFRA 2000:

- predominantly broadleaved woodland
- predominantly coniferous woodland
- mixed broadleaved and coniferous woodland

(MCPFE 2003)

Note: "other wooded land" is excluded from this definition for the MCPFE 2007 reporting.

Growing stock

The living tree component of the standing volume (MCPFE 2003, from TBFRA 2000). Volume over bark of all living trees more than X cm in diameter at breast height. Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm. Explanatory notes

1. The countries must indicate the three thresholds (X, Y, W in cm) and the parts of the tree that are not included in the volume. The countries must also indicate whether the reported figures refer to volume above ground or above stump.

2. The diameter is measured at 30 cm above the end of the buttresses if these are higher than 1 meter.

3. Includes windfallen living trees.

4. Excludes: Smaller branches, twigs, foliage, flowers, seeds, and roots.

(FAO 2004)

Introduced tree species

(synonyms: non-indigenous species, exotic species, alien species)

Tree species occurring outside their natural vegetation zone, area or region. Includes: Hybrids (MCPFE 2003, from TBFRA 2000).

invasive introduced tree species

Invasive introduced tree refers to an alien tree species whose introduction and spread threaten ecosystems, habitats or species with socio-cultural, economic and/or environmental harm, and/or harm to human health (MCPFE 2003, definition of invasive alien species from UNEP/CBD/COP/6/18/Add.1/Rev.1; 2002. The word "tree" was added).

Alien or alien species refers to a species, subspecies or lower taxon, introduced outside its normal past or present normal distribution; includes any part, gametes, seeds, eggs, or propagates of such species that might survive and subsequently reproduce (UNEP/CBD/COP/6/18/Add.1/Rev.1; 2002).

Legal right of access

Where the public are legally entitled to visit forest and other wooded land, whether publicly owned or owned by third parties. Some activities by the visiting public may however be forbidden or restricted (TBFRA 2000).

Management plan or equivalent

A written scheme of forest management, aiming at defined management goals, which is periodically revised. These include:

forest management plans

Information (in the form of text, maps, tables and graphs) collected during (periodic) forest inventories at operational forest units level (stands, compartments), and operations planned for individual stands or compartments to reach the management goals.

equivalents

Information collected on forest area, at forest management or aggregated forest management unit level (forest blocks, farms, enterprises, watersheds, municipalities, or wider units), and strategies/management activities planned to reach the management or development goals.

(MCPFE 2003)

MCPFE Class

as defined by the MCPFE Assessment Guidelines for Protected and Protective Forest and Other Wooded Land in Europe

MCPFE Class 1.1: Main Management Objective Biodiversity "No Active Intervention"

- The main management objective is biodiversity
- No active, direct human intervention is taking place
- Activities other than limited public access and non-destructive research not detrimental to the management objective are prevented in the protected area

MCPFE Class 1.2: Main Management Objective Biodiversity "Minimum Intervention"

- The main management objective is biodiversity
- Human intervention is limited to a minimum
- Activities other than listed below are prevented in the protected area:
  - Ungulate/game control
  - Control of diseases/insect outbreaks[47/]
  - Public access
  - Fire intervention
  - Non-destructive research not detrimental to the management objective
  - Subsistence resource use[48/]

[47/] In case of expected large diseases/insect outbreaks control measures using biological methods are allowed provided that no other adequate control possibilities in buffer zones are feasible.

[48/] Subsistence resource use to cover the needs of indigenous people and local communities, in so far as it will not adversely affect the objectives of management.

MCPFE Class 1.3: Main Management Objective Biodiversity "Conservation Through Active Management"

- The main management objective is biodiversity
- A management with active interventions directed to achieve the specific conservation goal of the protected area is taking place
- Any resource extraction, harvesting, silvicultural measures detrimental to the management objective as well as other activities negatively affecting the conservation goal are prevented in the protected area

MCPFE Class 2: Main Management Objective "Protection of Landscapes and Specific Natural Elements"

- Interventions are clearly directed to achieve the management goals landscape diversity, cultural, aesthetic, spiritual and historical values, recreation, specific natural elements
- The use of forest resources is restricted
- A clear long-term commitment and an explicit designation as specific protection regime defining a limited area is existing
- Activities negatively affecting characteristics of landscapes or/and specific natural elements mentioned are prevented in the protected area

MCPFE Class 3: Main Management Objective "Protective Functions"

- The management is clearly directed to protect soil and its properties or water quality and quantity or other forest ecosystem functions, or to protect infrastructure and managed natural resources against natural hazards
- Forests and other wooded lands are explicitly designated to fulfil protective functions in management plans or other legally authorised equivalents
- Any operation negatively affecting soil or water or the ability to protect other ecosystem functions, or the ability to protect infrastructure and managed natural resources against natural hazards is prevented

(MCPFE 2003)

Naturalness

Naturalness is specified in the following classes:

undisturbed by man (forest/other wooded land)

Forest/other wooded land which shows natural forest dynamics, such as natural tree composition, occurrence of dead wood, natural age structure and natural regeneration processes, the area of which is large enough to maintain its natural characteristics and where there has been no known significant human intervention or where the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established (MCPFE 2003, from TBFRA 2000).

semi-natural forest/other wooded land

Forest/other wooded land which is neither "forest/other wooded land undisturbed by man" nor "plantation" as defined separately (MCPFE 2003, from TBFRA 2000).

modified natural forest/other wooded land

Forest/other wooded land which is classified as "semi-natural forest/other wooded land" which shows characteristics of the class "forests/other wooded land undisturbed by man" such as close to

natural forest dynamics as described in class "forests/other wooded land undisturbed by man" but where there are clear indications of human activities. This includes land with naturally regenerating native species and natural regeneration of native or non-native species enhanced by planting of native species. Native species refers to a species, subspecies or lower taxon, occurring in its normal past or present distribution; See also criteria for classifying "Regeneration" (based on FRA 2005),

plantation

Forest stands established by planting or/and seeding in the process of afforestation or reforestation. They are either:

- of introduced species (all planted stands), or
- intensively managed stands of indigenous species which meet all the following criteria: one or two species at plantation, even age class, regular spacing.

Excludes: Stands which were established as plantations but which have been without intensive management for a significant period of time. These should be considered semi natural (TBFRA 2000).

Net annual increment

Average annual volume over the given reference period of gross increment less that of natural losses on all trees to a minimum diameter of 0 cm (d.b.h.) (TBFRA 2000).

Other wooded land

Land not classified as forest, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5–10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use. (FAO 2004)

Post-consumer wood energy

Post-consumer wood energy comprises wood derived from used palettes and boxes, demolition wood etc.

Note: this T&D was formulated in the process of the elaboration of the MCPFE-2007 Enquiry on the basis of existing definitions in different processes.

Private ownership

Forest/other wooded land owned by individuals, families, co-operatives and corporations which may be engaged in agriculture or other occupations as well as forestry; private forest enterprises and industries; private corporations and other institutions (religious and educational institutions, pension and investment funds, nature conservation societies, etc) (MCPFE 2003, from TBFRA 2000).

Public ownership

Forest/other wooded land belonging to the State or other public bodies (MCPFE 2003, from TBFRA 2000).

Predominantly coniferous

Forest/other wooded land on which more than 75 percent of the tree crown cover consists of coniferous species (TBFRA 2000).

Predominantly broadleaved

Forest/other wooded land on which more than 75 percent of the tree crown cover consists of broadleaved species (TBFRA 2000).

Protective forest – see MCPFE Class

Recreation

Any physical or psychological revitalisation through the voluntary pursuit of leisure time. Forest recreation includes the use and enjoyment of a forest or wildland setting, including heritage landmarks, developed facilities, and other biophysical features (BC Forest Service, 1997).

Recreational forest

A forest managed primarily to provide recreational opportunities (IUFRO 2000).

Reference year

The years for which figures should be reported, generally 1990, 2000 and 2005. If these differ from the years during which the data was collected, then adjustment will be necessary (interpolation or extrapolation).

Note: this T&D was formulated in the process of the elaboration of the MCPFE-2007 Enquiry on the basis of existing definitions in different processes.

Regeneration

Re-establishment of a forest stand by natural or artificial means following the removal of the previous stand by felling or as a result of natural causes, e.g. fire or storm (TBFRA 2000).

natural regeneration

Re-establishment of a forest stand by natural means, i.e. by natural seeding or vegetative regeneration. It may be assisted by human intervention, e.g. by scarification or fencing to protect against wildlife damage or domestic animal grazing (TBFRA 2000).

natural regeneration enhanced by planting

Natural regeneration which has been combined with artificial planting or seeding, either to ensure satisfactory restocking with the naturally regenerated species or to increase species diversity (TBFRA 2000).

regeneration by planting and seeding

The act of establishing a forest stand (e.g. plantation) or re-establishing a forest stand by artificial means, either by planting of seedlings or by scattering seed. The material used may be of indigenous or introduced origin. Planting and seeding may take place on forest, other wooded land or other land (TBFRA 2000).

coppice sprouting

The re-growth from coppice stools after the previous stand has been cut (TBFRA 2000).

Roundwood

All roundwood felled or otherwise harvested and removed. It comprises all wood obtained from removals, i.e. the quantities removed from forests and from trees outside the forest, including wood recovered from natural, felling and logging losses during the period, calendar year or forest year. It includes all wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form (e.g. branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed. It is an aggregate comprising wood fuel (including wood for charcoal) and industrial roundwood (wood in the rough). It is reported in cubic

metres solid volume underbark (i.e. excluding bark) (Joint UNECE/FAO/Eurostat/ITTO Forest Sector Questionnaire, 2001).

marketed roundwood

"Marketed" roundwood comprises all round wood sold on markets. It excludes round wood harvested for self-consumption (subsistence) and other forms of uses without market transaction.

Stand

A community of trees possessing sufficient uniformity in composition, age, arrangement or condition to be distinguishable from the forest or other growth on adjoining areas, thus forming a temporary silvicultural or management entity (IUFRO, 2000).

even-aged stand

A stand or forest type, in which no or relatively small age differences exist among individual trees within it, usually less than 20% of rotation length (IUFRO, 2000).

uneven-aged stand

Consisting of trees of a range of age classes, with age differences which are significant in relation to the stand structure management and rotation length (IUFRO, 2000).

Standing volume

Volume of standing trees, living or dead, above-stump measured overbark to top (0 cm). Includes all trees with diameter over 0 cm (d.b.h.) Includes: Tops of stems, large branches; dead trees lying on the ground which can still be used for fibre or fuel. Excludes: Small branches, twigs and foliage (MCPFE 2003, from TBFRA 2000).

Sustainable forest management

Sustainable management means the stewardship and use of forests and forest lands in such a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems (MCPFE, 1993).

Tree

A woody perennial with a single main stem or, in the case of coppice, with several stems, having a more or less definite crown. Includes: Bamboos, palms and other woody plants meeting the above criterion (TBFRA 2000).

Vulnerable

A taxon is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-near future, as defined by any of the criteria A to E of IUCN (1998) on page lii (MCPFE 2003, from IUCN, 1998).

Wood

All roundwood felled or otherwise harvested and removed. It comprises all wood obtained from removals, i.e. the quantities removed from forests and from trees outside the forest, including wood recovered from natural, felling and logging losses during the period, calendar year or forest year. It includes all wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form (e.g. branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed. It is an aggregate comprising wood fuel (including

wood for charcoal) and industrial roundwood (wood in the rough). It is reported in cubic metres solid volume underbark (i.e. excluding bark) (MCPFE 2003, from Joint FAO/ECE/Eurostat/ITTO Questionnaire).

Woody biomass

Organic woody material both above-ground and below-ground, and both living and dead, measured to a minimum diameter of 0 mm (d.b.h.). Includes stem, stump, branches, bark, seeds and foliage, roots, shrubs and bushes. Excludes: litter (definition of "biomass" in FAO 2004, which is based on IPCC Good Practice Guidelines LULUCF Glossary 2003; term "woody" added, minimum diameter threshold as in TBFRA 2000).

above-ground (living) woody biomass

all living woody biomass above the soil, including stem, stump, branches, bark, seeds and foliage. (FAO 2004, based on IPCC Good Practice Guidelines LULUCF Glossary 2003; term "woody" added).

below-ground (living) woody biomass

all living woody biomass of live roots and the below-ground part of the stump. (FAO 2004, based on IPCC Good Practice Guidelines LULUCF Glossary 2003; term "woody" added).

dead woody biomass

All non-living woody biomass not contained in the litter, see also "deadwood"

wood (processing) residues

comprise residues used for energy including wood and bark from sawmills, wood based panel mills, pulp and paper mills, furniture and secondary processing plants.

Note: this T&D was formulated in the process of the elaboration of the MCPFE-2007 Enquiry on the basis of existing definitions in different processes.

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